

ENVIRONMENTAL PRODUCT DECLARATION

PARTICLEBOARD



Timber Products manufactures both fir and pine particleboard substrates. Particleboard can be produced in all grades to fit your needs, including underlayment, door core, commercial, industrial, and specialty. Timber Products maintains certifications with Forest Stewardship Council (FSC) and SCS Global Services (for recycled content and no added formaldehyde).



Founded in 1918, Timber Products produces a diversified range of wood products. Best known for its hardwood plywood, the company is committed to environmental sustainability and offers a fully integrated approach to manufacturing with 9 manufacturing facilities, an import division, and a nationwide logistics and transportation division. In addition to hardwood plywood, Timber Products also specializes in wood panels with decorative overlays. From veneer to ultralight MDF to particleboard, Timber Products offers a variety of products including custom manufactured products.

By calculating the potential environmental impacts of their products, Timber Products hopes to better understand areas of high environmental impacts, within and outside their direct production process, and participate in voluntary reporting of product environmental performance.

For further details on our company and values, please visit:

<http://timberproducts.com/about-us/>



ENVIRONMENTAL PRODUCT DECLARATION



Timber Products Particleboard

According to ISO 14025,
EN 15804, and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Rd, Northbrook, IL 60062	www.ul.com www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v 2.7 2022	
MANUFACTURER NAME AND ADDRESS	Timber Products 305 S. Fourth Street Springfield, Oregon 97477	
DECLARATION NUMBER	4790500569.103.1	
DECLARED PRODUCT & DECLARED UNIT	1 cubic meter of particleboard	
REFERENCE PCR AND VERSION NUMBER	UL Part A Life Cycle Assessment Calculation Rules and Report Requirements v3.2 2018 UL Part B: Structural and Architectural Wood Products EPD Requirements, v1.1 (2020)	
DESCRIPTION OF PRODUCT APPLICATION/USE	The applications of particleboard include schools, hospitals, hospitality, airports, cabinetry, laminating substrate, furniture, casework, and fixtures.	
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A	
MARKETS OF APPLICABILITY	North America	
DATE OF ISSUE	May 1, 2023	
PERIOD OF VALIDITY	5 Years	
EPD TYPE	Product Specific	
RANGE OF DATASET VARIABILITY	N/A	
EPD SCOPE	Cradle-to-Gate	
YEAR(S) OF REPORTED PRIMARY DATA	2020	
LCA SOFTWARE & VERSION NUMBER	GaBi 10.6.1.25	
LCI DATABASE(S) & VERSION NUMBER	GaBi Database Service Pack 2021.2	
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1, CML 2001-2016, and IPCC AR5	

The PCR review was conducted by:

UL Environment

PCR Review Panel

epd@ul.com

This declaration was independently verified in accordance with ISO 14025: 2006.
 INTERNAL EXTERNAL

Cooper McCollum, UL Environment

This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:

Lindsay Bonney
WAP Sustainability Consulting, LLC

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

James Mellentine, Thrive ESG

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences in results for upstream or downstream of the life cycle stages declared.



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1. Product Definition and Information

1.1. Description of Company

Timber Products was founded in 1918, with a vision to deliver the best customer experience in the wood products and logistics industry. Today, Timber Products is one of the largest material suppliers to the nation's kitchen/bath cabinet, furniture, store fixture/display and architectural millwork industries. We source from 114,800 acres of forestland in Northern California, managed under the strict standards of the Sustainable Forestry Initiative® and Forest Stewardship Council® programs to ensure all of our products are responsibly created with the environment in mind.

1.2. Product Description

The results presented in this EPD are for particleboard manufactured at Timber Products' facilities in Medford, Oregon and Sutter Creek, California. Timber Products manufactures both fir and pine particleboard substrates, which is available in all grades suit many needs, including underlayment, door core, commercial, industrial, and specialty. Timber Products' portfolio includes FSC certified particleboard panels.

Soon after the development of this report, the Sutter Creek facility stopped operating due to a destructive fire. The results in this study include the Sutter Creek operations and are still considered representative of the reported products. Timber Products will seek to update the results of this LCA when a shift in production is made due to this plant closure.



This study covers particleboard products from the following CSI divisions:

- 06 16 26: Underlayment
- 06 40 23: Interior Architectural Woodwork
- 06 41 00: Architectural Wood Casework

Timber Products' particleboard is ideal for many applications including for schools, hospitals, hospitality, airports, cabinetry, laminating substrate, furniture, casework, and fixtures.

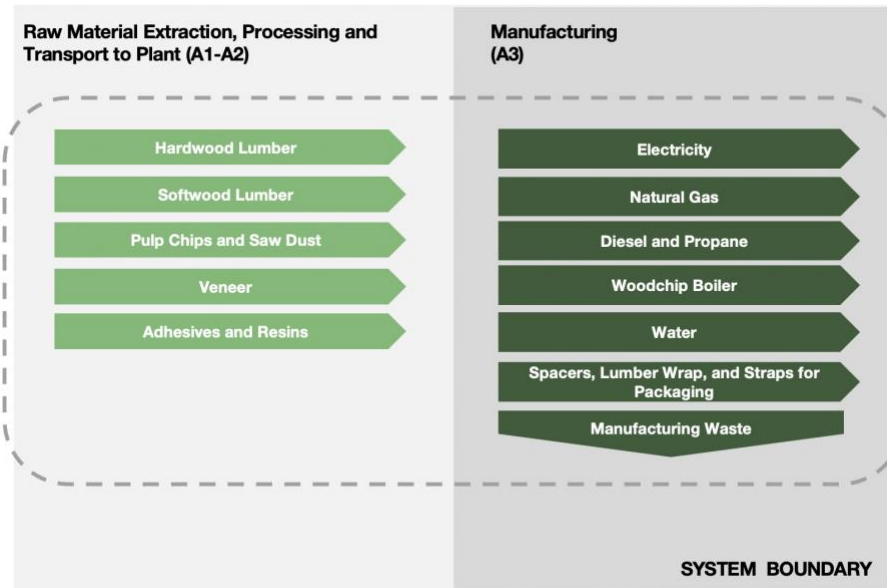




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Flow Diagram



1.3. Application

Timber Products' particleboard is ideal for many applications including for schools, hospitals, hospitality, airports, cabinetry, laminating substrate, furniture, casework, and fixtures.

1.4. Declaration of Methodological Framework

This EPD is considered a Cradle-to-Gate study. The LCA for this study follows an attributional approach. A summary of the life cycle stages included in this EPD is presented in Table 5.

1.5. Technical Requirements

Table 1 shows the available dimensions of the product reviewed. Timber Products maintains certifications with Forest Stewardship Council (FSC), California Air Resources Board (CARB), Capital Testing Ultra-low Admitting Formaldehyde, and SCS Global Services (for recycled content and no added formaldehyde).

Table 1: Technical Details

PARAMETER	VALUE	UNIT
Widths	1.21 or 1.52	m
Lengths	Up to 7.31	m
Density	564	kg/m ³

1.6. Material Composition

Products included in the study consist primarily of plywood, pulp chips, and softwood veneer.





Timber Products Particleboard

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Table 2: Material Composition

COMPONENT	COMPOSITION (%)
Adhesive	0-5%
Hardwood Plywood	30-40%
Pulp Chips	5-15%
Resin	0-5%
Saw Dust	5-15%
Softwood Plywood	30-40%
Softwood Veneer	5-15%
Wax	0-5%

1.7. Manufacturing

The products under review are manufactured at Timber Products’ Medford, Oregon and Sutter Creek, California facilities. Select particleboard is manufactured in Medford, which uses wood, as well as recycled and recovered fiber. Particleboard is also produced from western pine at the facility in Sutter Creek.

Raw materials utilized in SpectraBoard are sourced from a variety of suppliers in the United States.

1.8. Packaging

After manufacturing, the particleboard is packaged for transport. The amount of packaging is detailed in Table 3.

Table 3: Packaging Inputs, per m³ of Product

INPUT	VALUES	UNIT
Lumber Wrap	0.57	kg
Metal Strap	0.81	kg
Plastic Strap	0.21	kg
Spacers	0.80	kg

1.9. Transportation

Materials for particleboard are sourced from a variety of suppliers in the US and are transported via of truck. Supplier locations, product composition, and the frequency at which Timber Products sources from each supplier were considered when calculating the average transportation distance.





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2. Life Cycle Assessment Background Information

2.1. Declared Unit

The declared unit is 1 m³ of particleboard. Table 4 shows additional details related to the declared unit.

Table 4: Declared Unit

NAME	VALUE	UNIT
Declared Unit	1 m ³ of particleboard	
Mass	564	kg
Moisture Content	6 - 8	%

2.2. System Boundary

This EPD is considered a Cradle-to-Gate study. A summary of the life cycle modules included in this EPD is presented in Table 5.

Table 5: System Boundary

MODULE NAME	DESCRIPTION	ANALYSIS PERIOD	SUMMARY OF INCLUDED ELEMENTS
A1	Product Stage: Raw Material Supply	2020	Raw material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2020	Transportation from supplier to manufacturing site. Fuel use requirements estimated based on product weights and measured and calculated distance.
A3	Product Stage: Manufacturing	2020	Energy and material inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	MND	Module Not Declared
A5	Construction Process Stage: Installation	MND	Module Not Declared
B1	Use Stage: Use	MND	Module Not Declared
B2	Use Stage: Maintenance	MND	Module Not Declared
B3	Use Stage: Repair	MND	Module Not Declared
B4	Use Stage: Replacement	MND	Module Not Declared
B5	Use Stage: Refurbishment	MND	Module Not Declared
B6	Operational Energy Use	MND	Module Not Declared
B7	Operational Water Use	MND	Module Not Declared
C1	EOL: Deconstruction	MND	Module Not Declared
C2	EOL: Transport	MND	Module Not Declared
C3	EOL: Waste Processing	MND	Module Not Declared
C4	EOL: Disposal	2020	Treatment of biogenic carbon
D	Benefits beyond system	MND	Module Not Declared





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2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. Some assumptions made in the study that may have affected the results are:

- The composition utilized is a weighted average based on production at the two manufacturing facilities under study.
- Particleboard is partially made of Timber Products' hardwood plywood. Hardwood plywood manufactured in Timber Products' Medford facility were assumed to be used in the production of particleboard.
- The mode of transport and supplier location of resin is unknown. It was assumed the resin is transported 2,048 miles via truck within the US.
- The manufacturing inputs utilized are weighted averages based on production at Sutter Creek and Medford. It was assumed the moisture content of the thermal wood was 30%.
- The use and selection of secondary datasets from GaBi – The selection of which generic dataset to use to represent an aspect of a supply chain is a significant value choice. Collaboration between the LCA practitioner, Timber Products associates and GaBi data experts was valuable in determining best-case scenarios in the selection of data. However, no generic data can be a perfect fit. Improved supply chain specific data would improve the accuracy of results, however budgetary and time constraints have to be taken into account.

2.4. Cut-off Criteria

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the declared unit. No known flows are deliberately excluded from this EPD.

2.5. Data Sources

Primary data were collected by Timber Products associates for onsite energy, water and waste during the course of manufacturing. Whenever available, supplier data were used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production were used from GaBi Software version 10.6.1.25 and database Service Pack 2021.2. All calculation procedures adhere to ISO14044.

2.6. Data Quality

The geographical scope of the manufacturing portion of the life cycle is the United States. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered good. Primary data were provided by the manufacturer and represent all information for calendar year 2020. Primary data provided by the manufacturer is specific to the technology that the company uses in manufacturing their product (within the data quality restraints outlined in Section 2.3). Data is not necessarily site-specific and is considered fair. Data used to allocate energy, water, and waste on a per unit of product produced includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process only energy and water use from the total energy use. Sub-metering would improve the technological coverage of data quality.

2.7. Period under Review

The period under review is calendar year 2020.





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2.8. Treatment of Biogenic Carbon

The product system represented in this EPD includes the information modules A1, A2 and A3. According to ISO 21930 7.2.7, if a bio-based material containing biogenic carbon leaves the studied product system at the system boundary between product systems in information modules C1 to C4 (or any other information module), this export of bio-based material and associated flow of biogenic carbon is reported as an export of biogenic carbon expressed in CO₂ in the LCI and characterized with +1 kg CO₂e/kg CO₂ of biogenic carbon in the calculation of the GWP in the respective information module C1 to C4 (or any other information module). The following results apply this methodology to the biogenic carbon present in the primary product as it leaves the manufacturer in module A3.

- 1 m³ particleboard = 564 kg product
- 564 x 50% Carbon content = 280 kg carbon
- 280 kg carbon x 44/12 = 1,026 kg CO₂ eq.

2.9. Allocation

General principles of allocation were based on ISO 14040/44.

To derive a per-unit value for the manufacturing inputs/outputs, mass allocation based on total production at Timber Products facilities was adopted. The total consumption during 2020 was divided by the total production mass during 2020 to derive a weighted-average use-per-production unit value, which was then applied to particleboard production. This allocation methodology was used for the following inputs and manufacturing outputs:

- Electrical Energy
- Thermal Energy
- Water Consumption
- Waste Generation

Discussions with Timber Products staff divulged this was a representative way to allocate the manufacturing inputs/outputs due to the fact that all products created at the facilities are similar in nature and because sub-metering was not available to extract data specific to any product. As a default, secondary GaBi datasets use a physical mass basis for allocation.





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3. Life Cycle Assessment Results

Table 6: Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use	Building Operational Water Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type Cradle-to-Gate	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental Impacts were calculated using the GaBi software platform. Impact results have been calculated using both TRACI 2.1 and CML 2001-Jan 2016 characterization factors. Results presented in this report are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

Table 7: LCIA Indicators

ABBREVIATION	PARAMETER	UNIT
CML 2001 - Jan 2016		
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
AP	Acidification potential of soil and water	kg SO2 eq
EP	Eutrophication potential	kg Phosphate eq
POCP	Photochemical ozone creation potential	kg Ethene eq
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb eq
ADPF	Abiotic depletion potential for fossil resources	MJ, net calorific value
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO2 eq
EP	Eutrophication potential	kg N eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
Resources	Depletion of non-renewable fossil fuels	MJ, surplus energy
SFP	Smog formation potential	kg O3 eq
IPCC AR5		
GWP	Global warming potential (100 years, includes biogenic CO ₂)	kg CO ₂ eq
GWP	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq





Table 8: Biogenic Carbon Indicators

ABBREVIATION	PARAMETER	UNIT
BCRP	Biogenic Carbon Removal from Product	[kg CO ₂]
BCEP	Biogenic Carbon Emission from Product	[kg CO ₂]
BCRK	Biogenic Carbon Removal from Packaging	[kg CO ₂]
BCEK	Biogenic Carbon Emission from Packaging	[kg CO ₂]
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO ₂]
CCE	Calcination Carbon Emissions	[kg CO ₂]
CCR	Carbonation Carbon Removals	[kg CO ₂]
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	[kg CO ₂]

Table 9: Resource Use, Waste, and Output Flow Indicators

ABBREVIATION	PARAMETER	UNIT
Resource Use Parameters		
RPR _E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value (LHV)
RPR _M	Use of renewable primary energy resources used as raw materials	MJ, net calorific value
RPR _T	Total use of renewable primary energy resources	MJ, net calorific value
NRPR _E	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _M	Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _T	Total use of non-renewable primary energy resources	MJ, net calorific value
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Net use of fresh water	m ³
Waste Parameters and Output Flows		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EEE	Exported electrical energy	MJ
EET	Exported thermal energy	MJ





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3.1. Life Cycle Impact Assessment Results

All results are given per declared unit, which is 1 m³ of particleboard.

Table 10: IPCC AR5 Impact Assessment Results

IPCC AR5	A1-A3	A1	A2	A3
GWP, incl biogenic carbon [kg CO ₂ eq]	7.98E+02	-4.10E+02	4.21E+01	1.17E+03*
GWP, excl biogenic carbon [kg CO ₂ eq]	7.98E+02	6.39E+02	4.23E+01	1.17E+02

*A3 results for GWP, incl biogenic carbon include downstream emissions that occur in information module C4.

Table 11: North American Impact Assessment Results

TRACI v2.1	A1-A3	A1	A2	A3
AP [kg SO ₂ eq]	4.17E+00	3.84E+00	1.87E-01	1.49E-01
EP [kg N eq]	2.61E-01	2.28E-01	1.80E-02	1.45E-02
ODP [kg CFC-11 eq]	1.57E-07	1.57E-07	8.27E-15	3.98E-13
Resources [MJ]	1.50E+03	1.18E+03	7.76E+01	2.39E+02
SFP [kg O ₃ eq]	7.00E+01	6.24E+01	4.33E+00	3.31E+00

Table 12: EU Impact Assessment Results

CML 2001 – JAN 2016	A1-A3	A1	A2	A3
ODP [kg CFC-11 eq]	1.48E-07	1.48E-07	8.27E-15	3.98E-13
AP [kg SO ₂ eq]	3.69E+00	3.44E+00	1.36E-01	1.15E-01
EP [kg PO ₄ ⁻³ eq]	4.42E-01	3.82E-01	3.66E-02	2.30E-02
POCP [kg ethene eq]	2.92E-01	3.34E-01	-4.93E-02	7.01E-03
ADP _{element} [kg Sb-eq]	1.71E-04	1.17E-04	1.27E-05	4.13E-05
ADP _{fossil} [MJ, LHV]	9.71E+03	8.34E+03	4.90E+02	8.85E+02

3.2. Life Cycle Inventory Results

All results are given per declared unit, which is 1 m³ of particleboard.

Table 13: Resource Use

PARAMETER	A1-A3	A1	A2	A3
RPR _E [MJ, LHV]	7.68E+03	7.11E+03	2.42E+01	5.46E+02
RPR _M [MJ, LHV]	1.07E+04	1.07E+04	0.00E+00	0.00E+00
RPR _T [MJ, LHV]	1.83E+04	1.78E+04	2.42E+01	5.46E+02
NRPR _E [MJ, LHV]	1.24E+04	9.95E+03	5.86E+02	1.90E+03
NRPR _M [MJ, LHV]	4.93E+02	4.93E+02	0.00E+00	0.00E+00
NRPR _T [MJ, LHV]	1.29E+04	1.04E+04	5.86E+02	1.90E+03
SM [kg]	1.04E+02	1.04E+02	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m ³]	3.85E+00	2.24E+00	1.03E-01	1.50E+00





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Table 14: Output Flows and Waste Categories

PARAMETER	A1-A3	A1	A2	A3
HWD [kg]	9.01E-03	9.01E-03	4.90E-08	1.84E-07
NHWD [kg]	6.95E+00	5.58E+00	5.39E-02	1.31E+00
HLRW [kg]	3.30E-04	3.05E-04	1.97E-06	2.31E-05
ILLRW [kg]	2.77E-01	2.56E-01	1.66E-03	1.94E-02
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon emissions and removals are reported in accordance with ISO 21930 7.2.7 and 7.2.12. Based on ISO 21930 accounting rules for cradle-to-gate life cycle assessment, all carbon removed from the atmosphere (characterized in the LCIA as -1 kg CO₂e/kg CO₂) in module A1 is calculated as being emitted to the atmosphere in other modules (characterized in the LCIA as +1 kg CO₂e/kg CO₂). IPCC GWP, incl. biogenic carbon includes biogenic carbon emissions and removals from the information modules A1-A3 and also reports values for module C4 to account for the biogenic carbon that is not emitted in the declared modules to ensure a net neutral biogenic carbon balance. Therefore, in Table 10, the results for total IPCC GWP, incl. biogenic carbon and IPCC GWP, excl. biogenic carbon are equal.

Table 15: Carbon Emissions and Removals

PARAMETER	TOTAL	A1	A2	A3	C4
BCRP [kg CO ₂]	9.38E+02	9.38E+02	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO ₂]	1.03E+03	0.00E+00	0.00E+00	0.00E+00	1.03E+03
BCRK [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO ₂]	2.42E+01	0.00E+00	0.00E+00	2.42E+01	0.00E+00
CCE [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO ₂]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



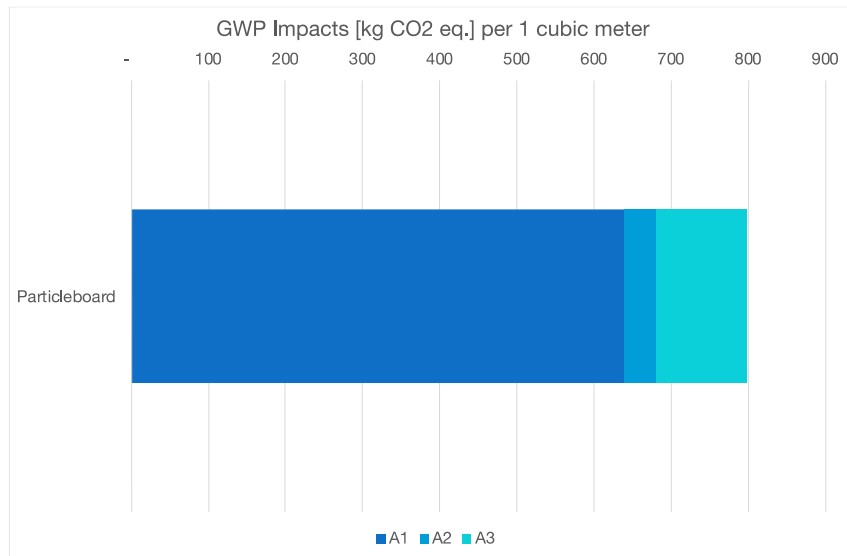


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4. LCA Interpretation

Overall for medium density fiberboard products, Global Warming (GWP) is the impact category of most significance. The impacts from raw material extraction (A1) and manufacturing (A3) are most impactful at 80% and 15%, respectively, while impacts from transportation (A2) are significantly lower (5%).



At a more granular level, we find lumber and additives (adhesives, waxes, and resins) used account for 86% and 9% of combined A1 and A2 impacts, respectively. The emissions sources contributing the most within the manufacturing stage (A3) are natural gas and electricity, accounting for 52% and 25% of overall emissions, respectively.





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5. References

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