ENVIRONMENTAL PRODUCT DECLARATION

HARDWOOD VENEER

The applications of hardwood veneer include more than just hardwood plywood—it acts as an excellent key material for musical instruments, furniture, and cabinets. Other applications include door skins, curved and cut-to-size applications, wall panels, counter fronts, flooring, and edgebanding.

Timber Products

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/

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

Timber Products

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION ULCOM/EPD

Timber Products Hardwood Veneer

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	4790500569.101.1
DECLARED PRODUCT & DECLARED UNIT	1 cubic meter of hardwood veneer
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	Hardwood veneer is used to create a variety of products including musical instruments, furniture, and cabinets, as well as door skins, curved and cut-to-size applications, wall panels, counter fronts, flooring, and edgebanding.
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 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 referessnce PCR by:	James Mellentine 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.

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 Forest Stewardship Council® program to ensure all of our products are responsibly created with the environment in mind.

1.2. Product Description

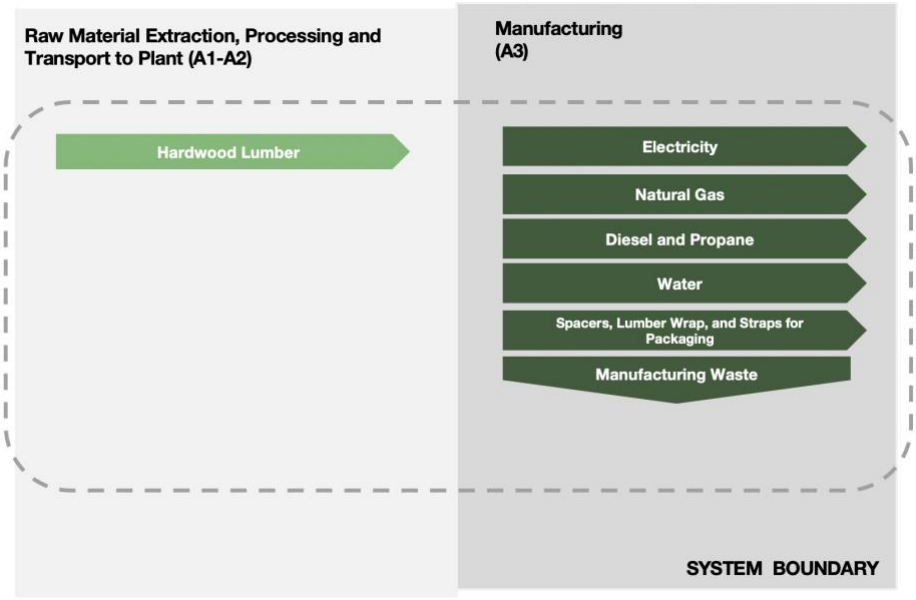
The results presented in this EPD are for hardwood veneer (rotary veneers) manufactured at Timber Products' facility in Munising, Michigan. Where energy and water usage and/or manufacturing waste from a relevant facility was not provided, an average waste and/or water consumption rate based on comparable Timber Products facilities was assumed.

This study covers hardwood veneer products from the following CSI divisions:

- 06 41 13: Wood-Veneer-Faced Architectural Cabinets
- 06 48 26: Wood-Veneer Frames
- 09 74 16: Flexible Wood Veneers
- 12 32 13: Manufactured Wood-Veneer-Faced Casework

Products made with Timer Products' hardwood veneers include musical instruments, furniture, and cabinets, as well as door skins, curved and cut-to-size applications, wall panels, counter fronts, flooring, and edgebanding.

Flow Diagram



1.3. Application

Hardwood veneers can be used to make a variety of different products including musical instruments, furniture, and cabinets, as well as door skins, curved and cut-to-size applications, wall panels, counter fronts, flooring, and edgebanding.

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) and California Air Resources Board (CARB).

Table 1: Technical Details

PARAMETER	VALUE	UNIT
Area	1.21 x 2.43, 2.43 x 1.21, and 3.04 x 0.91	m
Density	653	kg/m^3

1.6. Material Composition

Products included in the study consist of one major component: hardwood.

Table 2: Material Composition

COMPONENT	COMPOSITION (%)
Ash, Beech, Birch, Cherry, Maple, Red Oak, White Oak	0%-100%

1.7. Manufacturing

The products under review are manufactured at Timber Products' Munising, Michigan facility.

Hardwood rotary veneers are produced by rotating a log by its ends against a blade, which results in continuous sheets of flat grain veneer. Rotary veneer is most commonly used in the cores of panels.

Raw materials utilized in the hardwood veneer are sourced from a variety of suppliers in the various regions of North America.

1.8. Packaging

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

Table 3: Packaging Inputs, per m^3 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

All timber for hardwood veneer is transported to the Munising facility via truck. The average distance from the raw material source to the facility is 877 km. Supplier locations, product composition, and the frequency at which Timber Products sources from each supplier were considered when calculating the average transportation distance.

2. Life Cycle Assessment Background Information

2.1. Declared Unit

The declared unit is 1 m^3 of hardwood veneer. Table 4 shows additional details related to the declared unit.

Table 4: Declared Unit

Name	Value	Unit
Declared Unit	1 m^3 of hardwood veneer	
Mass	653	kg
Moisture Content	8 - 12	%

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

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:

- It was assumed no resins or finishes are added to the product.
- The exact addresses of a limited number of timber suppliers were not provided; in such cases, an average distance was assumed.
- Manufacturing data for the Munising facility produced was not provided. Therefore, an average of inputs for the manufacturing of Timber Products' hardwood plywood across three facilites was utilized. Water usage and waste generation were similarly estimated (estimated from one facility).
    - The manufacturing input data used was collected as annual totals including all utility usage and production information. For the LCA, the usage information was divided by production volume at that site to create energy, water, and waste consumption/generation per cubic meter of hardwood plywood (assumed to be the same for hardwood veneer).
- 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 North America. 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.

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 m^3 veneer = 653 kg product
- 653 x 50% Carbon content = 323 kg carbon
- 323 kg carbon x 44/12 = 1,183 kg CO_2 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' hardwood plywood 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 hardwood veneer 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.

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 CO2]
BCEP	Biogenic Carbon Emission from Product	[kg CO2]
BCRK	Biogenic Carbon Removal from Packaging	[kg CO2]
BCEK	Biogenic Carbon Emission from Packaging	[kg CO2]
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO2]
CCE	Calcination Carbon Emissions	[kg CO2]
CCR	Carbonation Carbon Removals	[kg CO2]
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	[kg CO2]

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

3.1. Life Cycle Impact Assessment Results

All results are given per declared unit, which is 1 m^3 of hardwood veneer.

Table 10: IPCC AR5 Impact Assessment Results

IPCC AR5	A1-A3	A1	A2	A3
GWP, incl biogenic carbon [kg CO2 eq]	**1.19E+03**	-8.94E+02	6.22E+01	2.02E+03*
GWP, excl biogenic carbon [kg CO2 eq]	**1.19E+03**	2.98E+02	6.23E+01	8.30E+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]	**2.29E+00**	1.23E+00	2.69E-01	7.96E-01
EP [kg N eq]	**2.25E-01**	1.27E-01	2.62E-02	7.23E-02
ODP [kg CFC-11 eq]	**1.45E-12**	5.94E-13	1.22E-14	8.40E-13
Resources [MJ]	**1.97E+03**	4.77E+02	1.15E+02	1.38E+03
SFP [kg O_3 eq]	**5.57E+01**	3.36E+01	6.21E+00	1.59E+01

Table 12: EU Impact Assessment Results

CML 2001 – JAN 2016	A1-A3	A1	A2	A3
ODP [kg CFC-11 eq]	**1.45E-12**	5.94E-13	1.22E-14	8.40E-13
AP [kg SO_2 eq]	**1.78E+00**	8.88E-01	1.96E-01	6.94E-01
EP [kg PO_4^{-3} eq]	**3.60E-01**	2.02E-01	5.27E-02	1.06E-01
POCP [kg ethene eq]	**6.32E-01**	6.37E-01	-7.42E-02	6.90E-02
$ADP_{element}$ [kg Sb-eq]	**3.31E-04**	8.61E-05	1.87E-05	2.26E-04
ADP_{fossil} [MJ, LHV]	**9.79E+03**	3.09E+03	7.22E+02	5.98E+03

3.2. Life Cycle Inventory Results

All results are given per declared unit, which is 1 m^3 of hardwood veneer.

Table 13: Resource Use

Parameter	A1-A3	A1	A2	A3
RPR_E [MJ, LHV]	**1.13E+04**	1.02E+04	3.56E+01	1.08E+03
RPR_M [MJ, LHV]	**1.15E+04**	1.15E+04	0.00E+00	0.00E+00
RPR_T [MJ, LHV]	**2.28E+04**	2.17E+04	3.56E+01	1.08E+03
$NRPR_E$ [MJ, LHV]	**1.78E+04**	4.51E+03	8.65E+02	1.24E+04
$NRPR_M$ [MJ, LHV]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00
$NRPR_T$ [MJ, LHV]	**1.78E+04**	4.51E+03	8.65E+02	1.24E+04
SM [kg]	**0.00E+00**	0.00E+00	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]	**3.27E+00**	1.24E+00	1.52E-01	1.87E+00

Table 14: Output Flows and Waste Categories

Parameter	A1-A3	A1	A2	A3
HWD [kg]	**1.26E-05**	1.14E-05	7.23E-08	1.15E-06
NHWD [kg]	**1.59E+01**	1.17E+01	7.95E-02	4.14E+00
HLRW [kg]	**3.82E-04**	2.05E-04	2.91E-06	1.75E-04
ILLRW [kg]	**3.20E-01**	1.72E-01	2.45E-03	1.46E-01
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

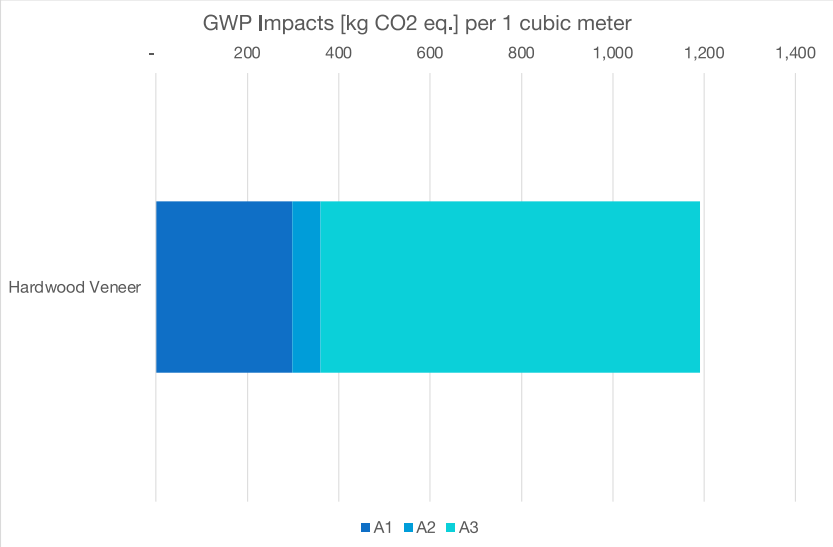
Biogenic carbon emissions and removals are reported in accordance with ISO 21930 7.2.7 and 7.2.12. Based on ISO 21930 accounting rules for cradle-to-gate life cycle asessment, all carbon removed from the atmosphere (characterized in the LCIA as -1 kg CO2e/kg CO2) in module A1 is calculated as being emitted 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	C3/C4
BCRP [kg CO2]	**1.17E+03**	1.17E+03	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO2]	**1.18E+03**	0.00E+00	0.00E+00	0.00E+00	1.18E+03
BCRK [kg CO2]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO2]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO2]	**8.08E+00**	0.00E+00	0.00E+00	8.08E+00	0.00E+00
CCE [kg CO2]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO2]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO2]	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5. LCA Interpretation

Overall for hardwood veneer products, Global Warming (GWP) is the impact category of most significance. The impacts from manufacturing (A3) and raw material extraction (A1) are most impactful at 70% and 25%, respectively, while impacts from transportation (A2) are significantly lower (5%).



At a more granular level, we find lumber used accounts for 74% of combined A1 and A2 impacts. The emissions sources contributing the most within the manufacturing stage (A3) are natural gas and electricity, accounting for 35% and 33% of overall emissions, respectively.

6. References

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