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EPD® INDIA THE INTERNATIONAL EPD® SYSTEM

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Environmental Product Declaration

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

Compact Laminate

Manufactured by **Merino Industries Limited**

Geographical Scope	India
EPD Registration Number	EPD-IES-0016404
Publication Date	2024-09-24
Valid Until	2029-09-23
Programme	The International EPD® System
Programme Operator	EPD International AB

General Information

Programme:	**The International EPD® System**	
Address:	EPD International AB, Box 210 60 SE-100 31 Stockholm, Sweden	
Website:	www.envirodec.com	www.environdecindia.com
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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, EN 15804 reference package based on EF 3.1 has been used.	
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair of the review is Claudia A. Peña. The review panel may be contacted via: info@environdec.com	

Life Cycle Assessment (LCA) practitioner:	Mr. Suraj Shekhar The ESG advisory Email: suraj.shekhar@theesgadvisory.in
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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

The Merino Group, since its inception in 1965, has a remarkable story of evolution that has not only stood the test of time but has also gained prominence over the decades.

With humble beginnings in plywood, the Merino Group has gained global recognition as an industry leader in laminates and surface solutions.

With a growth mindset and an unwavering focus on delivering excellence, Merino Group has consistently launched products using the best materials, cutting-edge production techniques and advanced technology.

As a leading manufacturer of decorative laminates, Merino Group is driven by a passion to provide our customers with worldclass surface solutions that exceed their expectations. While products, technologies, and techniques have evolved over the years, the commitment to quality remains unaltered as Merino Group progresses at scale and speed towards a sustainable future.

Product Information

Compact, basically, is a product comprising papers and resins. The product is made by thermal curing of saturated multiple layers of papers with respective Phenol Formaldehyde resin and Melamine formaldehyde resin in a multi daylight high pressure hydraulic press. The thickness range for Compact High-pressure laminates varies from 2.00 mm to 30.00 mm.

Merino Group produces Compacts at three manufacturing locations Hapur-Uttar Pradesh, Rohad-Haryana; and Dahej-Gujarat. The production volume of different thickness of Compact produced is provided in Table-1.
Primarily laminates are used for rooms, external/ internal walls, cupboard, doors, cabinets, TV units and beds. Offers high durability and resistance to withstand damages.

Table 01

Compact Thickness, mm	Production Volume, %
2.00	9.98
4.00	26.68
6.00	41.97
8.00	6.49
10.00	8.91
12.00	2.78
16.00	0.87
18.00	2.00
19.00- 30.00	0.32

Content Information

Raw Material	Weight, Kg	Post Consumer material, weight %	Biogenic material, weight-% and kg C/kg
Paper	6.00	0	50%, 3.0 Kg; 0.33kgC/Kg
Phenol Formaldehyde Resin	2.268	0	0.00
Melamine Formaldehyde Resin	0.792	0	00.00

Packaging Material	Unit	Value	Biogenic material, weight-% and kg C/kg
Wood	m3	0.0029	50%, 0.00145
Polyethylene	Kg	0.0006	0.00
Paper	kg	0.0006	50%, 0.0003
Mild Steel	Kg	0.0004	0.00

Life Cycle Assessment

Declared unit:	**1 m^2 of Compact of 6 mm thickness**
Time representativeness:	Primary data from the manufacturing site, suppliers, and the electricity mix were collected for the period starting from FY 2023 - 24
Database(s) and LCA software used:	Ecoinvent v3.10 (allocation, cut-off by classification) database and SimaPro v9.6.0.1 software have been used for the LCA calculations. LICA method used is EN 15804: A2 compliant.
Description of system boundaries	Cradle to gate with modules C1–C4 and module D (A1–A5 + C + D).
Geographical scope:	India
Allocation of co-products or waste:	Allocation has not been applied.

Data quality and data collection:	According to EN 15804:2012+A2:2019 EF 3.1, specific data was used for module A3 (Processes the manufacturer has influence over) and was gathered from Merino Industries Limited. The data includes actual product weights, amounts of raw materials used, product content, energy consumption, transportation distances, water consumption, and waste generation. The infrastructure/capital goods are excluded in the LCA.
Cut-off rules:	No cut-off criteria are defined for this study. The system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model..

System Boundaries and Manufacturing Flow Diagram

	Product Stage			Construction 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	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	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	IN	IN	IN	IN	IN	-	-	-	-	-	-	-	IN	IN	IN	IN	IN
Specific data used	>62%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X- Declared modules, ND- Not declared modules.

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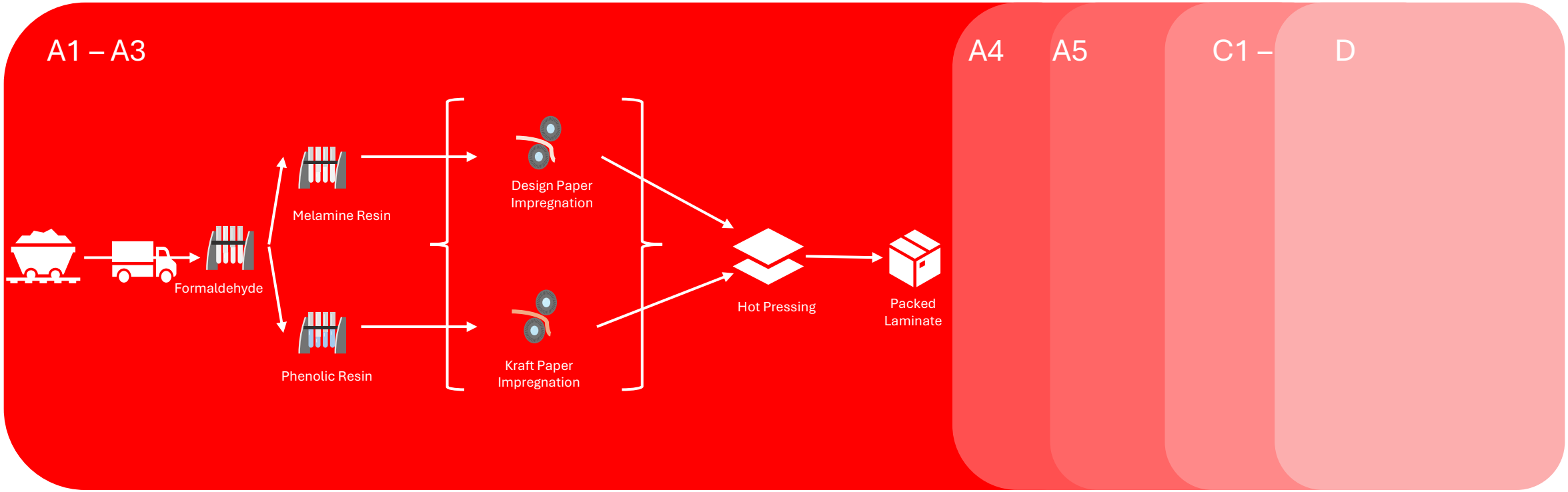
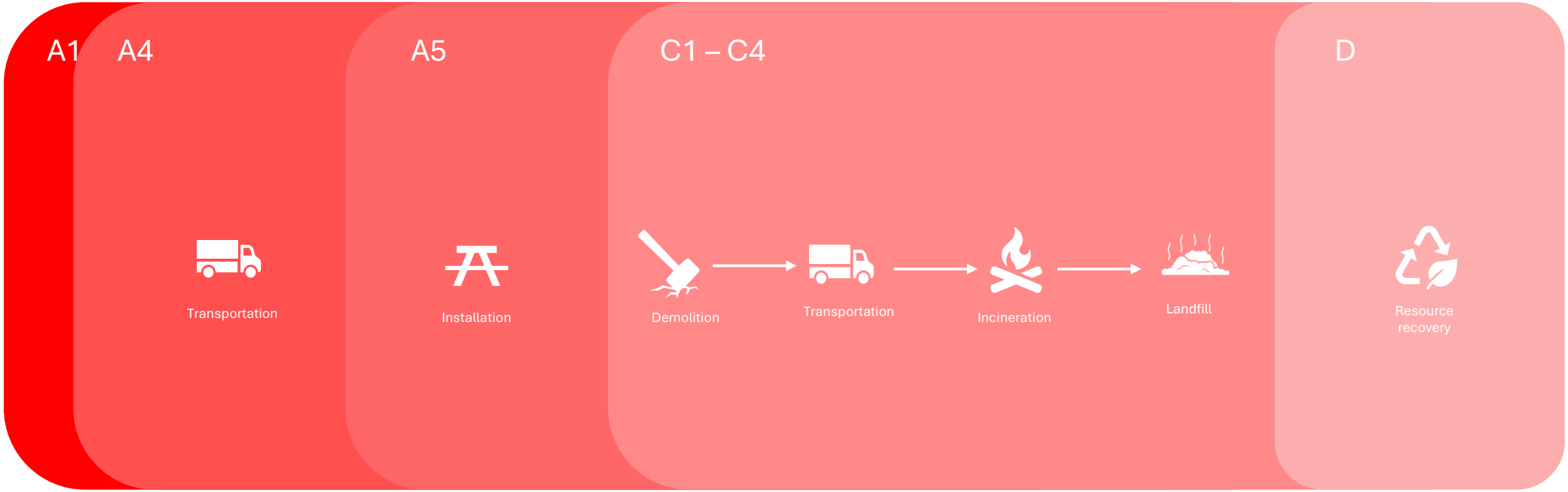
Declaration of Sources and Share of Primary Data

Process	Source type	Source	Reference Year	Data category	%Share of primary data of GWP-GHG results for A1-A3
Printed Paper	Database	Ecoinvent 3.10	2024	Secondary Data	17
Phenolic Resin	Collected Data	Merino	2024	Primary Data	**19**
Tissue Paper	Collected Data	Merino	2024	Primary Data	**4**
Melamine Resin	Collected Data	Merino	2024	Primary Data	**16.5**
Electricity	Collected Data + Database	Merino + Ecoinvent 3.10	2024	Primary Data	**14**
Transportation of input materials to site	Database	Ecoinvent 3.10	2024	Primary Data	**9**
Polyethylene [Packaging]	Database	Ecoinvent 3.10	2024	Generic daata	3.3
Mild Steel [Packaging]	Database	Ecoinvent 3.10	2024	Generic daata	3.2
BOPP [Packaging]	Estimated	Ecoinvent 3.10	2024	Generic daata	1

System Boundaries and Manufacturing Flow Diagram



System Boundaries and Manufacturing Flow Diagram



System Description

A1-A3: Production Stage

Description: The product stage of the products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to the manufacturer” and “manufacturing”.

Raw material supply: Compact requires raw materials like different kind of papers like Kraft paper, design paper, Tissue paper etc. and chemicals like Phenolic resin and Melamine resin which will be accounted in this module.

Transport to the Manufacturer: Raw material are purchased from different regions of India as well as some materials are imported from different countries. This transportation and the amount transported will be accounted in this module.

Manufacturing: This stage includes the manufacturing and packaging of the Compact as well as the treatment of paper and polythene waste.

For 1 kWh of Electricity the GWP-GHG value is 0.49 Kg CO2 eq.

A4-A5: Construction Stage

A4: Transport to the final Consumer

Description: This module includes dispatch of Compact to final consumer. It includes both Domestic dispatch as well as Export.

A5:Installation

Description: For compact of thickness more than 3mm screws are used for installing on the surface.

C1-C4: End of Life Stage

C1: Deconstruction/Demolition

Description: Demolition include removing of Compact from the surface. Here this assumption is been taken that Compact is being removed during demolition of the building, which in itself represent a very low impact considering the lifetime impact of the product.

System Description

C2: Transportation to EOL

Description: Includes the transport of the discarded and waste Compact to final waste treatment and final disposal. In this stage, the below assumptions were taken.

Parameter	Value
With a collection rate of 100%, the transport trucks are the size of 7.5 - 16 ton capacity	100 Km
Final Disposal to a landfill, the transport truck are the size of 7.5 - 16 ton capacity	50 Km

C3: Waste processing

Description: With respect to management of the product after the end of its useful life, the following assumption were taken.

Parameter	Value
Incineration is preferred for product, cutting wastes and packaging waste	70 %

C4: Disposal

Description: The ashes remaining after the process of incineration are subsequently disposed off in a landfill.

D:Recycling potential

Description: Compact recovered after demolition is incinerated in open. Credit generated from incineration are therefore, not considered in this module due to open burning.

Biogenic balancing was done in C4

Electricity Mix of Merino			
Source	**Percentage**	**Dataset**	**Version**
Northern Grid, India	34.25	SimaPro Indian Data	New
Rooftop Solar	6.16	Ecoinvent	3.10
DG set	1.79	Ecoinvent	3.10
5.5 MW Solar Power Plant	57.8	Ecoinvent	3.10

LCA Results

The LCIA results for 1 m^2 of 6 mm Compact

Environmental impact indicators	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change	kg CO2 eq.	3.11E+00	1.94E+00	4.42E-01	0.00E+00	3.86E-01	7.40E+00	2.19E-03	0.00E+00
Climate change - Biogenic	kg CO2 eq.	-1.16E+01	4.14E-03	4.26E-01	0.00E+00	2.28E-05	7.32E+00	3.88E+00	0.00E+00
Climate change - Fossil	kg CO2 eq.	1.47E+01	1.94E+00	1.58E-02	0.00E+00	3.86E-01	7.78E-02	2.19E-03	0.00E+00
Climate change - Land use and LU change	kg CO2 eq.	3.85E-02	8.60E-04	3.73E-04	0.00E+00	1.30E-04	1.90E-05	1.13E-06	0.00E+00
Depletion Potential ODP	kg CFC11 eq.	2.42E-07	3.46E-07	5.42E-10	0.00E+00	1.79E-08	8.73E-10	6.33E-11	0.00E+00
Acidification Potential AP	mol H+ eq.	9.15E-02	1.13E-02	1.73E-04	0.00E+00	7.82E-04	8.07E-04	1.55E-05	0.00E+00
Eutrophication Potential- freshwater	kg P eq.	1.10E-02	2.02E-04	-1.04E-05	0.00E+00	2.71E-05	3.37E-05	1.82E-07	0.00E+00
Eutrophication Potential - marine	kg N eq.	2.27E-02	2.71E-03	3.73E-04	0.00E+00	1.76E-04	4.28E-04	5.91E-06	0.00E+00
Eutrophication Potential - terrestrial	mol N eq.	2.42E-01	2.97E-02	1.29E-03	0.00E+00	1.88E-03	4.11E-03	6.46E-05	0.00E+00
Photochemical ozone creation Potential	kg NMVOC eq.	7.38E-02	9.16E-03	5.64E-04	0.00E+00	1.09E-03	1.03E-03	2.31E-05	0.00E+00
Abiotic depletion potential - non fossil	kg Sb eq.	1.09E-04	5.40E-06	6.25E-08	0.00E+00	1.28E-06	1.34E-07	3.42E-09	0.00E+00
Abiotic depletion potential fossil fuels	MJ	9.42E+01	2.44E+01	-2.76E-02	0.00E+00	4.58E-01	1.60E-01	3.32E-03	0.00E+00
Water user deprivation potential	m3 W eq. Dep	1.21E+01	1.07E-01	-3.01E-03	0.00E+00	2.03E-02	3.30E-02	2.35E-03	0.00E+00

LCA Results

Global Warming Potential - (GWP-GHG)	kg CO2 eq.	3.51E+00	1.94E+00	1.33E-01	0.00E+00	3.85E-01	7.61E+00	2.19E-03	0.00E+00

Additional Impact categoriec	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter emissions (PM)	**disease inc.**	1.11E-06	1.41E-07	2.92E-07	0.00E+00	2.06E-08	9.04E-09	3.53E-10	0.00E+00
Ionising radiation Human Health (IRP)	**kBq U-235 eq**	1.61E+00	1.13E-01	4.49E-04	0.00E+00	4.34E-03	7.96E-04	3.42E-05	0.00E+00
Ecotoxicity, freshwater	**CTUe**	8.17E+03	2.11E+01	2.45E+00	0.00E+00	1.60E+00	1.15E+00	9.29E-03	0.00E+00
Human toxicity, cancer effect	**CTUh**	1.64E-07	2.23E-09	2.09E-10	0.00E+00	1.53E-09	1.41E-09	9.89E-12	0.00E+00
Human toxicity, non-cancer effects	**CTUh**	1.78E-07	1.72E-08	3.23E-09	0.00E+00	2.73E-09	9.74E-09	9.17E-12	0.00E+00

Resource use indicators	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Land use related impacts	**Dimensionless**	1.60E+03	1.70E+01	-1.37E+00	0.00E+00	2.26E+00	1.94E-01	1.06E-01	0.00E+00
Use of renewable primary energy carrier	MJ	3.52E+02	3.67E-01	-3.48E-01	0.00E+00	6.85E-02	1.72E-02	4.98E-04	0.00E+00
Use of renewable primary energy raw mtls	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy	MJ	3.52E+02	3.67E-01	-3.48E-01	0.00E+00	6.85E-02	1.72E-02	4.98E-04	0.00E+00
Use of non-renewable prim energy carrier	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-ren. prim enrergy as raw mtls	MJ	9.87E+01	2.59E+01	-2.56E-02	0.00E+00	4.80E-01	1.68E-01	3.48E-03	0.00E+00

Total of non-ren. primary energy sources	MJ	9.87E+01	2.59E+01	-2.56E-02	0.00E+00	4.80E-01	1.68E-01	3.48E-03	0.00E+00
Use of Secondary Material	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable Secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net Use of Freshwater	m3	3.27E-01	3.08E-03	-1.93E-04	0.00E+00	5.86E-04	9.86E-04	5.56E-05	0.00E+00

Resource use indicators	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.20E-03	8.17E-05	1.47E-06	0.00E+00	3.48E-05	4.23E-06	3.39E-07	0.00E+00
Non-Hazardous waste disposed	kg	2.19E+00	1.23E+00	1.12E-02	0.00E+00	1.72E-01	4.35E-02	3.50E-01	0.00E+00
Radioactive waste disposed	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Components for reuse	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30	0.00E+00	0.00E+00
Exported Electrical Energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal Energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

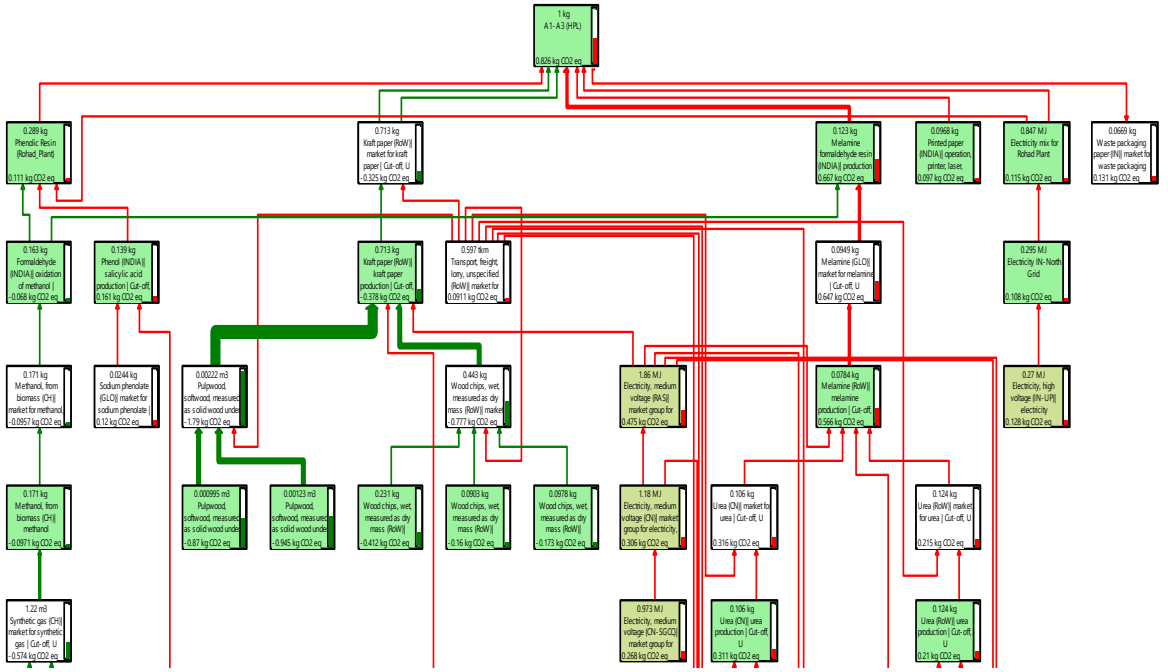
Interpretation

The manufacturing process and raw materials for HPL (High-Pressure Laminate) and Compact laminates are largely the same. The system boundary for the life cycle assessment was considered from cradle-to-gate, as per the Product Category Rules (PCR) for construction products.

In the life cycle assessment, the A1-A3 modules (raw material production, transport, and manufacturing) are the major contributors.

Within the A1-A3 modules, the production of raw materials, their procurement, and the final manufacturing process are the largest impact drivers across all the declared modules. Specifically, resin production accounts for more than 80% of the total CO2 equivalent emissions in this stage.

The electricity consumption during the A3 (manufacturing) stage contributes 0.101 kg of CO2 equivalent. This relatively low impact is due to Merino's use of a solar plant that provides 57.8% of its electricity demand, resulting in a healthier electricity mix.



Regarding the acidification potential, the kraft paper and melamine resins are the primary contributors, at 0.00473 mol H+ eq. and 0.00416 mol H+ eq., respectively.

Reference

- **ISO 14020:2000**

Environmental labels and declarations — General principles

- **ISO 14040:2006**

Environmental management — Life cycle assessment — Principles and framework

- **ISO 14044:2006**

Environmental management — Life cycle assessment — Requirements and guidelines

- **ISO 14025:2006**

Environmental labels and declarations — Type III environmental declarations — Principles and procedures

- **The International EPD® System**

www.environdec.com

- **EN 15804:2012+A2:2019**

Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction product

- **The International EPD® System**

PCR 2019:14 Construction products v1.3.2 (EN 15804:A2)

- **Ecoinvent 3.10**

www.ecoinvent.org

- **SimaPro LCA Software**

www.simapro.com