RAW PARTICLEBOARD

Environmental Product Declaration (EPD)

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

PROGRAMME:	The International EPD® System, www.environdec.com
PROGRAMME OPERATOR:	EPD International AB
REGIONAL PROGRAMME OPERATOR	EPD Australasia, https://epd-australasia.com/
EPD REGISTRATION NUMBER:	EPD-IES-0017522:001
EPD OWNER	Laminex Group Pty Limited
VALID FROM:	2025-03-01
VALID UNTIL:	2030-03-01

ECO PLATFORM EPD VERIFIED

EPD® THE INTERNATIONAL EPD® SYSTEM

AUSTRALASIA EPD®

EPD of multiple products, based on the representative product of the product group. This EPD covers Trade Essentials® Raw Particleboard STD E1, Trade Essentials® Raw Particleboard MR E0 and Trade Essentials® Raw Particleboard MR E1 in different thicknesses. The full range of products covered in the EPD are listed on page 22.

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 epd-australasia.com

Laminex®

Innovators in decorative surface and building solutions.

CONTENTS PG

COMPANY INTRODUCTION

For nine decades, Laminex® has stood at the forefront of Australia's decorative surfaces industry, synonymous with enduring quality, innovation, and local manufacturing.

Laminex's network of plants has grown to cover seven locations across four states, manufacturing a vast range of products from raw particleboard and MDF to decorated board, high pressure laminates and componentry products.

Our unwavering pursuit of design excellence drives Laminex to continually innovate. Over the years, our product range has expanded to include modern laminates, joinery systems, primed wall linings and decorated wall and ceiling panelling.

We are proud to deliver a diverse portfolio of products that support the Green Building Council of Australia's (GBCA) Green Star® rated projects, ensuring that our contributions to the built environment are as responsible as they are inspiring.

Our operations are conducted under occupational health and safety, and quality management systems, certified to the ISO 45001 and ISO 9001 standards respectively. Our ISO 14001 certified environmental management system ensures we take proactive measures at our plants to minimize our environmental footprint, and achieve our environmental objectives.

As a large manufacturer of wood products, we respect and support responsible forest management and are committed to producing quality products that are backed by independently verified forest certifications – Chain of Custody for Forest Products (AS 4707) - Responsible Wood and Programme for the Endorsement of Forest Certification (PEFC). This means that our certified wood products are manufactured using responsibly sourced wood fibres, and can be traced through the supply chain to our distribution centres.

LAMINEX® MANUFACTURING PLANTS IN AUSTRALIA

Ballarat – Decorated Particleboard, Decorated MDF

Bathurst – Partitioning & Lockers

Cheltenham – High Pressure Laminate, Compact Laminate

Dardanup – Particleboard, Decorated Particleboard

Gympie (Monkland) – Particleboard

Gympie (Toolara) – MDF, Decorated MDF, Surround Primed Panels, Architectural Panels

PRODUCT INFORMATION

PRODUCTS COVERED BY THIS EPD

This is an EPD based on the representative composition of Laminex raw particleboard manufactured at the Laminex plant located in Dardanup, Western Australia.

This EPD of multiple products, is based on a representative product, where the representative product was conservatively selected based on the production weighted average of the worst-case results for each product thickness.

The raw particleboard products covered by this EPD include Trade Essentials® Standard (STD), in formaldehyde emission class E1 and Trade Essentials® Moisture Resistant (MR) in formaldehyde emission classes E0 and E1.

Raw particleboard products are made at our Dardanup and Monkland plants. Data for the raw particleboard products covered by this EPD was collected from the Dardanup plant. The EPD results are also representative for products, within the group, from other plants. The EPD is therefore fully representative of Laminex raw particleboard production.

The full range of products covered by this EPD are listed in the Product Conversion Table on page 22.

PRODUCT DESCRIPTION

Laminex raw particleboard is a medium density, grainless, resin bonded particleboard panel finished with a fine uniform surface.

Raw particleboard is typically used in the construction of furniture, and when laminated, is used in cabinets and general-purpose interior building panels.

The UN CPC and ANZSIC codes applicable to Laminex product in this EPD are shown in Table 1.

Table 1: Industry Classification

PRODUCT	CLASSIF-ICATION	CODE	CATEGORY
PARTICLE-BOARD PRODUCTS	UN CPC Ver.2.1	31431	Particleboard
	ANZSIC 2006	1494	Reconstituted Wood Product Manufacturing

DECLARED UNIT

EPDs that do not cover the full product life cycle from raw material extraction through to end-of-life use the term "declared unit", rather than functional unit.

The Declared Unit for this EPD is 1 kg (kilogram) of raw particleboard product plus its packaging, at the factory gate.

For guidance on how to convert the results in this EPD to your practical application, see section 'How to use this EPD' (page 22).

DESIGN STANDARD

Laminex raw particleboard is manufactured to the requirements of AS/NZS 1859.1:2004 Reconstituted wood-based panels – Specifications – Particleboard, and tested to AS/NZS 4266.1 - Reconstituted wood-based panels - Methods of testing- Base panels.

PACKAGING

Raw particleboard is packaged utilising reused or non-standard wood composite coversheets to protect the product from damage. Sheeting may be applied to top and bottom surfaces, as well as side protection, if required, for transport or customer requirements.

The product is packaged with 'bearers' or packing gluts (normally reused or non-standard wood based composite material) to enable lifting and loading for transport. This also provides spacing for transport operation to secure multiple packs of product during shipment for load stability.

The coversheets, side boards and bearers/gluts are secured around the packs with recyclable PET strapping.

The product is identified with cardboard labels/ banners containing batch tracking data and basic reference information pertaining to product type and brand description.

CONTENT DECLARATION

The content declaration for this EPD of multiple products is based on a representative product, where the representative product in the group was conservatively selected based on the production weighted average of the worst-case results for each product thickness.

Table 2: Content Declaration of a Product

PRODUCT COMPONENTS	WEIGHT, KG	WEIGHT, %	POST-CONSUMER RECYCLED MATERIAL, WEIGHT -%	BIOGENIC MATERIAL, WEIGHT-%	BIOGENIC MATERIAL, KG C/KG
Wood fibre	0.905	90.5%	0%	90.50%	0.449
Resin (MUF, UF, other)	0.0925	9.3%	0%	0	0
Other	0.00226	0.2%	0%	0	0
Fire Retardant	0	0.0%	0%	0	0
Total	1.00	100.0%	0%	90.50%	0.449

Table 3: Content Declaration of Packaging

PACKAGING MATERIALS	WEIGHT, KG	WEIGHT-% (VERSUS THE PRODUCT)	BIOGENIC MATERIAL, WEIGHT-% (VERSUS THE PRODUCT)	WEIGHT BIOGENIC CARBON, KG C/KG
Wooden packaging (coverboards & bearers)	0.0420	4.2%	4.2%	0.0210
PET straps	2.44E-04	0.0%	0	0
Total	0.0423	4.2%	4.2%	0.0210

DANGEROUS SUBSTANCES FROM THE CANDIDATE LIST OF SVHC FOR AUTHORISATION

No products declared within this EPD contain substances exceeding the limits for registration according to the European Chemicals Agency's "Candidate List of Substances of Very High Concern for Authorisation".

MANUFACTURING PROCESS

Laminex manufactures particleboard at its plants in Monkland, South East Queensland and Dardanup, Western Australia. The plants utilise sustainable wood resources from softwood plantations (roundwood) and other residues (e.g., wood chip and shavings) from neighbouring sawmills.

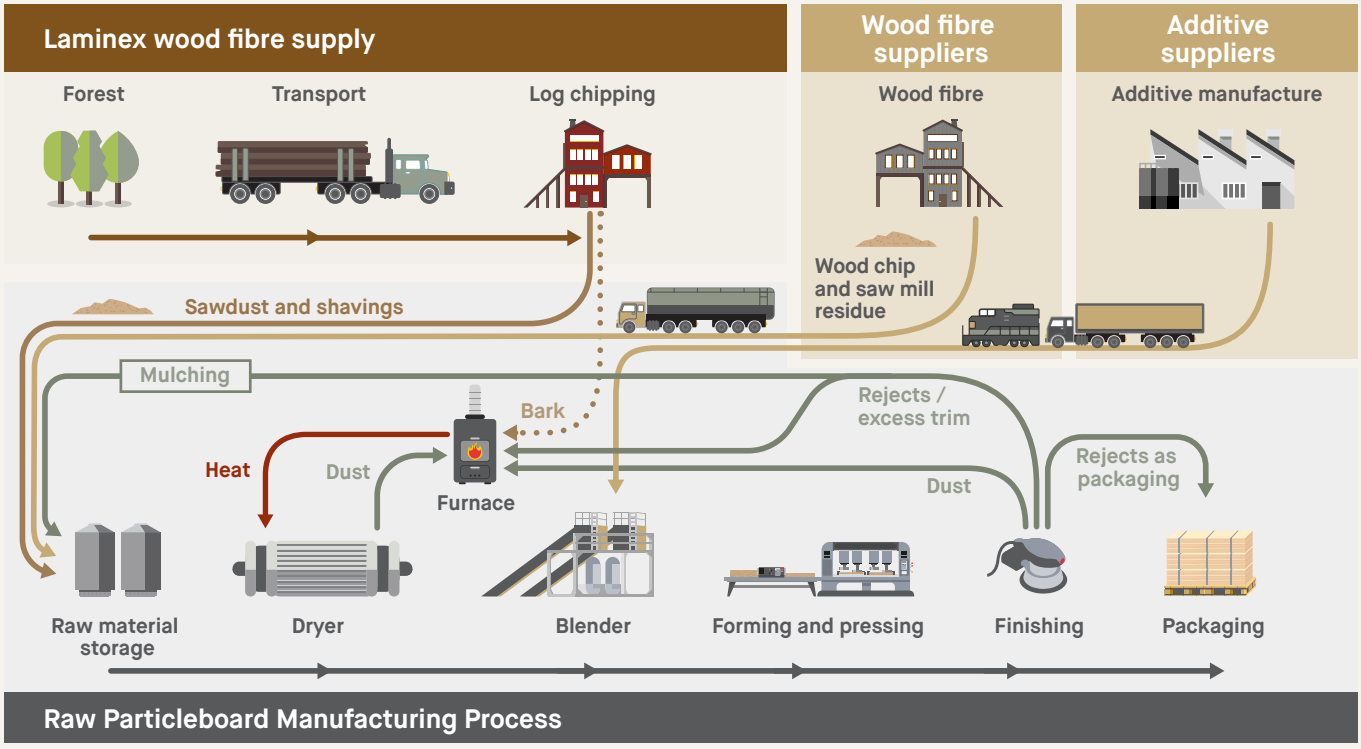
Wood resources are transported to site and stored for use in the manufacturing process. Roundwood from plantation sources is debarked and chipped, then stored in piles with other purchased wood residues. Sources are separated to control input to manufacturing process and enhance process efficiency.

Wood sources are blended in a controlled manner to assist formulation of different products. Wood residues are 'air' graded to remove grit contaminants that may impact final product performance, then processed and size segregated to produce fine 'surface' and coarse 'core' particles. Particles are dried to low moisture content and stored ready for pressing.

At this point, resin, wax and other additives are added to the surface and core particle flow streams to regulate the performance required of the different types of products. Glue kitchen treated particles are then formed into a 3-layer mat (surface-core-surface distribution) and pressed under heat and pressure conditions to cure the gluing system. The raw, rough particleboard is cooled to stabilise the structure, tested for suitable performance standards, and sanded to complete the process for the finished particleboard product.

The finished product is packaged and stored ready for distribution to Laminex distribution centres.

Figure 1: Raw particleboard manufacturing process



SYSTEM BOUNDARIES

As shown in the table below, this EPD is of the type 'cradle to gate' with modules C1–C4, module D (A1–A3 + C + D). This scope includes manufacture of raw materials (module A1), raw material transport (A2), manufacture (A3), end-of-life (C1-C4), and resource recovery (D). Other life cycle stages (Modules A4-A5, B1-B7) are dependent on particular scenarios and best modelled at the building level.

Table 4: Modules included in the Scope of the EPD

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
	RAW MATERIAL SUPPLY	TRANSPORT OF RAW MATERIALS	MANUFACTURING	TRANSPORT TO CUSTOMER	CONSTRUCTION / INSTALLATION	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DECONSTRUCTION / DEMOLITION	TRANSPORT TO WASTE PROCESSING	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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
GEOGRAPHY	GLO	GLO	AU	-	-	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
SPECIFIC DATA	64.1%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATION: PRODUCTS	38.1%				-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATION: SITES	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

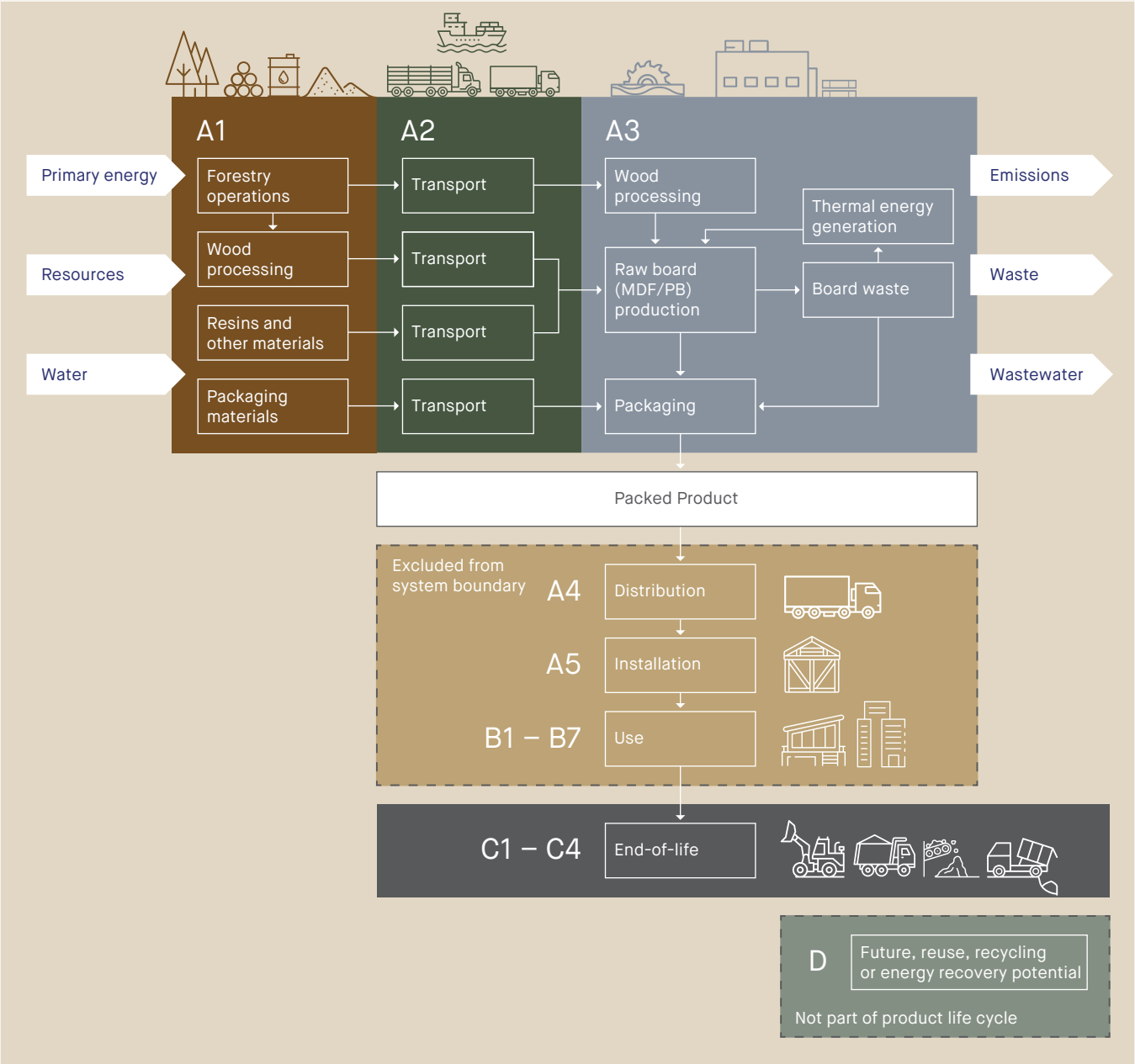
X = included in the EPD; ND = Module not declared (such a declaration shall not be regarded as an indicator result of zero)

Specific data includes GWP-GHG impacts related to the manufacturing processes (primarily electricity thermal energy from biomass and natural gas) and raw materials transport.

RAW PARTICLEBOARD SYSTEM BOUNDARIES

The processes below are included in the product system to be studied. For modules beyond A3, the scenario included is currently in use and is representative as the most probable alternatives.

Figure 2: Raw particleboard system boundary diagram



PRODUCT STAGE (MODULES A1–A3)

The production stage includes the environmental impacts associated with raw materials extraction and processing of inputs, transport to, between and within the manufacturing site, and manufacturing of the representative product at the exit of the production site. The impacts include the production and use of fuels, thermal energy and electricity, production of auxiliary materials and packaging materials, and waste treatment of production wastes.

A1–A3 results include the 'balancing-out reporting' of the biogenic CO_2, PERM and PENRM of packaging released in module A5. This was done according to Annex 3 of PCR 2019:14 v1.3.3 (EPD International, 2024).

MODULE A1 (RAW MATERIAL SUPPLY)

Includes the source of wood logs, wood chips, and wood fibre, production of resins and other materials, generation and transmission of electricity in Western Australia and the generation of thermal energy from biomass and LPG.

MODULE A2 (TRANSPORT)

Includes the transportation of wood logs, wood chips, and wood fibre from suppliers to Laminex sites, via trucks. Transport of resins, decorative paper and other materials used in the product manufacturing is a combination of truck and sea freight.

MODULE A3 (MANUFACTURING)

Manufacturing of raw particleboard includes the production of ancillary materials, on-site transport by forklifts and the recycling and landfilling of manufacturing waste. It also includes manufacturing of raw boards to be used as product packaging.

Since Module C is included in the EPD, the use of Module A1–A3 results without considering the results of Module C is discouraged.

END OF LIFE (MODULE C)

When a product reaches its end-of-life, it is disposed of. The end-of-life stage (Modules C1-C4) is modelled on the assumption that currently in Australasia, landfill is the main end-of-life option for discarded raw particleboard products. This means that Module C3 is equal to zero as no waste processing is required.

MODULES C1 (DECONSTRUCTION/DEMOLITION)

Includes dismantling the raw particleboard product after use. Dismantling includes use of a diesel fuelled excavator.

MODULES C2 (TRANSPORT TO END-OF-LIFE)

Includes transport of waste raw particleboard product to landfill after demolition of the building where it was used.

MODULES C4 (DISPOSAL)

Includes raw particleboard product end-of-life in landfill.

The emission of biogenic CO_2 in landfill is calculated, following EN15804, which does not allow consideration of permanent storage. The biogenic carbon balances in A1–A3 and C4, but due to methane emissions during production and landfill the GWP-biogenic values do not balance.

Table 5: End of Life Scenarios for Products

PROCESS	1 KG
Collection process specified by type	0 kg collected separately
	1 kg of product collected with mixed construction waste
Recovery system specified by type	0 kg for re-use
	0 kg for recycling
	0 kg for energy recovery
Disposal specified by type	1 kg of product for final disposal (landfill)
Assumptions for scenario development	Diesel consumption for dismantling of 1 kg of product after use with an excavator (100kW)- 0.172 kg per tonne of material. All product waste is transported from construction site to landfill via truck. Transport distance is assumed to be 100 km with capacity utilisation of 61%

RECOVERY AND RECYCLING POTENTIAL (MODULE D)

The resource recovery stage (Module D) is modelled based on the assumption that currently landfill is the main end-of-life option for discarded particleboard products. Materials that are sent to landfills at end-of-life are linked to an inventory that accounts for waste composition, regional leakage rates, landfill gas capture, and utilisation rates (flaring vs. power production). All landfill gas that is combusted for energy recovery is assumed to be used to generate electricity via a generator. A credit is assigned for power output using the Australian consumption grid mix. This results in a credit for Module D.

LIFE CYCLE INVENTORY (LCI) DATA AND ASSUMPTIONS

UPSTREAM DATA

Primary data was used for all manufacturing operations up to the factory gate, including upstream data for production of wood fibre by Laminex. Primary data for Laminex operations was collected for the 12-month period between 1st July 2020 to 30th June 2021. No changes to production technology have occurred since the data collection period and hence the data continues to be representative of current practice.

LCA SOFTWARE AND DATABASE

Sphera Solutions LCA for Experts (LCAFE) software version 10.8.0.14 was used together with Sphera Managed LCA Content database version 2023.2 (Sphera 2023) for all the data in the background system. Most datasets have a reference year between 2019 and 2024 and all fall within the 10-year limit allowable for generic data under EN 15804.

ELECTRICITY

The composition of the residual electricity grid mix of Western Australia is modelled in LCA FE based on published data for the financial year 1st July 2022 – 30st June 2023 (thinkstep Ltd, 2024; Australian Government, 2024). The Western Australian residual electricity mix is made up of natural gas (43.61%), hard coal (29.81%), solar (13.21%), wind (13.02%), biogas (0.29%), biomass (0.04%), and heavy fuel oil (0.02%). The emission factor for the Western Australian residual grid mix for the GWP-GHG indicator is 0.641 kg CO_2-eq /kWh (based on EF3.1).

TRANSPORT

Primary transport data was used for transport of production inputs (A2). Wood fibre was transported within Australia by truck. Resins and other materials were assumed to be transported from Australia or from overseas mainly from Malaysia, Europe or China. Any wastes from the production process (A3) are assumed to be transported over a 100 km distance to a treatment or disposal site.

END OF LIFE

The Decomposition rate of organic carbon to landfill gas is assumed to be 0.66% (DOC_f) (Ximenes, et al., 2013).

For every kilogram of carbon converted to landfill gas, 76% is assumed to be released as carbon dioxide and 24% is assumed to be released as methane.

REPRESENTATIVE PRODUCT

This EPD of multiple products, is based on a representative product, where the representative product was conservatively selected based on the production weighted average of the worst-case results for each product thickness. The product was then selected as the product with results closest to the production-weighted average GWP-GHG results.

CUT OFF CRITERIA

Infrastructure used in electricity generation is included as standard in the LCAFE datasets, as this is important for renewable generation.

All other reported data were incorporated and modelled using the best available life cycle inventory data.

ALLOCATION

Where subdivision of processes was not possible, allocation rules listed in PCR chapter 4.5 have been applied. Where economic allocation was required (for wood-based materials), data was applied from verified FWPA studies (FWPA 2019, FWPA 2022). No secondary materials are used in the product's manufacturing.

End-of-life allocation follows the requirements of EN 15804:2017+A2:2019 § 6.4.3.3 and generally follows the polluter pays principle.

ASSESSMENT INDICATORS

The results tables describe the different environmental indicators for each product per declared unit, for each declared module. The EN 15804 reference package based on EF 3.1 is used.

- Table 6 contains the core environmental impact indicators in accordance with EN 15804:2012+A2:2019, describing the potential environmental impacts of the product.
- Table 7 provides additional environmental impact indicators in accordance with EN 15804:2012+A2:2019.
- Table 8 shows the life cycle inventory indicators for resource use.
- Table 9 displays the life cycle inventory indicators for waste and other outputs.
- Table 10 displays biogenic carbon content indicators.
- Table 11 contains results for environmental impact indicators in accordance with EN 15804:2012+A1:2013 to aid backward comparability.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

The use of primary energy is separated into energy used as raw material and energy used as energy carrier as per option C in Annex 3 in the PCR (EPD International, 2023) Energy indicators (MJ) are always given as net calorific value.

Table 6: EN15804+A2 Core Environmental Impact Indicators

IMPACT CATEGORY	ABBREVIATION	UNIT
Climate change – total	GWP-total	kg CO_2-eq.
Climate change – fossil	GWP-fossil	kg CO_2-eq.
Climate change – biogenic	GWP-biogenic	kg CO_2-eq.
Climate change – land use and land use change	GWP-luluc	kg CO_2-eq.
Ozone depletion	ODP	kg CFC-11-eq.
Acidification	AP	Mole of H^+-eq.
Eutrophication aquatic freshwater	EP-freshwater	kg P-eq.
Eutrophication aquatic marine	EP-marine	kg N-eq.
Eutrophication terrestrial	EP-terrestrial	Mole of N-eq.
Photochemical ozone formation	POCP	kg NMVOC-eq.
Depletion of abiotic resources – minerals and metals[1, 5]	ADPE	kg Sb-eq.
Depletion of abiotic resources – fossil fuels[1]	ADPF	MJ
Water use[1]	WDP	m^3 world equiv.

Table 7: EN15804+A2 Additional Environmental Impact Indicators

INDICATOR	ABBREVIATION	UNIT
Particulate Matter emissions	PM	Disease incidences
Ionising Radiation – human health[4]	IRP	kBq U235-eq.
Eco-toxicity (freshwater)[1, 5]	ETP_{fw}	CTUe
Human Toxicity, cancer[1, 5]	HTP_c	CTUh
Human Toxicity, non-cancer[1, 5]	HTP_{nc}	CTUh
Land use related impacts / soil quality[1]	SQP	Dimensionless
Climate Change[2]	GWP-GHG	kg CO_2-eq.
Climate Change[3]	GWP-GHG (IPCC AR5)	kg CO_2-eq.

Table 8: Life Cycle Inventory Indicators on Use of Resources

INDICATOR	ABBREVIATION	UNIT
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material;	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Total use of net fresh water	FW	m^3

Table 9: Life Cycle Inventory Indicators on Waste Categories and Output Flows

INDICATOR	ABBREVIATION	UNIT
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for reuse	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported electrical energy	EEE	MJ
Exported thermal energy	EET	MJ

Table 10: Biogenic Carbon Content Indicators

INDICATOR	ABBREVIATION	UNIT
Biogenic carbon content – product	BCC-prod	kg C
Biogenic carbon content – packaging	BCC-pack	kg C

Note: 1kg biogenic carbon is equivalent to 44/12 kg CO_2

Table 11: EN15804+A1 Environmental Impact Indicators

INDICATOR	ABBREVIATION	UNIT
Global warming potential	GWP (A1)	kg CO_2-eq.
Ozone depletion potential	ODP (A1)	kg CFC-11-eq.
Acidification potential	AP (A1)	kg SO_2-eq.
Eutrophication potential	EP (A1)	kg PO_4^{3-}-eq.
Photochemical ozone creation potential	POCP (A1)	kg C_2H_4-eq.
Abiotic depletion potential for non-fossil resources	ADPE (A1)	kg Sb-eq.
Abiotic depletion potential for fossil resources	ADPF (A1)	MJ

DISCLAIMERS

1 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 experience with the indicator.

2 This indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero. It has been included in the EPD following the PCR.

3 GWP-GHG (IPCC AR5) is an additional GWP100 indicator that is aligned with the Intergovernmental Panel on Climate Change (IPCC) 2013 Fifth Assessment Report (AR5) (IPCC 2013), national greenhouse gas reporting frameworks in Australia and New Zealand and previous versions of the Construction Products PCR (PCR2019:14v1.11). It excludes biogenic carbon and indirect radiative forcing.

4 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 some construction materials, is also not measured by this indicator.

5 The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

For raw particleboard products, the following indicators are not relevant, hence result in zero values:

- Components for re-use (CRU) is zero since there are none produced.
- Materials for energy recovery (MER) is zero since no credits are claimed for any incinerated wastes, applying the cut-off approach.
- Exported thermal energy (EET) is zero since there is none produced.

ENVIRONMENTAL PERFORMANCE

RESULTS FOR ONE KG OF PACKAGED WOOD-BASED PRODUCT

The following tables show the results for one kg of raw particleboard product plus its packaging at the factory gate.

Note: As this EPD is typically used within Australasia, the English form of thousand separator is used.

Table 12: EN15804+A2 – Environmental Indicators

INDICATOR ABBR.	UNIT	PRODUCT STAGE	DECONSTRUCTION	TRANSPORT	WASTE PROCESSING	DISPOSAL	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL	A-C VARIATION WITHIN GROUP
		A1–A3	C1	C2	C3	C4	D	
GWP-TOTAL	kg CO_2-eq.	-9.25E-01	6.04E-04	8.36E-03	0.00E+00	1.68E+00	-7.93E-03	30.9%
GWP-FOSSIL	kg CO_2-eq.	6.14E-01	6.04E-04	8.36E-03	0.00E+00	5.50E-02	-7.93E-03	34.7%
GWP-BIOGENIC	kg CO_2-eq.	-1.54E+00	2.98E-08	4.18E-07	0.00E+00	1.62E+00	-7.32E-06	2.1%
GWP-LULUC	kg CO_2-eq.	2.23E-05	7.03E-09	9.86E-08	0.00E+00	4.75E-05	-1.58E-07	10.0%
ODP	kg CFC-11-eq.	6.56E-12	1.33E-17	1.87E-16	0.00E+00	1.36E-13	-5.48E-14	68.0%
AP	Mole of H^+-eq.	3.22E-03	2.90E-06	7.24E-06	0.00E+00	2.26E-04	-4.02E-05	32.4%
EP-FRESHWATER	kg P-eq.	9.26E-07	1.05E-10	1.48E-09	0.00E+00	4.47E-08	-4.22E-09	60.4%
EP-MARINE	kg N-eq.	1.33E-03	1.42E-06	2.96E-06	0.00E+00	6.90E-05	-8.63E-06	25.6%
EP-TERRESTRIAL	Mole of N-eq.	1.29E-02	1.56E-05	3.26E-05	0.00E+00	7.56E-04	-9.42E-05	32.7%
POCP	kg NMVOC-eq.	3.73E-03	3.97E-06	7.24E-06	0.00E+00	2.20E-04	-2.39E-05	27.4%
ADPE	kg Sb-eq.	5.48E-08	1.93E-12	2.70E-11	0.00E+00	1.55E-09	-2.49E-10	11.5%
ADPF	MJ	8.81E+00	8.19E-03	1.15E-01	0.00E+00	7.97E-01	-8.76E-02	32.0%
WDP	m^3 world equiv.	7.96E-02	1.00E-06	1.40E-05	0.00E+00	-4.60E-04	-3.14E-03	88.3%

Table 13: EN15804+A2 - Additional environmental indicators

INDICATOR ABBR.	UNIT	PRODUCT STAGE	DECONSTRUCTION	TRANSPORT	WASTE PROCESSING	DISPOSAL	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL	A-C VARIATION WITHIN GROUP
		A1–A3	C1	C2	C3	C4	D	
PM	Disease incidences	2.88E-08	3.30E-11	3.87E-11	0.00E+00	2.00E-09	-3.90E-10	32.2%
IRP	kBq U235-eq.	2.42E-03	2.58E-08	3.61E-07	0.00E+00	4.69E-04	-1.93E-06	72.2%
ETP_{fw}	CTUe	2.12E+00	1.92E-03	2.69E-02	0.00E+00	2.92E-01	-2.05E-02	32.5%
HTP_c	CTUh	7.96E-10	3.18E-14	4.47E-13	0.00E+00	2.81E-11	-7.98E-13	177.5%
HTP_{nc}	CTUh	2.81E-09	6.99E-13	9.65E-12	0.00E+00	2.72E-09	-1.74E-11	8.2%
SQP	Pt	8.14E+01	7.04E-06	9.88E-05	0.00E+00	5.74E-02	-9.67E-03	0.5%
GWP-GHG	kg CO_2-eq.	6.23E-01	6.04E-04	8.36E-03	0.00E+00	1.31E-01	-7.93E-03	31.0%
GWP-GHG (IPCC AR5)	kg CO_2-eq.	6.23E-01	6.04E-04	8.36E-03	0.00E+00	1.26E-01	-7.93E-03	31.2%

Table 14: Inventory indicators – Resource use

INDICATOR ABBR.	UNIT	PRODUCT STAGE A1–A3	DECONSTRUCTION C1	TRANSPORT C2	WASTE PROCESSING C3	DISPOSAL C4	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL D
PERE	MJ	2.18E+00	7.20E-06	1.01E-04	0.00E+00	7.81E-02	-2.36E-02
PERM	MJ	1.77E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.99E+01	7.20E-06	1.01E-04	0.00E+00	7.81E-02	-2.36E-02
PENRE	MJ	7.05E+00	8.19E-03	1.15E-01	0.00E+00	7.97E-01	-8.76E-02
PENRM	MJ	1.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8.81E+00	8.19E-03	1.15E-01	0.00E+00	7.97E-01	-8.76E-02
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	3.30E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	3.87E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.89E-03	1.88E-08	2.63E-07	0.00E+00	1.38E-05	-4.41E-05

Table 15: Inventory indicators – Waste material and output flow

INDICATOR ABBR.	UNIT	PRODUCT STAGE A1–A3	DECONSTRUCTION C1	TRANSPORT C2	WASTE PROCESSING C3	DISPOSAL C4	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL D
HWD	kg	1.00E-09	5.08E-15	7.12E-14	0.00E+00	3.51E-11	2.82E-13
NHWD	kg	2.28E-02	9.25E-08	1.30E-06	0.00E+00	9.73E-01	-2.73E-05
RWD	kg	2.19E-05	2.53E-10	3.55E-09	0.00E+00	4.43E-06	-1.39E-08
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	6.41E-05	0.00E+00	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	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-02	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 16: Inventory indicators – Biogenic carbon content

INDICATOR ABBR.	UNIT	PRODUCT STAGE A1–A3	DECONSTRUCTION C1	TRANSPORT C2	WASTE PROCESSING C3	DISPOSAL C4	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL D
BCC-PROD	kg	4.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCC-PACK	kg	2.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 17: EN15804+A1 – Environmental Indicators

INDICATOR ABBR.	UNIT	PRODUCT STAGE	DECONSTRUCTION	TRANSPORT	WASTE PROCESSING	DISPOSAL	FUTURE REUSE, RECYCLING OR ENERGY RECOVERY POTENTIAL
		A1–A3	C1	C2	C3	C4	D
GWP (A1)	kg CO_2-eq.	-9.29E-01	6.02E-04	8.33E-03	0.00E+00	1.67E+00	-7.89E-03
ODP (A1)	kg CFC-11-eq.	7.73E-12	1.57E-17	2.20E-16	0.00E+00	1.61E-13	-6.45E-14
AP (A1)	kg SO_2-eq.	2.38E-03	2.01E-06	5.25E-06	0.00E+00	1.75E-04	-3.29E-05
EP (A1)	kg PO_4^{3-}-eq.	4.83E-04	4.75E-07	1.01E-06	0.00E+00	2.38E-05	-2.97E-06
POCP (A1)	kg Ethene-eq.	3.79E-04	1.96E-07	-7.63E-07	0.00E+00	2.55E-05	-1.76E-06
ADPE (A1)	kg Sb-eq.	5.49E-08	1.93E-12	2.70E-11	0.00E+00	1.58E-09	-2.48E-10
ADPF (A1)	MJ	8.71E+00	8.17E-03	1.15E-01	0.00E+00	7.81E-01	-8.72E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

VARIATION

The maximum variation of GWP-GHG results within the product group is 38.1%. The variation is mainly based on quantity of wood fibre, resins and other materials used in the products, which is dependent on the product thickness. Products within the group are modelled based on different thicknesses.

MATERIAL CIRCULARITY INDICATORS (MCI)

As part of the development of this EPD, thinkstep-anz was commissioned to calculate Material Circularity Indicators (MCIs) for the product in this EPD.

MCI, developed by the Ellen MacArthur Foundation, is a method for measuring how well a product performs in the context of a circular economy. The methodology aligns with ISO 59020 and quantifies the extent to which a product has decoupled from the consumption of virgin and non-renewable resources and the production of unrecoverable waste. It provides a common metric that applies to all of the different circular economy strategies including avoidance, durability, reuse, remanufacturing, recycling, regenerative sourcing, composting and energy recovery. The MCI can be reported as an MCI Score or as a percentage circularity (% MCI).

MCI Score: a value between 0 and 1 in which a score of 0.1 represents a linear system that uses only virgin, non-renewable materials and produces only non-recoverable waste and a score of 1 represents a perfectly circular system that uses only non-virgin or renewable materials and produces only recoverable waste. Values between 0 and 0.1 are reserved for products that consume more material, typically due to a lower utility than an average product.

%MCI: is calculated using the same methodology and assumptions as the MCI Score but reports circularity on a scale from 0% (Linear) to 100% (Perfectly Circular) and is easier to understand and communicate.

Although the methodology for MCI Score and %MCI is the same, the score cannot be directly transposed but needs to be converted per the methodology described by the Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2019/2024).

Table 18 shows the MCI results for raw particleboard product. The results are driven by the quantity of sustainably certified biological materials in the product manufacturing as well as the amount of recoverable waste, from the product life cycle. All the wood fibre used by Laminex in manufacturing raw particleboard products is certified against Australian Forest Standard AS 4707 Chain of Custody for Forest Based Products, which is considered a renewable material supporting product circularity. Laminex products do not contain recycled materials or reused components. The amount of recoverable waste considers both the share of recoverable manufacturing waste and the share of recoverable waste at the product end-of-life. Manufacturing recoverable waste is waste product recovered for use as packaging or recycling and does not include material waste used for thermal energy generation. The product is assumed to be landfilled at end-of-life, which is deemed as unrecoverable waste.

The higher the quantity of biological materials used in the product manufacturing and the higher the proportion of the recoverable waste from the production process, the higher the MCI score and % MCI. MCI results should be considered alongside the other results in this EPD

Table 18: MCI results for raw particleboard products

PRODUCT	MCI SCORE	MCI %
RAW PARTICLEBOARD	0.589	54.3%

ADDITIONAL ENVIRONMENTAL INFORMATION

INDOOR ENVIRONMENTAL QUALITY

Formaldehyde is a colourless volatile organic compound (VOC) that occurs naturally in the environment, and is used in a wide variety of commercial products including glues, wood products, furniture, and textiles. Laminex particleboard is manufactured with a specially formulated low-formaldehyde emitting amino plastic resin (urea-formaldehyde-based with added melamine for moisture resistance). Laminex particleboard is manufactured to the AS/NZS 1859.1 standard and tested using AS/NZS 4266.16, and classified E1 or E0 in accordance with the limits below.

Table 19: Formaldehyde emission classes

EMISSION CLASS	EMISSION LIMIT (MG/LITRE)	EMISSION LIMIT (PPM)
E0	Less than or equal to 0.5	Less than or equal to 0.04
E1	Less than or equal to 1.5	Less than or equal to 0.08

All of the resins and cleaning systems used in our manufacturing processes are water-based and are controlled in line with ISO 14001, the international standard for environmental management systems.

SAFETY AND HANDLING

Particleboard is a reconstituted wood product containing wood, resin and wax. Machine tools must be fitted with dust extractors and the wearing of a dust mask and eye protection is recommended. Material Safety Data Sheets for Particleboard can be found in the Technical Library on the Laminex website.

RETURN AND RECYCLING

Particleboard at end of life can be returned to Laminex particleboard plants and remanufactured. Recycling particleboard prolongs material circulation and reduces dependency on virgin wood sources. Recovered particleboard must be separated from contaminants, such as metal or plastic, before it can be received at a Laminex plant for reprocessing.

When wood waste cannot be recycled it can still be used to produce biomass energy. Biomass energy is a renewable energy, sourced from natural materials like wood, which is then generated into heat or electricity, replacing conventional fossil energy sources.

DOCUMENT LIBRARY

All of our product documentation, certificates and reports including Formaldehyde Emissions reports, VOC certificates, AFS/PEFC Chain of Custody certification, Environmental Product Declarations and third-party verified sustainability certificates are available in our Document Library on the Laminex website.

HOW TO USE THIS EPD

To apply the results from this EPD to a specific product, the representative data from this EPD needs to be multiplied by the product mass per 1 m² (product's area density for a specific product thickness). Area density for all products covered by this EPD is provided in Table 20.

Table 20: Product conversation table for all products covered in this EPD.

PRODUCT	THICKNESS	KG/M²
Trade Essentials® Raw Particleboard MR E0	16	10.2
Trade Essentials® Raw Particleboard MR E0	18	11.4
Trade Essentials® Raw Particleboard MR E0	25	15.5
Trade Essentials® Raw Particleboard MR E0	33	21.1
Trade Essentials® Raw Particleboard MR E0	38	24.0
Trade Essentials® Raw Particleboard MR E1	9	6.0
Trade Essentials® Raw Particleboard MR E1	12	8.0
Trade Essentials® Raw Particleboard MR E1	16	10.2
Trade Essentials® Raw Particleboard MR E1	18	11.4
Trade Essentials® Raw Particleboard MR E1	25	15.5
Trade Essentials® Raw Particleboard MR E1	27.4	13.3
Trade Essentials® Raw Particleboard MR E1	27.5	14.6
Trade Essentials® Raw Particleboard MR E1	27.6	15.2
Trade Essentials® Raw Particleboard MR E1	28.6	18.3
Trade Essentials® Raw Particleboard MR E1	30	19.4
Trade Essentials® Raw Particleboard MR E1	32	16.3
Trade Essentials® Raw Particleboard MR E1	32.8	16.7
Trade Essentials® Raw Particleboard MR E1	32.9	21.9
Trade Essentials® Raw Particleboard MR E1	33	22.1
Trade Essentials® Raw Particleboard MR E1	38	21.6
Trade Essentials® Raw Particleboard STD E1	9	6.0
Trade Essentials® Raw Particleboard STD E1	12	8.0
Trade Essentials® Raw Particleboard STD E1	16	10.2
Trade Essentials® Raw Particleboard STD E1	18	11.4
Trade Essentials® Raw Particleboard STD E1	25	15.5
Trade Essentials® Raw Particleboard STD E1	30	19.4

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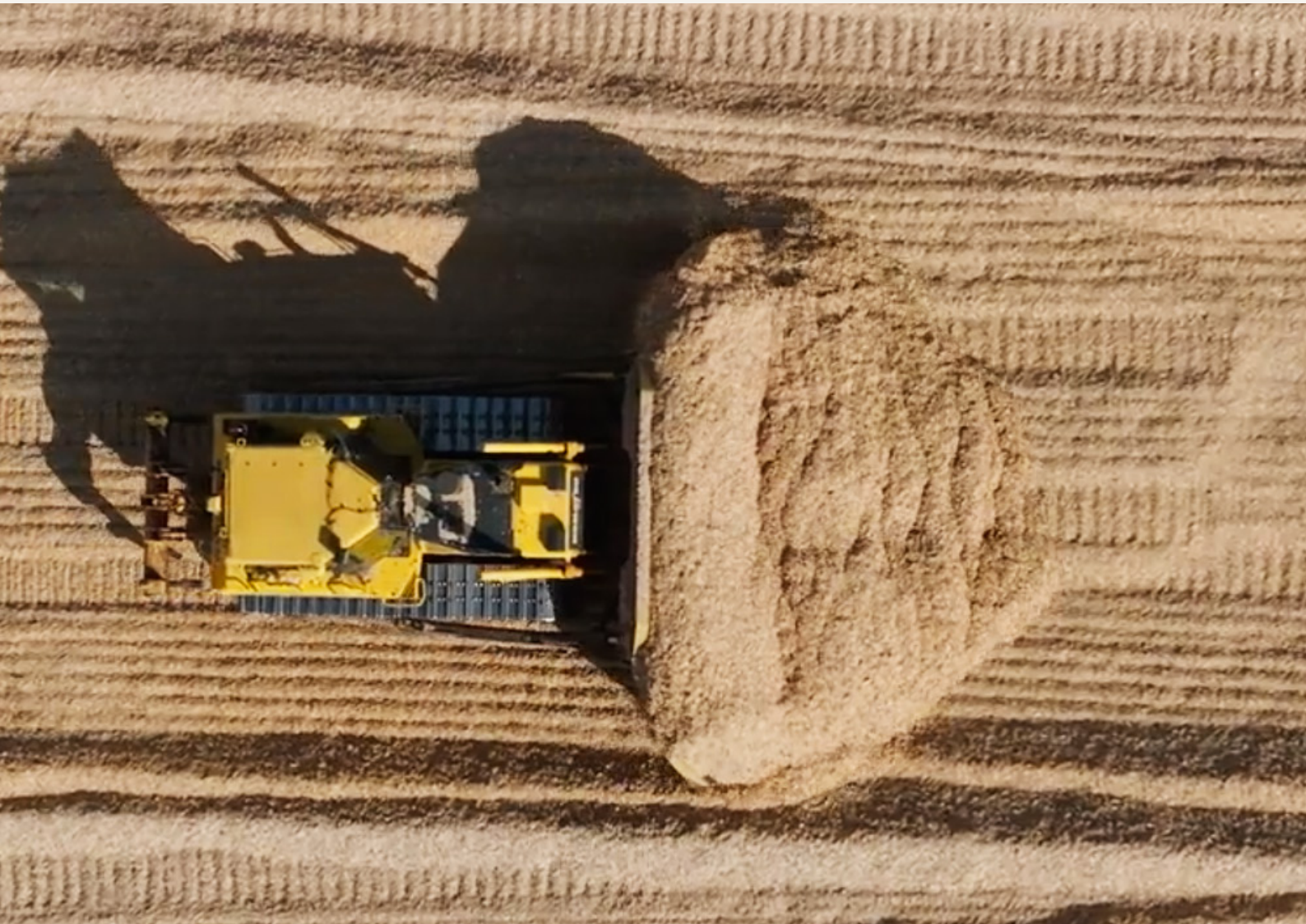
GENERAL INFORMATION

An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

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.

The results for EN15804+A1 compliant EPDs are not comparable with EN15804+A2 compliant studies as the methodologies are different. Results that are EN15804+A1 compliant are given in this document to assist comparability across EPDs.



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REFERENCE YEAR FOR DATA:	2020-06-30 – 2021-06-30
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PRODUCT CATEGORY RULES (PCR)

CEN standard EN 15804 served as the core Product Category Rules (PCR)

PRODUCT CATEGORY RULES (PCR):	PCR 2019.14 Construction Products, version 1.3.4
PCR REVIEW WAS CONDUCTED BY:	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.
REVIEW CHAIR:	Claudia A. Peña, PINDA LCT SpA, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact

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THIRD-PARTY VERIFICATION

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

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VERIFIER APPROVED BY:	EPD Australasia
PROCEDURE FOR FOLLOW-UP OF DATA DURING EPD VALIDITY INVOLVED THIRD-PARTY VERIFIER	☐ Yes ☑ No

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