CARTERS

Your Building Partner

ENVIRONMENTAL PRODUCT DECLARATION

PRE-NAILED FRAMES

EPD of an identical product manufactured at several sites.
In accordance with ISO 14025:2006 and EN 15804:2012+ A2:2019/AC:2021 for pre-nailed frames from CARTERS.

PROGRAMME:	The International EPD System www.environdec.com
PROGRAMME OPERATOR:	EPD International AB
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AUSTRALASIA EPD® INTERNATIONAL EPD SYSTEM

EPD INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

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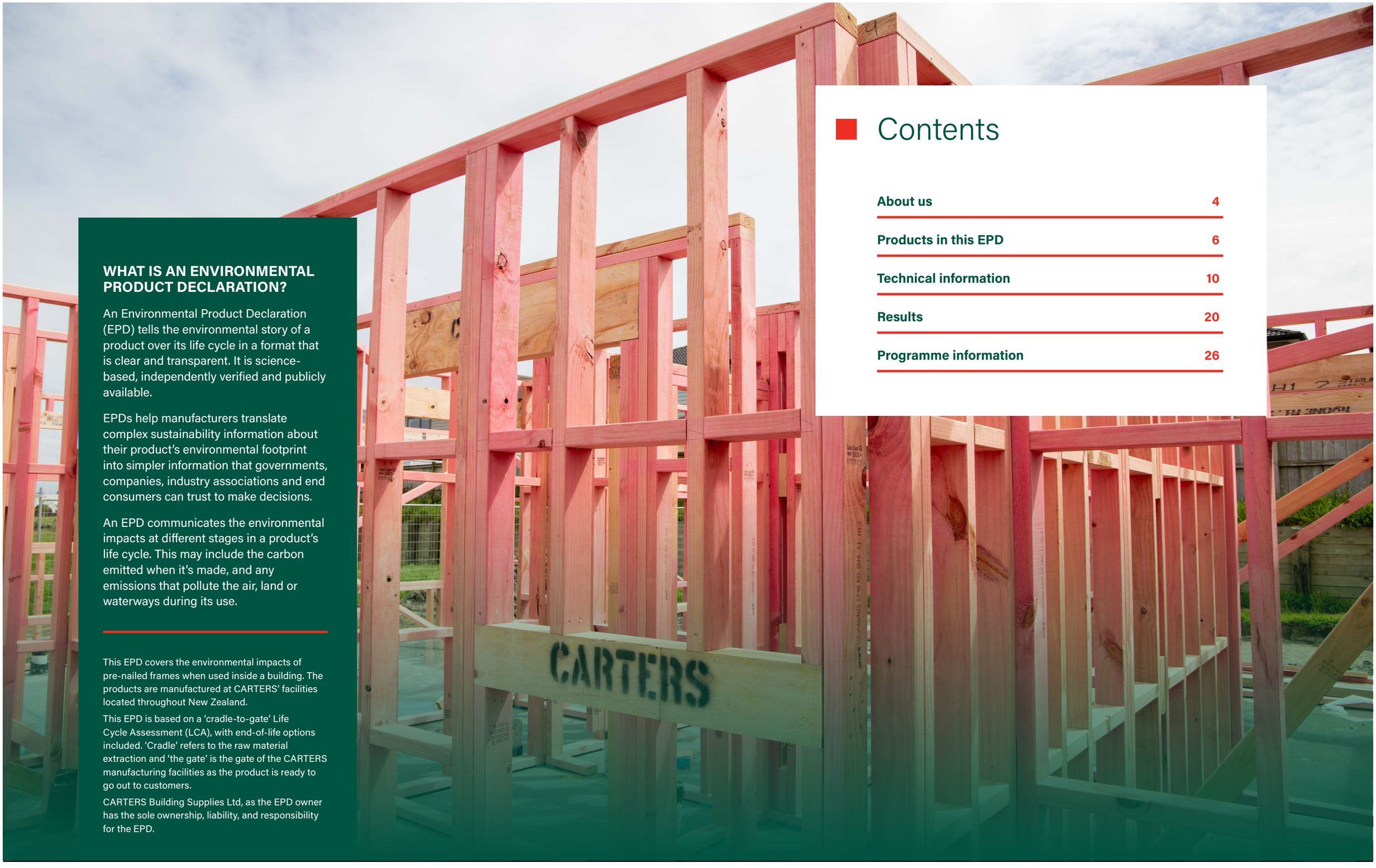
150 YEARS

50 BRANCHES

1 ACCOUNT



WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

An Environmental Product Declaration (EPD) tells the environmental story of a product over its life cycle in a format that is clear and transparent. It is science-based, independently verified and publicly available.

EPDs help manufacturers translate complex sustainability information about their product's environmental footprint into simpler information that governments, companies, industry associations and end consumers can trust to make decisions.

An EPD communicates the environmental impacts at different stages in a product's life cycle. This may include the carbon emitted when it's made, and any emissions that pollute the air, land or waterways during its use.

This EPD covers the environmental impacts of pre-nailed frames when used inside a building. The products are manufactured at CARTERS' facilities located throughout New Zealand.

This EPD is based on a 'cradle-to-gate' Life Cycle Assessment (LCA), with end-of-life options included. 'Cradle' refers to the raw material extraction and 'the gate' is the gate of the CARTERS manufacturing facilities as the product is ready to go out to customers.

CARTERS Building Supplies Ltd, as the EPD owner has the sole ownership, liability, and responsibility for the EPD.

CARTERS Your Building Partner

Contents

About us

CARTERS BUILDING SUPPLIES

After over 150 years in the industry, we're committed to partnering with the building trade. We have a nationwide chain of 50 building supply stores and nine manufacturing plants that support builders right across New Zealand.

As part of the Carter Holt Harvey Group, CARTERS offer a range of trade-quality building supplies for both residential and commercial projects, rural farm supplies and more. Products include those sourced from CARTERS sister companies, Carter Holt Harvey Building Products (supplying timber), Carter Holt Harvey Plywood, and Carter Holt Harvey LVL.

We actively engage with building industry events and sponsorships to give back to our customers and ensure they remain updated with their Licensed Building Practitioner (LBP) points and education. Customers can also benefit from our Advantage loyalty program, which rewards them for their business.

A digital tool belt is just a click away for CARTERS Account holders when they log in to the Trade Portal and Trade App. Get in touch with us today to find out more about partnering with CARTERS.

CARTERS Your Building Partner

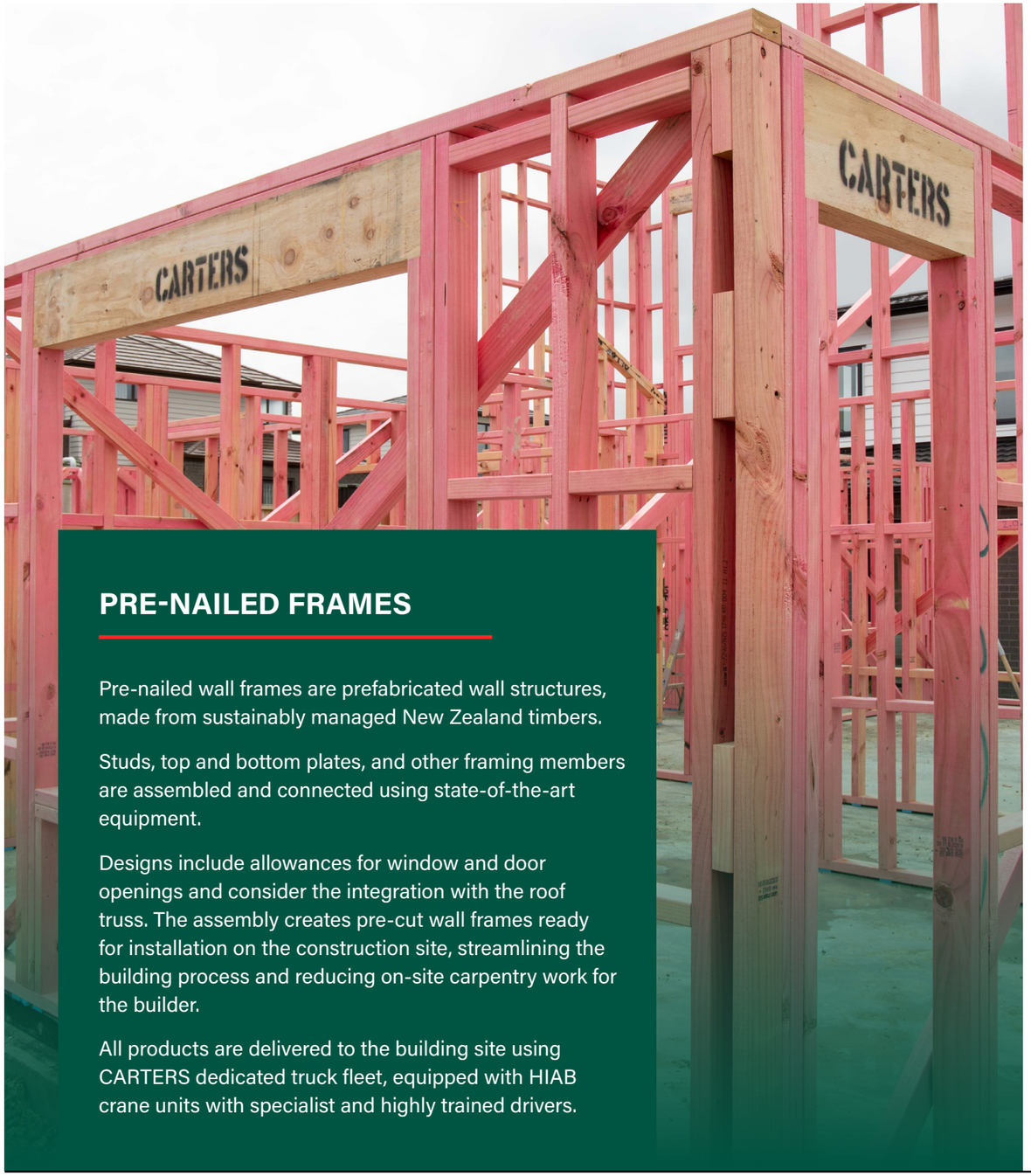
SUSTAINABILITY

CARTERS and Carter Holt Harvey take a sustainable approach to the way they operate and grow the business. The company's commitment to the environment is fundamental to its business.

From the use of plantation forests to promoting polices minimising waste and emissions, we endeavour to continually strive to be an outstanding business in everything the company does.

For CARTERS, this includes everything from manufacturing to service delivery, with sustainable solutions at the core of this. The CARTERS EPDs are a demonstration of the continual focus and commitment to sustainability, through a science-driven, independently verifiable process with standard methodology across all products.

Products in this EPD



PRE-NAILED FRAMES

Pre-nailed wall frames are prefabricated wall structures, made from sustainably managed New Zealand timbers.

Studs, top and bottom plates, and other framing members are assembled and connected using state-of-the-art equipment.

Designs include allowances for window and door openings and consider the integration with the roof truss. The assembly creates pre-cut wall frames ready for installation on the construction site, streamlining the building process and reducing on-site carpentry work for the builder.

All products are delivered to the building site using CARTERS dedicated truck fleet, equipped with HIAB crane units with specialist and highly trained drivers.

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MANUFACTURING LOCATIONS

CARTERS Building Supplies are one of New Zealand's largest off-site manufacturers of pre-nailed frames, trusses and cassette floors – providing a crucial product and service in the local building industry.

CARTERS Building Supplies have nationwide manufacturing facilities across the nine plants shown on the map. All roof trusses and wall frames are manufactured to meet the New Zealand Standards NZS3603 (Timber Structures) and NZS3622 (Verification of Timber Properties), as referenced in the New Zealand Building Code. CARTERS is a licensed MiTek fabricator. All plants are members of the Frame and Truss Manufacturers Association (FTMA).

FTMA NEW ZEALAND

ENVIRONMENTAL RESPONSIBILITY

Environmental responsibility is very important throughout CARTERS manufacturing plant processes. We source all timber from domestic, sustainably managed plantations and have active programs to optimise the use of timber in our manufactured products. Forest Stewardship Council® (FSC®) timber certification for our manufactured products is available if required by customers.

The business also focuses heavily on reducing waste destined for landfill through waste reduction and recycling programs, offering customers the choice of low and no-waste packaging options for delivery onto building sites. The off-site manufactured nature of CARTERS products also has the benefit of reducing building site waste for the end customer.

FSC www.fsc.org 100% Wood from well-managed forests FSC™ C018949

FSC® ACCREDITATION

CARTERS has been assessed by the Forest Stewardship Council®, a globally recognised independent body, and granted FSC® certification (FSC-C018949) for all its production sites. This certification has assessed and confirmed CARTERS operation is using responsibly sourced wood. The certification also covers a verification program and a risk assessment for the control of wood sourced from New Zealand *Pinus radiata* plantations as well as CARTERS internal process to manage this.

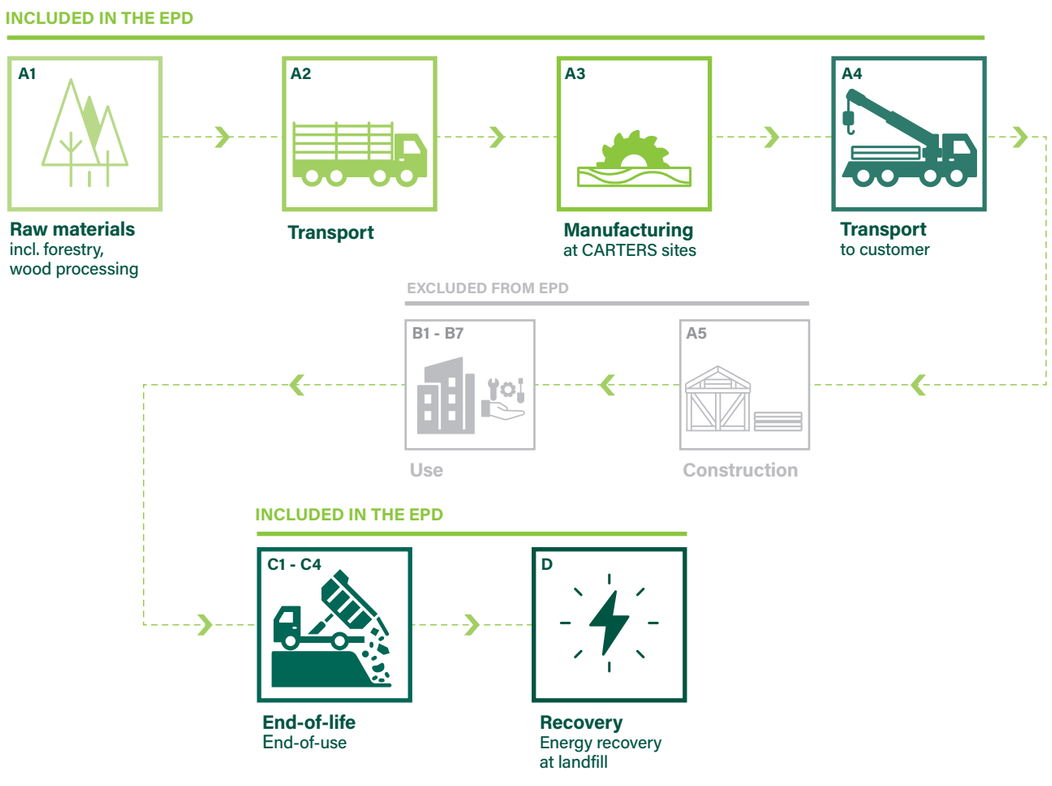
About this EPD

PRODUCT LIFE CYCLE

This is a 'cradle-to-gate with options' (type B) with modules C1-C4, module D, and optional module A4. This means that the production, end-of-life and recovery stages are modelled in this EPD. The construction process and use stages are not modelled.

The product stage involves the extraction (cradle) of all raw materials, transport to the manufacturing facilities, and the processing of the raw materials into the finalised product, as well as the production of packaging, and distributed to customers (gate).

The end-of-life stage includes the deconstruction of the building or structure, the transport to the processing facility, waste processing, and the disposal of materials that cannot be recycled.



HOW TO USE THIS EPD

CARTERS has developed this product specific EPD to help to showcase the environmental credentials of their products.

This independently verified EPD provides environmental performance information from cradle to gate (modules A1-A3), distribution (A4), plus end of life modules C1-C4 and module D.

The declared unit is one cubic metre (1 m^3) of product, plus any associated packaging. This is the total physical volume displaced by the product componentry, excluding voids.

The results may be used by specifiers and developers to calculate and present the environmental impacts of particular construction projects.

EPDS ARE NOT ALWAYS COMPARABLE

An 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).

It's important to note that EPDs within the same product category but from different programs may not be directly comparable. Construction products can only be compared if the EPDs comply with the EN 15804 standard. EPDs of construction products from a group of manufacturers (e.g. a sector EPD) may not be directly comparable to an EPD of a similar construction product that a single manufacturer has generated.

Understanding the detail is important in comparisons. Expert analysis is recommended to ensure data is truly comparable to avoid unintended misrepresentations.

Furthermore, this EPD conforms to EN 15804+A2. EPDs conforming to EN 15804+A1 are not directly comparable with those conforming to EN 15804+A2 due to differences in methodologies.

GREEN STAR

Green Star is Australasia's largest voluntary sustainability rating system for non-residential buildings, fitouts and communities.

This EPD can allow the represented products to qualify for points under the Green Building Council Australia (GBCA) Green Star rating system.

The Green Star rating system has also been adopted and adapted for New Zealand conditions by the New Zealand Green Building Council (NZGBC). CARTERS Building Supplies is proud to be a member and support NZGBC.

NZGBC
TE KAUNIHERA HANGANGA TAUTAIAO
Member 2025–2026

Technical information

DECLARED UNIT

ISO 14040 defines a functional unit as a 'quantified performance of a product system for use as a reference 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' instead.

These tables show the relevant standard and application for the products in this EPD.

Declared Unit:

1 m³ of pre-nailed frame product plus packaging

Conversion factor to mass: 535 kg/m³

Table 1. Industry classification

Product	Classification	Code	Category
Pre-nailed frames	UN CPC Ver.2.1	31600	Builders' joinery and carpentry of wood (including cellular wood panels, assembled parquet panels, shingles and shakes)
	ANZSIC 2006	1492	Wooded Structural Fitting and Component Manufacturing

Table 2. Technical specifications

Product group	Relevant standards
NZS 3604:2011	Timber-framed buildings

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'. (European Union, 2024)

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CONTENT DECLARATION

According to the General Programme Instructions, the EPD shall include a content declaration with a list of materials and chemical substances including information on their hazardous properties.

Table 3. Content declaration, pre-nailed frames – per 1 m³ product

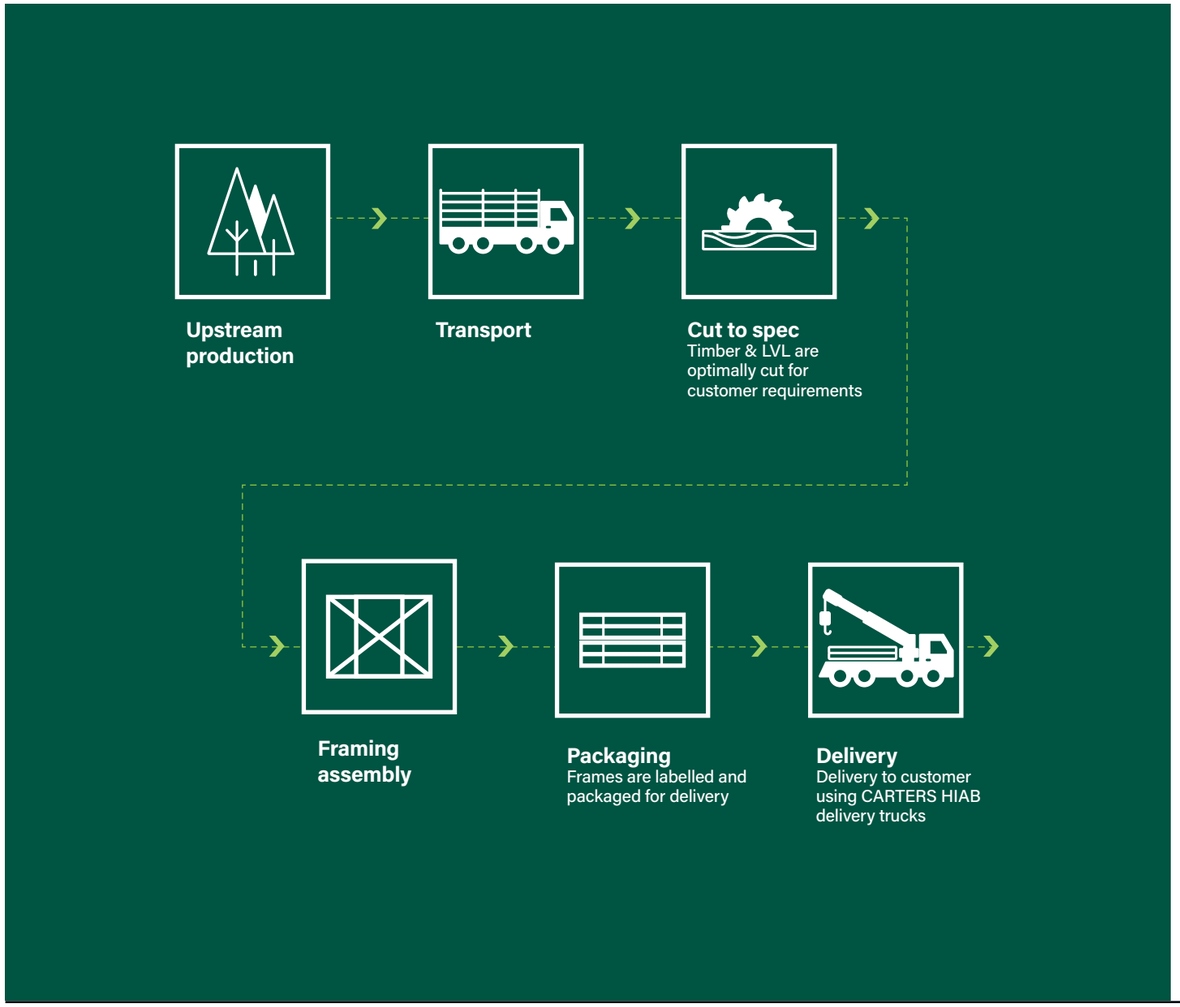
Product components	Weight kg	Post-consumer recycled material weight-% of product	Biogenic material weight-% of product	Biogenic material kg C/declared unit
Sawn timber, H1.2	469	0	50%	204
Sawn timber, H3.2	9	0	50%	4.16
LVL	48	0	50%	21.3
HyJOIST	0	0	50%	0.0121
Plywood untreated	0	0	50%	0
Plywood	0	0	50%	0
Fixings (nails, screws)	7.94	0	0	0
Plastic components	0.573	0	0	0
Sum	536			230

Table 4. Composition of packaging – per 1 m³ product

Packaging materials	Weight kg	Weight-% versus the product	Weight biogenic carbon kg C/kg
LDPE wrap	0.307	0.001	0.000
Plastic strapping	0.074	0.000	0.000
Paper labels	0.267	0.001	0.133
Sum	0.648		0.133

MANUFACTURING PROCESS

Timber and LVL inputs are received from Carter Holt Harvey processing sites. These are then optimally cut according to a design plan that matches customer requirements. Metal and plastic fixings specific to each project are also sourced. Componentry is then assembled on specialist assembly equipment, with final assembly subject to stringent quality control. Completed products are then labelled, wrapped, strapped and bundled for delivery. When required by the customer, job lots of frames are delivered to site using CARTERS own fleet of HIAB delivery trucks.



SYSTEM BOUNDARIES

In Life Cycle Assessments (LCA), the system boundary is a line that divides the processes which are included from those which are excluded.

As shown in table 5, this is a 'cradle-to-gate with options' (type B) with modules C1-C4, module D, and optional module A4. Other life cycle stages (Modules A5, B1-B7) are dependent on particular scenarios and best modelled at the building level.

Table 5. Modules included in the scope of the EPD
X = declared module | ND = module not declared (such a declaration shall not be regarded as an indicator result of zero)

	Product stage				Construction and use stages								End-of-life				Recovery
	Raw material supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	NZ	NZ	NZ	-	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	NZ
Specific data	73%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	27%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

The processes following are included in the product system to be studied. For modules beyond A3, the scenarios included are currently in use and are representative for one of the most probable alternatives.

PRODUCTION 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 product at the gate of the production site. The impacts include the production and use of material components, fuels and electricity, production of packaging materials, and waste treatment of production wastes.

Module 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 v1.3.4. (EPD International, 2024a)

MODULE A1 (RAW MATERIAL SUPPLY)

Includes the production of wood-based components – sawn timber, plywood, LVL, and HyJOIST, and fixings – nails, screws, bolts and plates. It also includes the generation and transmission of electricity in New Zealand.

MODULE A2 (TRANSPORT)

Includes the road transportation of wood components from manufacturing sites to CARTERS sites. Transport of most fixings used in CARTERS' production is a combination of truck and sea freight.

MODULE A3 (MANUFACTURING)

Manufacturing of CARTERS' prefabricated pre-nailed frames includes cutting to length and shape, trimming, and fastening, on-site movement by forklifts, and the recycling and landfilling of manufacturing waste.

CONSTRUCTION STAGE
(MODULE A4)

Construction stage includes the delivery of finished product between average/typical manufacturing and building sites.

Table 6. Transport to building site

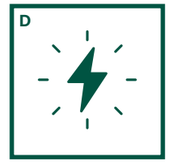
Scenario information	Unit expressed per declared unit
Fuel type and consumption, vehicle type used for transport.	Truck, Euro V, more than 32 t, 24 t payload Diesel usage: 0.0138 l/m³km
Average/typical distance	104 km
Capacity utilisation (including empty returns)	50%
Bulk density of transported products	535 kg/m³
Volume capacity utilisation factor (factor: =1 or < 1 or ≥ 1 for compressed or nested packaged products)	Not applicable

END OF LIFE
(MODULES C1-C4)

The scenario assumed is that timber framing components form part of a building at end-of-life. BRANZ indicates that the recovery levels of sawn timber in New Zealand are typically 0%, but in best-practice cases up to 25% of sawn timber may be recovered (BRANZ, 2022). As a conservative approach, it is assumed that all end-of-life materials are sent to landfill.

Table 7. End of life scenarios for products

Process	Unit expressed per m³ of pre-nailed frames
Collection process specified by type	1 m³ collected as mixed construction waste
Disposal specified by type	1 m³ timber for final deposition
Assumptions for scenario development, e.g. transportation	→ C1 – demolishing with an Excavator (100 kW); fuel consumption is calculated at 0.172 kg diesel input per tonne of material → C2 – 50 km of transport by truck with a utilisation rate of 50% → C3 – nil waste processing for recycling → C4 – 100% of recovered material is landfilled: timber on landfill.



RECOVERY AND RECYCLING POTENTIAL
(MODULE D)

Typically, almost 70% of methane from product decomposition in New Zealand landfills is captured. Of the methane captured, three-quarters is used to generate electricity. (Ministry for the Environment, 2019) and on methane capture efficiency (Hyder Consulting, 2007).

Life cycle inventory (LCI)

UPSTREAM DATA

Data for upstream raw materials and unit processes were obtained from the Managed LCA Content (MLC) Database (formerly known as GaBi LCI database).

Forestry and log supply data are based on previous LCA studies conducted for Carter Holt Harvey. Similarly, these same studies provide data life cycle inventory data for the manufacture of sawn timber, plywood, LVL, and HyJOIST at CHH sites (Carter Holt Harvey, 2023a, 2023b, 2023c).

Where necessary, this data has been updated with newer New Zealand electricity, diesel, and natural gas input processes. Location-based water inputs are used and regionalised for New Zealand.

Transport and distances have been modelled for specific supply dynamics.

LCA SOFTWARE AND DATABASE

The LCA model was created using the Life Cycle for Experts (LCAFE) (formerly known as GaBi Software) v10.9.0.31 for life cycle engineering, developed by Sphera Solutions, Inc.

The MLC Database v2024.2 (Sphera, 2024) provides the life cycle inventory data for several of the raw and process materials obtained from the background system.

ELECTRICITY

CARTERS has direct control of the electricity used within its manufacturing facilities. A residual mix dataset was used to model electricity use at these sites.

The composition of the residual electricity grid mix of New Zealand is modelled in LCAFE based on published data for the year 1 April 2021 – 31 March 2022 (BraveTrace, 2023). The New Zealand residual electricity mix is made up of hydro (56.6%), geothermal (19.7%) natural gas (12.5%), wind (6.55%), coal (4.25%), biomass (0.266%) and biogas (0.160%).

Generation site consumption (3.00%), and the low voltage (<1kV) grid's transmission and distribution losses (6.73%) are calculated based on data from the Ministry of Business, Innovation & Employment (MBIE, 2023).

The emission factor for the New Zealand residual grid mix for the GWP-GHG indicator is 0.151 kg CO_2-eq./kWh (based on EF3.1).

RECYCLING AND RECYCLED INPUTS

No recycled inputs were used in the manufacture of this product.

TRANSPORT

Actual transport modes and distances, including within module A1 where known, have been used. Container shipping, roll-on/roll-off ferry (inter-island), and heavy goods road transport were the three modes used for modelling module A2. The datasets used for the study were:

- Truck-trailer, Euro VI D-E, 34-40 t gross weight / 27 t payload capacity
- Container ship, 5,000 to 200,000 dwt payload capacity, deep sea
- Ro/ro ship, 1,200 to 10,000 dwt payload capacity

Where the transport distances were unknown – typically for the supply of minor components – a transport distance from the Port of Tauranga was used.

For wastes and recyclables, a transport distance of 50 kilometres has been assumed.

EXPLANATION OF IDENTICAL PRODUCTS & VARIATION

This is an EPD of one product (i.e. identical) manufactured at nine sites. The results were calculated for identical products produced at multiple sites and weighted based on the sales volume for CY2023. The variation for the GWP-GHG indicator results is 27% across modules A1-A3.

CUT OFF CRITERIA

thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the foreground production process, ('capital goods') regardless of potential significance.

Infrastructure/capital goods are excluded from all MLC datasets. An important exception is the inclusion of capital goods for electricity generation, where the capital goods are very important for modelling of changes towards more renewable generation. Capital goods related to electricity generation are included in all MLC electricity datasets.

Note: The system boundaries on manufacturing of equipment and for employees are not regarded as limiting the scope of the inventory or as an incomplete inventory (i.e. a cut-off).

Cut-off criteria were also applied to the packaging materials given most of them are reused or sent for recycling.

The effects of the exclusions are minimal (meeting the <1% flow exclusion criteria), given the impacts of CARTERS' prefabricated products are largely driven by upstream wood product and fixings production.

ALLOCATION

Process inputs, energy, water and waste used during product manufacture were allocated on a mass basis.

Upstream allocation within log supply and wood product production occurred within contributing CHH LCA studies (Carter Holt Harvey, 2023a, 2023b, 2023c).

Allocation of waste

The allocation of waste follows the 'polluter-pays' principle, as outlined in PCR 2019:14 v1.3.4 section 4.5.2 (EPD International, 2024a)

Packaging waste materials that are sent for landfill reach their end-of-waste state once they reach the landfill. The transport to the landfill is accounted for.

ASSUMPTIONS

Assumptions made during the LCI collection and modelling process are as follows:

- Cut-off criteria, as per the PCR 2019:14 version 1.3.4 (EPD International, 2024a), are reasonable in the context of the overall impacts of CARTERS prefabricated building components.
- Where specific life cycle inventory data were unavailable, proxy data were used, giving preference to regional data
- Use of any required secondary data from outside New Zealand is sufficiently representative of the impacts of the material – for example, fixings.
- All zinc fixings are sourced from Asia. This is the conservative position. Some zinc fittings are sourced from New Zealand and Australia, others from Taiwan.
- All stainless-steel and galvanised fixings are shipped from China.
- It is assumed that all fittings are landed in and distributed from Tauranga.
- Consumables – paints, crayons, and gun oil, are assumed to be sourced locally by each branch.

Assessment indicators

An introduction to the core environmental impact indicators is provided below. The best-known effect of each indicator is listed in the descriptions and the abbreviations, in brackets, correspond to the labels in the following results tables. The EN 15804 reference package based on EF 3.1 is used.

Environmental impact indicators described

Climate change (global warming potential)

(GWP-total, GWP-fossil, GWP-biogenic, GWP-luluc)

A measure of greenhouse gas emissions, such as CO_2 and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may in turn have adverse impacts on ecosystem health, human health and material welfare. GWP is split into three sub-indicators: fossil, biogenic, and land-use and land-use change.

Ozone depletion potential

(ODP)

Depletion of the ozone leads to higher levels of UVB ultraviolet rays reaching the earth's surface with detrimental effects on humans and plants. The ozone depletion potential is a measure of air emissions that contribute to the depletion of the stratospheric ozone layer.

Acidification potential

(AP)

Acidification potential is a measure of emissions that cause acidifying effects to the environment. A molecule's acidification potential indicates its capacity to increase the hydrogen ion (H+) concentration in the presence of water, thus decreasing the pH value. Potential effects include fish mortality, forest decline, and the deterioration of building materials.

Eutrophication potential

(EP-freshwater, EP-marine, EP-terrestrial)

Eutrophication covers all potential impacts of excessively high levels of macronutrients, the most important of which are nitrogen (N)and phosphorus (P). In aquatic ecosystems where this term is mostly applied, this typically describes a degradation in water quality. Eutrophication can result in an undesirable change in the type of species that flourish and an increase in the production of biomass. As the decomposition of biomass consumes oxygen, eutrophication may decrease the available oxygen level in the water column and threaten fish in their ability to respire.

Photochemical ozone formation potential

(POCP)

Photochemical ozone formation potential gives an indication of the emissions from precursors that contribute to ground level smog formation, mainly ozone (O_3). Ground level ozone may be harmful to human health and ecosystems and may also damage crops. These emissions are produced by the reaction of volatile organic compounds (VOCs) and carbon monoxide in the presence of nitrogen oxides and UV light.

Abiotic resource depletion

(ADP-mm, ADP-fossil)

The consumption of non-renewable resources decreases the availability of these resources and their associated functions in the future. Depletion of mineral resources and non-renewable energy resources are reported separately. Depletion of mineral resources is assessed based on total reserves.

Water use

(WDP)

Water scarcity is a measure of the stress on a region due to water consumption.

Results

The following tables show results for one declared unit: 1 m³ (535 kg) pre-nailed frames.

CORE ENVIRONMENTAL IMPACT INDICATORS

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. Since modules C, D, and A4 are included in the EPD, the use of module A1-A3 results without considering the results of modules C, D, and A4 is discouraged.

Table 8. Abbreviations environmental indicators

Abbr	Indicator
GWP-total	Climate change (total)
GWP-fossil	Climate change (fossil)
GWP-biogenic	Climate change (biogenic)
GWP-luluc	Climate change (land use and land use change)
ODP	Depletion potential of the stratospheric ozone layer
AP	Acidification potential of land and water
EP-freshwater	Eutrophication potential (freshwater)
EP-marine	Eutrophication aquatic (marine)
EP-terrestrial	Eutrophication (terrestrial)
POCP	Photochemical ozone formation
ADP-mm	Depletion abiotic resources – minerals & metals[1]
ADP-fossil	Depletion abiotic resources – fossil fuels[1]
WDP	Water use deprivation[1]

Table 9. Core environmental indicator results for pre-nailed frames, per 1 m³

Abbr	Unit	A1-A3	A4	C1	C2	C3	C4	D	A-C variation within group
GWP	kg CO_2 eq.	-677	6.83	0.362	0.665	0	827	-0.0912	28.9%
GWP-fossil	kg CO_2 eq.	173	6.83	0.362	0.665	0	51.7	-0.0910	15.6%
GWP-biogenic	kg CO_2 eq.	-850	9.52E-05	1.05E-05	9.38E-06	0	775	-1.71E-04	12.5%
GWP-luluc	kg CO_2 eq.	0.0713	1.79E-04	9.39E-06	1.77E-05	0	0.0691	-6.26E-06	9.7%
ODP	kg CFC 11 eq.	9.70E-10	6.84E-13	3.58E-14	6.73E-14	0	9.29E-11	-9.60E-15	112.8%
AP	Mol H+ eq.	2.03	0.0370	0.00188	0.00118	0	0.193	-4.34E-04	166.9%
EP-freshwater	kg P eq.	5.01E-04	1.05E-06	5.50E-08	1.03E-07	0	4.37E-05	-1.07E-07	15.1%
EP-marine	kg N eq.	0.835	0.0184	9.12E-04	5.27E-04	0	0.0542	-8.66E-05	187.5%
EP-terrestrial	Mol N eq.	9.66	0.202	0.00998	0.00578	0	0.597	-0.00153	173.0%
POCP	kg NMVOC eq.	2.63	0.0385	0.00257	0.00140	0	0.157	-2.23E-04	180.9%
ADP-mm	kg Sb eq.	5.63E-04	8.99E-08	4.71E-09	8.85E-09	0	2.27E-06	-9.54E-09	23.6%
ADP-fossil	MJ	1,990	90.2	4.72	8.88	0	765	-0.951	4.0%
WDP	m³ world eq.	42.0	0.0257	0.00135	0.00253	0	-0.527	-0.149	8.6%

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.

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ADDITIONAL ENVIRONMENTAL INDICATORS

Optional environmental categories provide further information on environmental impacts.

Table 10. Abbreviations additional environmental indicators

Abbr	Indicator
GWP-GHG	Global warming potential[2]
GWP-GHG (IPCC AR5)	IPCC AR5 GWP-GHG[3]
PM	Respiratory inorganics
IRP	Ionising Radiation – human health[4]
ETP-fw	Ecotoxicity – freshwater[5]
HTPc	Human Toxicity, cancer[5,6]
HTPnc	Human Toxicity, non-cancer[5,6]
SQP	Land use related impacts / soil quality[5,6]

Table 11. Additional environmental indicator results for pre-nailed frames, per 1 m³

Abbr	Unit	A1-A3	A4	C1	C2	C3	C4	D	A-C variation within group
GWP-GHG	kg CO_2 eq.	177	6.83	0.362	0.665	0	56.8	-0.0912	20.0%
GWP-GHG (IPCC AR5)	kg CO_2 eq.	177	6.83	0.362	0.665	0	56.5	-0.0912	19.2%
PM	Disease incidences	3.68E-05	2.53E-07	2.37E-08	1.48E-08	0	1.52E-06	-3.22E-09	209.9%
IRP	kBq U235 eq.	4.51	0.00189	9.89E-05	1.86E-04	0	0.439	-5.86E-05	107.6%
ETP-fw	CTUe	8,340	40.3	2.11	3.96	0	361	-9.01	65.4%
HTPc	CTUh	2.56E-07	6.64E-10	3.47E-11	6.52E-11	0	7.90E-09	-5.16E-11	85.3%
HTPnc	CTUh	1.49E-05	1.46E-08	7.66E-10	1.43E-09	0	2.19E-07	-8.10E-11	19.2%
SQP	Pt	615	0.184	0.00962	0.0181	0	56.4	-0.169	41.8%

2 This indicator should be 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 (EPD International, 2024b). In this study it is calculated by subtracting the value of Climate change – biogenic (GWP-biogenic) from the value of Climate change – total (GWP-total) since the ecoinvent Excel LCIA results do not include the indicator.

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 (PCR2019:14v1.3.2). 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 from 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, non-cancer 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.

6 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.

RESOURCE USE INDICATORS

The resource use indicators describe the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water.

Table 12. Abbreviations resource use indicators

Abbr	Indicator
PERE	Renewable primary energy as energy carrier
PERM	Renewable primary energy resources as material utilization
PERT	Total use of renewable primary energy resources
PENRE	Non-renewable primary energy as energy carrier
PENRM	Non-renewable primary energy as material utilization
PENRT	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water

Table 13. Resource use indicator results for pre-nailed frames, per 1 m^3

Abbr	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	3,630	0.390	0.0204	0.0384	0	113	-5.18
PERM	MJ	8,900	0	0	0	0	0	0
PERT	MJ	12,500	0.390	0.0204	0.0384	0	113	-5.18
PENRE	MJ	1,990	90.2	4.72	8.88	0	765	-0.951
PENRM	MJ	0.163	0	0	0	0	0	0
PENRT	MJ	1,990	90.2	4.72	8.88	0	765	-0.951
SM	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3	2.43	5.23E-04	2.74E-05	5.15E-05	0	0.0691	-0.0109

WASTE MATERIAL AND OUTPUT FLOW INDICATORS

Waste indicators describe waste generated within the life cycle of the product. Waste is categorised by hazard class, end-of-life fate and exported energy content.

Table 14. Abbreviations waste material and output flow indicators

Abbr	Indicator
HWD	Hazardous waste disposed
NHWD	Non-hazardous waste disposed
RWD	Radioactive waste disposed
CRU	Components for re-use
MFR	Materials for recycling
MER	Materials for energy recovery
EEE	Exported electrical energy
EET	Exported thermal energy

Table 15. Waste material and output flow indicator results for pre-nailed frames, per 1 m^3

Abbr	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	1.04E-05	1.45E-09	7.61E-11	1.43E-10	0	1.18E-07	-3.73E-11
NHWD	kg	132	0.00221	1.16E-04	2.18E-04	0	535	-7.33E-04
RWD	kg	0.0140	1.76E-05	9.22E-07	1.73E-06	0	0.00414	-4.01E-07
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0.959	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	2.21	0
EET	MJ	0	0	0	0	0	0	0

BIOGENIC CARBON CONTENT

Biogenic carbon refers to the carbon stored in organic materials. This is sequestered during growth and released at end of life. EN15804+A2 requires the declaration of biogenic carbon content of the product and its packaging.

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

Table 16. Biogenic carbon content indicator results for pre-nailed frames, per 1 m^3

Indicator	Abbr	Unit	A1-A3
Biogenic carbon content – product	BCC-prod	kg	233
Biogenic carbon content – packaging	BCC-pack	kg	0.0355

EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS

EN15804+A1 results are included to aid comparison and backwards compatibility with rating tools.

Table 17. Abbreviations for EN15804+A1 additional environmental impact indicators

Abbr	Indicator
GWP-GHG (EN15804+A1)	Global warming potential (total)
ODP (EN15804+A1)	Depletion potential of the stratospheric ozone layer
AP (EN15804+A1)	Acidification potential of land and water
EP (EN15804+A1)	Eutrophication potential
POCP (EN15804+A1)	Photochemical ozone creation potential
ADPE (EN15804+A1)	Abiotic depletion potential – elements
ADPF (EN15804+A1)	Abiotic depletion potential – fossil fuels

Table 18. EN15804+A1 environmental indicator results for pre-nailed frames, per 1 m^3

Abbr	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP (EN15804+A1)	kg CO_2-eq.	-678	6.76	0.359	0.658	0	824	-0.0905
ODP (EN15804+A1)	kg CFC11-eq.	9.84E-10	8.05E-13	4.22E-14	7.93E-14	0	1.09E-10	-1.15E-14
AP (EN15804+A1)	kg SO_2-eq.	1.43	0.0253	0.00130	8.41E-04	0	0.151	-3.04E-04
EP (EN15804+A1)	kg PO_4^{3-}-eq.	0.299	0.00620	3.06E-04	1.78E-04	0	0.0189	-4.73E-05
POCP (EN15804+A1)	kg C_2H_4-eq.	0.410	-0.00779	1.35E-04	-2.02E-05	0	0.0103	-1.42E-05
ADPE (EN15804+A1)	kg Sb-eq.	5.63E-04	9.00E-08	4.71E-09	8.87E-09	0	2.30E-06	-9.52E-09
ADPF (EN15804+A1)	MJ	1,950	89.6	4.69	8.82	0	750	-0.950

While the indicators and characterisation methods are from EN15804:2012+A1:2013, other LCA rules for the study (system boundaries, allocation, etc.) are according to EN15804:2012+A2:2019; i.e. this study does not claim that the results of the 'A1 indicators' are compliant with EN15804:2012+A1:2013.

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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.

Programme information

Declaration owner	**CARTERS Building Supplies Limited** Post: 64-68 Harris Road, East Tamaki, Auckland 2013 New Zealand Web: www.carters.co.nz Email: EPDenquiries@carters.co.nz	
Geographical scope	New Zealand	
Reference year	2023-01-01-to 2023-12-31	
LCA accountability	**thinkstep Ltd** Barbara Nebel, Ian Appleton, Chanjief Chandrakumar Post: 11 Rawhiti Road, Pukerua Bay 5026 Wellington, New Zealand Web: thinkstep-anz.com Email: anz@thinkstep-anz.com	
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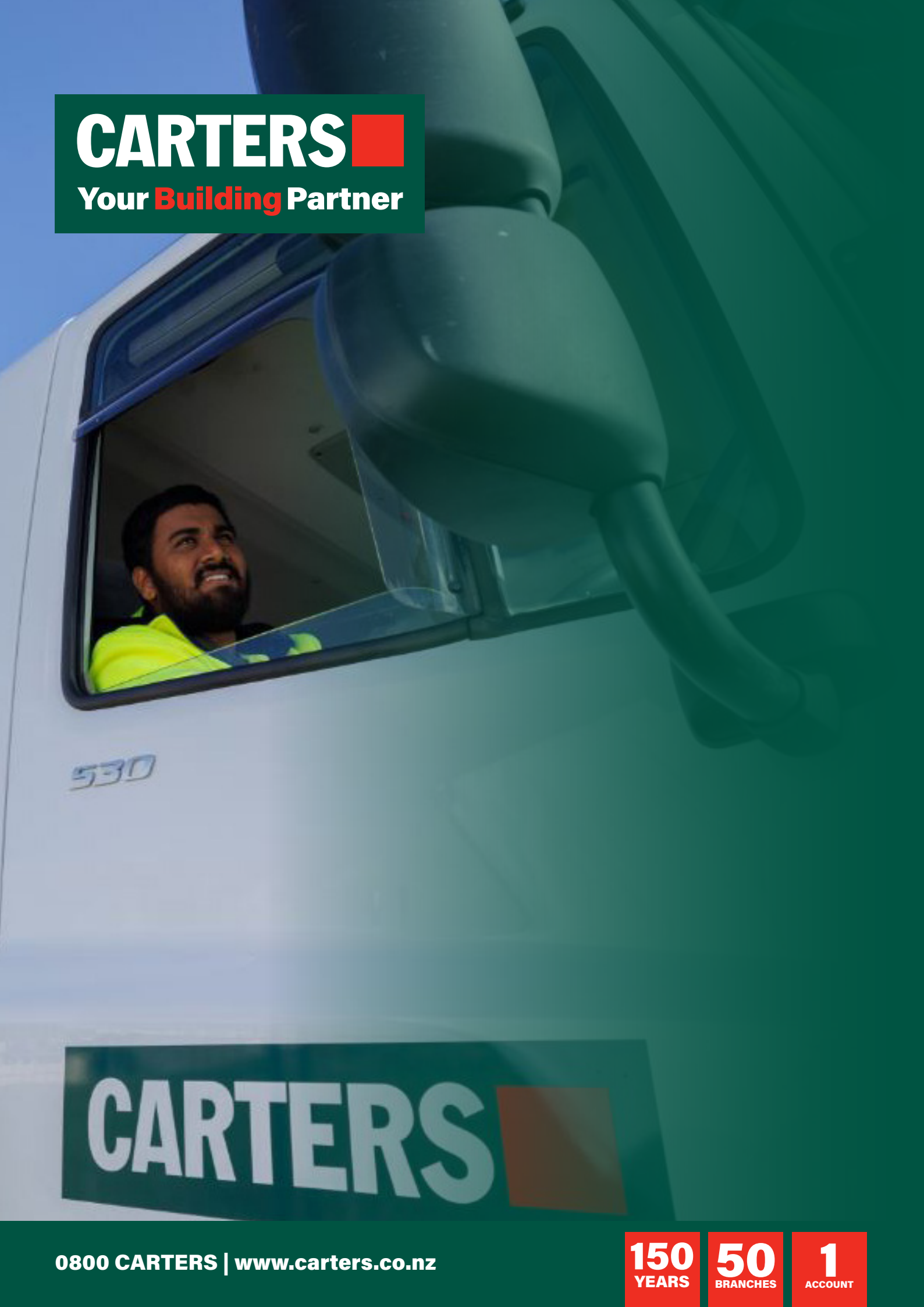
Regional programme	**EPD Australasia Limited** Post: 315a Hardy Street 7010 Nelson, New Zealand Web: www.epd-australasia.com Email: info@epd-australasia.com	
PCR	**CEN standard EN 15804 serve as the core Product Category Rules (PCR)** PCR 2019.14 Construction Products, version 1.3.4 (published on 2024-04-30, valid until 2025-06-20). (EPD International, 2024a) c-PCR Wood and Wood based products for use in construction (EN16485), (published on 2025-04-08). (EPD International, 2025)	
PCR review 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/support	
Independent verification of the declaration and data, according to ISO 14025:	☐ EPD process certification (Internal) ☑ EPD verification (External)	
Third party verifier	Andrew D Moore, Life Cycle Logic Pty Ltd Email: andrew@lifecyclelogic.com.au	
Approved by	**EPD Australasia Limited**	
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ yes ☑ no	



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150 YEARS

50 BRANCHES

1 ACCOUNT