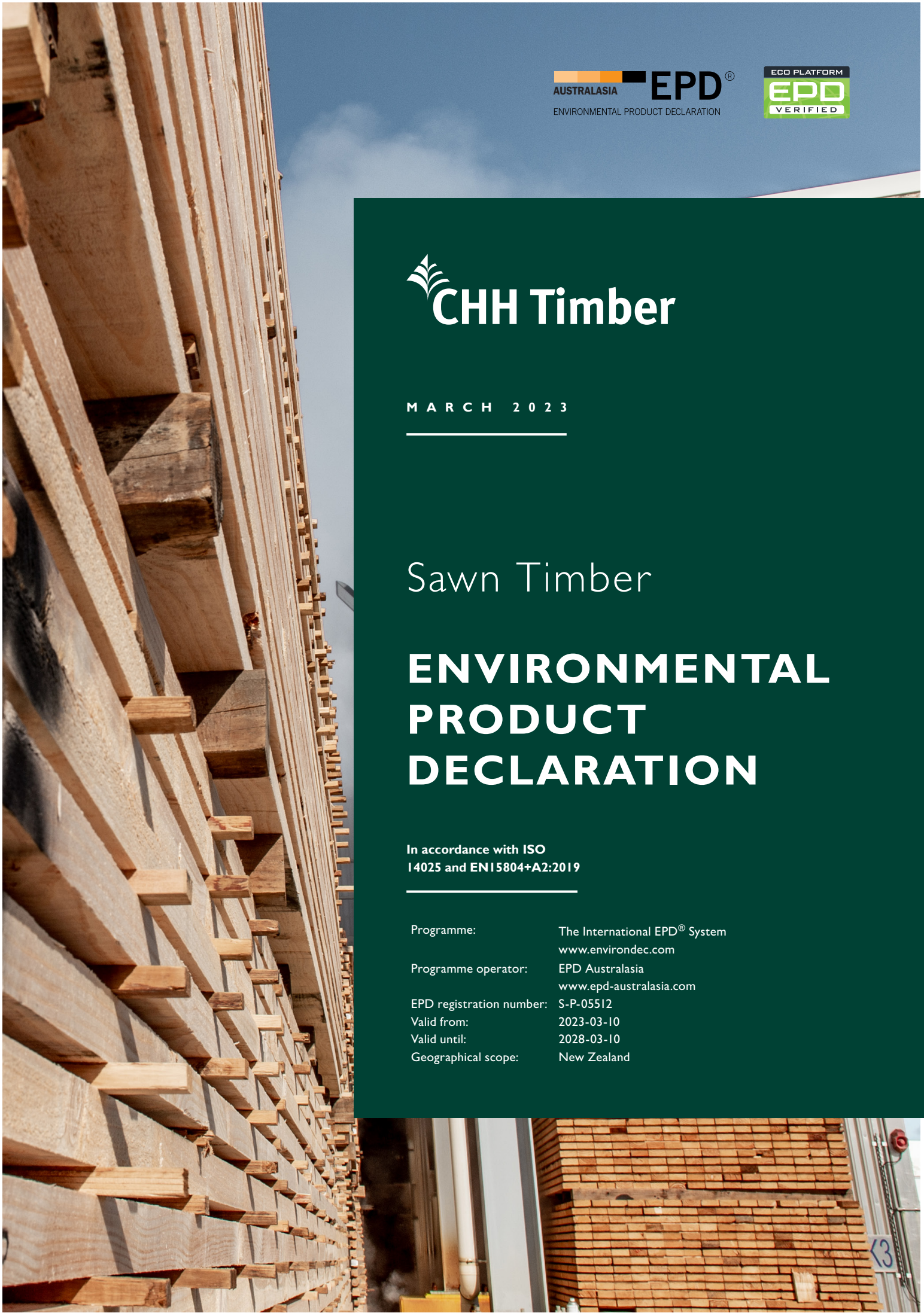

AUSTRALASIA EPD®
ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

CHH Timber

MARCH 2023

Sawn Timber

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN15804+A2:2019

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD Australasia www.epd-australasia.com
EPD registration number:	S-P-05512
Valid from:	2023-03-10
Valid until:	2028-03-10
Geographical scope:	New Zealand

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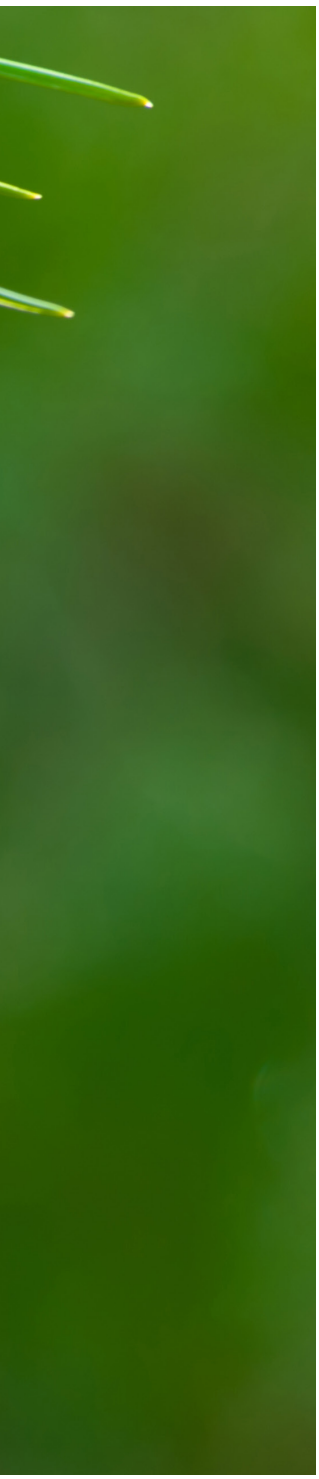


WHAT IS AN EPD?

Carter Holt Harvey recognizes the importance of providing transparent and independently verified environmental impact information about its products. An Environmental Product Declaration (EPD) is a robust, science based, independently verified and standardized method for communicating the environmental impacts of products.

This EPD covers the environmental impacts of Carter Holt Harvey sawn timber for application both within and outside the building envelope subject to treatment level. The products are manufactured within the Carter Holt Harvey Sawmills and processing plants located in Nelson and Kawerau, with treatment of some products completed at its Kinleith treatment facility, 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 Kawerau and Nelson sawmills as the product is ready to go out to customers.

Carter Holt Harvey, as the EPD owner has the sole ownership, liability, and responsibility for the EPD.

This EPD has been produced in accordance with a consistent set of rules known as product category rules (PCR). EPDs within the same product category from different programmes may not be comparable.

EPDs of construction products may not be comparable if they do not comply with EN15804+A2 or if they are produced using different product category rules.

ABOUT CARTER HOLT HARVEY

Carter Holt Harvey (CHH) is one of New Zealand's leading forest products companies, manufacturing and supplying timber, laminated veneer lumber (LVL), plywood and other building products to the New Zealand market.

Carter Holt Harvey together with its legacy companies has been a feature of the Australasian timber industry for more than 150 years.

Over the past decade, it has reconfigured its asset base through a combination of organic growth, capacity expansions at key sites and investment in technology.

CHH has consistently introduced new processes to improve productivity, and kept the business streamlined by closing smaller, inefficient facilities.

Today, Carter Holt Harvey is organised into four business units: Carter Holt Harvey Building Products (CHH Timber), Carter Holt Harvey Plywood (CHH Plywood), Carter Holt Harvey LVL (Futurebuild® LVL) and Carters Building Supplies.

CHH Timber is one of the largest and oldest producers of timber building products across New Zealand. Manufacturing timber across the Kawerau, Kinleith and Nelson Mill facilities, CHH Timber produces brands Laserframe® and Pinex® for use in structurally graded or outdoor timber applications.

SUSTAINABLE GROWTH

Carter Holt Harvey takes a sustainable approach to the way the company operates and grows its business. The company's commitment to the environment is fundamental to its business. From the use of plantation forests to promoting polices minimizing waste and emissions, CHH is proud of the sustainable base for its products. CHH continually strives to be an outstanding business in everything the company does, from manufacturing to service delivery with sustainable solutions at the core of this.

The CHH 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.

CarterHoltHarvey

BUSINESS UNITS

CHH Timber

CHH PLY

futurebuild LVL®

CARTERS
Your Building Partner

RESPONSIBLE OPERATIONS

FSC AND SUSTAINABILITY ACCREDITATIONS

CHH Timber has been assessed by the Forest Stewardship Council®, a globally recognised independent body, and granted FSC® certification (FSC® C011498 and FSC® C021357) for all its production sites. This certification commonly known as FSC has assessed and confirmed CHH Timber 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 and CHH Timber internal process to manage this.

THIRD PARTY QUALITY ASSURANCE PROGRAM

CHH Timber has strict quality assurance processes in place to monitor that Laserframe adequately satisfies structural and visual requirements. Bureau Veritas has been contracted to undertake independent, third-party auditing of the Machine Stress Grading processes at CHH Timber's structural mill sites. Independent audit inspections are carried out bi-annually and include:

- Audit of the Machine Stress Grading process and procedures
- Assessing the competence of personnel in relation to skills and knowledge requirements
- Verification of the calibration of testing equipment

CHH Timber also has quality assurance processes in place to monitor that its range of products satisfy the penetration and retention requirements for treatment in accordance with NZS 3640. Independent Verification Services (IVS) has been contracted to undertake independent, third-party auditing of CHH Timber's internal treatment processes at out treatment sites. Independent audit inspections are carried out bi-annually and include an audit of the treatment process and procedures. IVS also complete the verification of each treatment batch/charge for compliance with NZS 3640.

100%

OF CHH TIMBER PRODUCTS ARE DOMESTICALLY SOURCED AND MANUFACTURED

CARTER HOLT HARVEY TIMBER AND THE ENVIRONMENT

CHH Timber takes its environmental responsibility seriously with each facility having waste handling procedures to optimise recovery and manage the use of arisings whilst limiting waste. This starts with the use of only radiata pine sourced from sustainably managed renewable plantation and includes the application of optimisation algorithms for saw patterns and log rounding to enhance finished goods recovery, as well as the development of markets for the downgrading of arising product for use in industrial applications including packaging. All waste product derived is assessed for downstream applications including bark, boiler fuel and/or sold for use in wood fibre products.

Biomass-fuels

CHH Timber Nelson sawmill actively uses waste material arising from processing activities as an important energy source to generate heat used in kiln drying of timber.

Geothermal Energy

Where possible, CHH takes advantage of the opportunity to use earth's natural resources. Located near one of New Zealand's geothermal energy fields, CHH Timber Kawerau sawmill utilises geothermal energy as part of its kiln drying process.

PRODUCTS COVERED IN THIS EPD

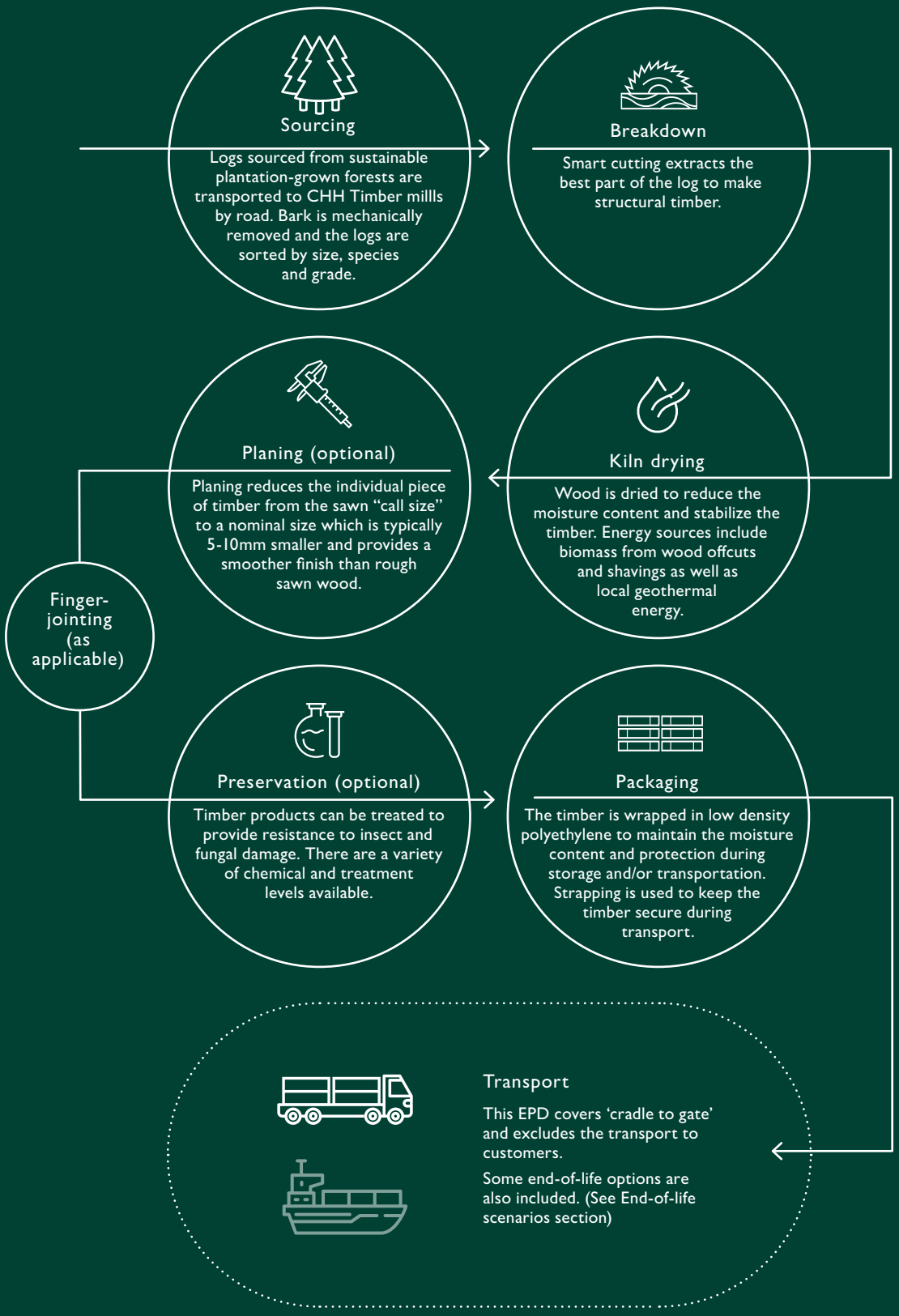
THIS EPD COVERS SAWN, GAUGED AND FINGER-JOINTED TIMBER

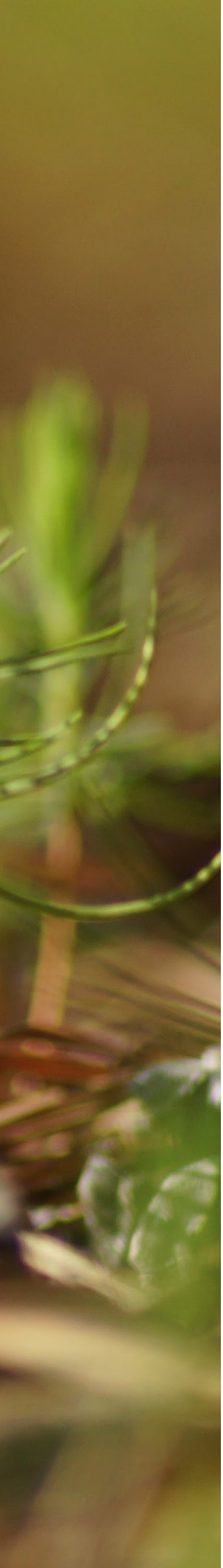
Radiata pine is sourced from sustainably managed forests for the two CHH sawmills at Kawerau and Nelson. The wood is debarked and cut to various product dimensions, maximising the fibre within the log. Subseqent processes include kiln drying to reduce the moisture content and stabilise the timber, planing to refine the surface and final dimensions and preservative treatment to ensure a long and useful life. Treatment processes use environmentally stable chemicals that meet or exceed applicable safety guidelines and standards.

PRODUCT APPLICATION

Sawn and/or gauged softwood is commonly used for structural and landscaping products. Applications include residential houses, multi-storey buildings, commercial fit-outs, home renovations, and various landscaping uses. Various treatment processes are available to meet the reqirements of different applications.

Figure 1. Manufacturing process (abridged)





HOW TO USE THIS EPD

Carter Holt Harvey has developed this product specific EPD to help to showcase the environmental credentials of their wood products. The EPD also provides life cycle data for calculating the impacts of wood products at a building level. This data may be used by specifiers and developers to calculate and present the environmental impacts of particular construction projects.

This EPD can allow the represented products to qualify for points under green rating tools, such as the Green Star rating tool of the New Zealand Green Building Council (NZGBC).

New Zealand Green Building Council states:

> *"An EPD does not imply environmental superiority; it is solely a transparent declaration of the life-cycle environmental impact. The detailed, transparent environmental data that EPDs provide is an important step towards enabling whole-of-building life cycle assessment"*

The remainder of this EPD comprises two parts. Part one is the Technical Information for the method, assumptions, description of environmental indicators. Part two contains the results from modelling the life cycle assessment of the different products.

DECLARED UNIT

ONE CUBIC METRE OF TIMBER, AS SPECIFIED IN THE TABLE BELOW, PACKAGED AND READY FOR DISPATCH TO THE CONSUMER.

Table 1. Declared Unit

Product Group	Unit	Product
Sawn, kiln-dried softwood	1 m^3	Sawn, kiln-dried softwood 13% moisture content (dry basis) with an average density of 520 kg/m^3
Sawn and gauged, kiln-dried softwood	1 m^3	Sawn and gauged, kiln-dried softwood 13% moisture content (dry basis) with an average density of 520 kg/m^3
Finger-jointed, sawn, gauged, kiln-dried softwood	1 m^3	Finger-jointed, sawn and gauged, kiln-dried softwood 13% moisture content (dry basis) with an average density of 520 kg/m^3

PRESERVATIVE TREATMENTS

Timber products produced in New Zealand can be treated to help resist insect attack and/or fungal decay. Products to be used in outdoor applications such as decking, cladding, fencing and landscaping are usually treated to the appropriate hazard class.

The sawn and gauged kiln-dried timber products listed in Table 1 may be supplied in an untreated or treated form. The treatment types shown in Table 2 are used by Carter Holt Harvey.

Table 2. Treatment class Treatment type Use

Treatment class	Treatment type	Use
H1.2	Boron	House framing
H3	CCA	Outdoor products not in ground contact, structural
H3.1	Propiconazole + Tebuconazole (LOSP)	Outdoor products (paint coating reqired), not in ground contact, non-structural
H4	CCA	Outdoor products in ground contact, non-structural
H5	CCA	Outdoor products, severe decay risk present, structural

CLASSIFICATION

Table 3 shows the classification codes and class descriptions of the products included within this EPD according to the UN CPC (Version 2.1) and ANZSIC 2006 classification systems.

Table 3. Timber products included in this EPD

Product type	Classification	Code	Category
Sawn, kiln-dried gauged, kiln-dried	UN CPC Ver.2.1	31101	Wood, sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6 mm, of coniferous wood
	ANZSIC 2006	1411 1413	Log Sawmilling Timber re-sawing and dressing
Finger-jointed, sawn, gauged, kiln-dried softwood	UN CPC Ver.2.1	31211	Wood, continuously shaped along any of its edges or faces (including strips and friezes for parquet flooring, not assembled, and beadings and mouldings) of coniferous wood, Radiata Pine.
	ANZSIC 2006	1413	Timber resawing and dressing

PRODUCT COMPOSITION

All timber products included in this EPD are of the species **Radiata Pine (*Pinus radiata*)**, grown within New Zealand in independent sustainably managed plantations and processed by CHH Timber.

Treated timber products declared within this EPD include those treated with Boron, Light Organic Solvent Preservatives (LOSP) and copper chrome arsenate (CCA).

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".

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 EPD is 'cradle-to-gate with modules C1-C4 (end-of-life processing) and module D (recycling potential). The options include end-of-life processing (Modules C3-C4) and the recycling potential (Module D).

Other life cycle stages (Modules A4-A5 and B1-B7) are dependent on particular scenarios and best modelled at the building level, therefore these modules have not been declared.

Table 4. Modules included in the scope of the EPD (X = declared module | MND = module not declared)

	Product stage			**Construction process stage**		**Use stage**								**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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	NZ	NZ	NZ	-	-	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	NZ
Specific data	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

END OF LIFE

At the end of its useful life, a timber product is removed from the building and may end up recycled, reused, combusted to produce energy, or landfilled. In New Zealand, the most common end-of-life method is landfill, especially for treated products, which have limitations for recycling and incinerating.

The landfill scenario and three other possible end of life scenarios are described below. Each scenario assumes that 100% of the wood is sent to that scenario. To create an end-of-life mix for a given region or end use, the reader should take a weighted sum of these scenarios. Where no specific data are available, the 'landfill' scenario should be used.

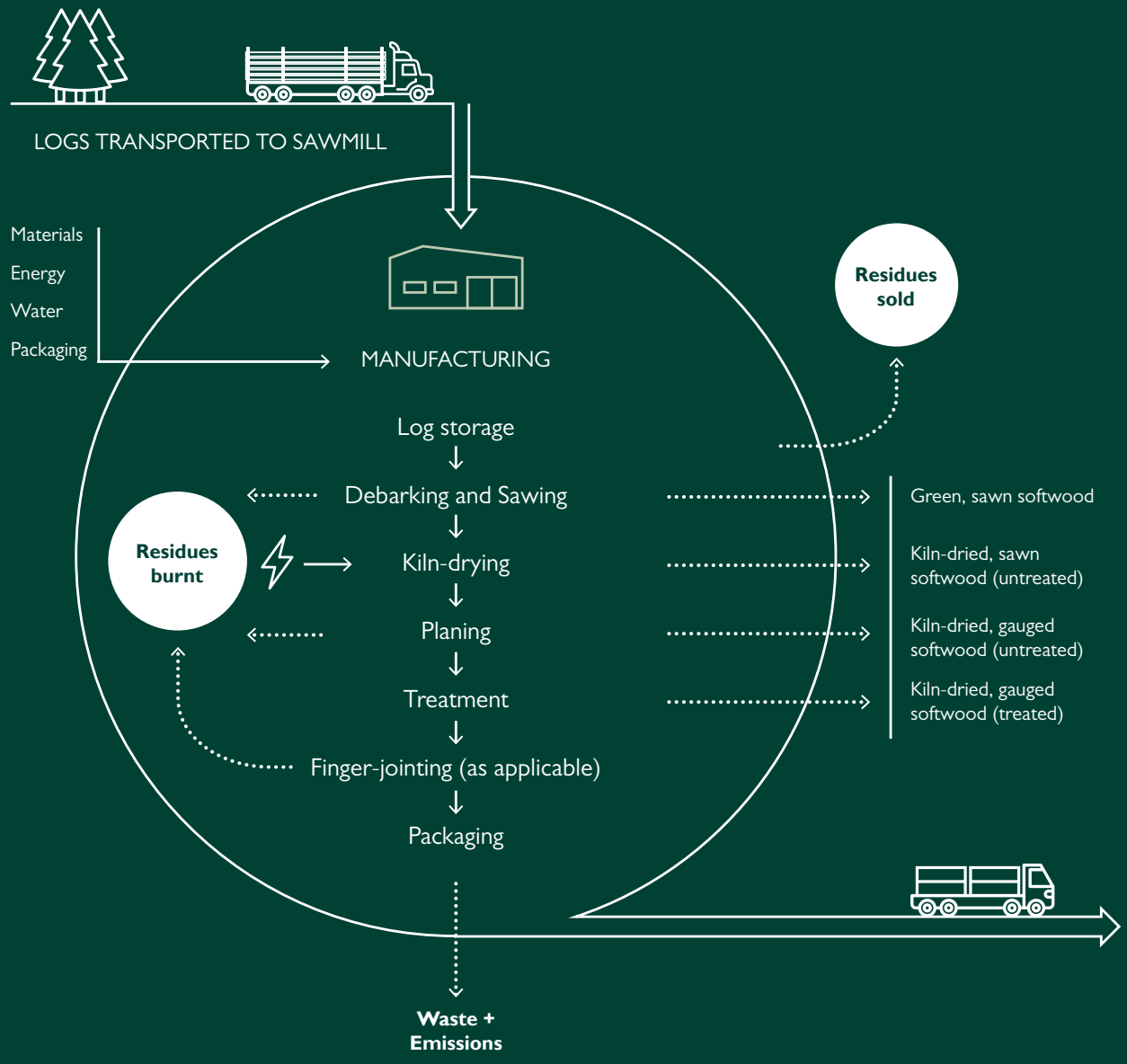
Under EN 15804+A2, the carbon sequestration of timber has a net neutral impact over the whole life cycle because all sequestered carbon is released at the end-of-life stage. This means that assumptions of the decomposition of wood products and various end-of-life scenarios all have the same effect in terms of biogenic carbon.

PRODUCTION (MODULES A1-A3)

For all timber products in this EPD, the production stage includes the forestry, sawmilling and kiln drying stages. It also includes treatment, planing, finger-jointing and laminating for the applicable products.

Figure 1 shows the basic manufacturing processes for the products included within this EPD. Each product type represents an output from a different point in the production process.

Figure 2. Manufacturing (A1-A3) process flowchart



LANDFILL

Emissions from landfill are dependent on the Degradable Organic Carbon fraction (DOCf).

The DOCf = 0.1% for radiata pine. This is based on bioreactor laboratory research by Wang et al. (2011) for *Pinus radiata*. The impacts associated with the landfill are declared in module C4. All landfill gas that is combusted for energy recovery (module C4) is assumed to occur in a power plant with an electrical conversion efficiency of 36% (Australian Government 2014, p. 189) and the resulting electricity receives a credit for offsetting average electricity from the New Zealand grid (module D) in line with EN 16485:2014 (Section 6.3.4.5).

The landfill scenario assumes the following for carbon emissions:

- Of the carbon in the wood that breaks down in landfill, 50% is methane and 50% is carbon dioxide (Australian Government 2016, Table 43).
- All carbon dioxide is released directly to the atmosphere.
- 53% of the methane is captured, based on landfills with gas capture in New Zealand (MfE, 2019) and on methane capture efficiency (Hyder Consulting, 2007).
- Of this, one quarter (13% of the total) is flared, and three quarters (40% of the total) is used for energy recovery (Carre, 2011).
- Of the 47% of methane that is not captured, 10% (5% of the total) is oxidised (released as carbon dioxide) (Australian Government, 2016a) and 90% (42% of the total) is released into the atmosphere as methane.
- In summary, for every kilogram of carbon converted to landfill gas, 80% is released as carbon dioxide and 20% is released as methane.

In accordance with EN 15804+A2, any remaining biogenic carbon not degraded is treated as an emission of biogenic CO2 to the air.

ENERGY RECOVERY

This scenario includes shredding (module C3) and combustion with the recovered thermal energy assumed to replace thermal energy from natural gas (module D) in line with EN 16485:2014 (Section 6.3.4.5). Note that other options may also be in use within New Zealand, including replacement of coal, replacement of electricity, and replacement of both electricity and thermal energy (via co-generation).

REUSE

The product is assumed to be removed from a building manually and reused with no further processing (i.e. direct reuse). Transport and wastage are excluded and only one reuse cycle is considered. The second life is assumed to be the same (or very similar) to the first, meaning that a credit is given for production of 1 m^3 of timber in module D. The CO_2 sequestered, and energy content of the wood are assumed to leave the system boundary at module C3 so that future product systems can also claim these without double-counting in line with EN 16485:2014 (Section 6.3.4.2). Any further processing, waste or transport would need to be modelled and included separately.

RECYCLING

Timber may be recycled in many different ways. This scenario considers shredding and effectively downcycling into wood chips. Wood waste is chipped (module C3) and assigned credits relative to the avoided production of virgin woodchips as a co-product from sawmilling (module D). In line with the reuse scenario, the CO_2 sequestered, and energy content of the wood are assumed to leave the system boundary at C3 so that future product systems can also claim these without double-counting (EN 16485:2014, Section 6.3.4.2).

LIFE CYCLE INVENTORY (LCI) AND ASSUMPTIONS

ENERGY

Thermal energy and transport fuels have been modelled using the Australian average as no New Zealand specific datasets are available (see Sphera, 2021 for documentation).

Electricity for timber production (modules A1-A3) has been modelled with the New Zealand-specific grid mix. The New Zealand national electricity grid production mix (Sphera 2021, electricity reference year 2018) is made up of hydro (57.02%), geothermal (17.9%) natural gas (15.97%), wind (4.85%), hard coal gases (1.44%) hard coal (1.26%), biomass (0.74%), biogas (0.59%), and photovoltaics (0.17%), lignite (0.05%) and fuel oil (0.01%). The emission factor for the New Zealand national grid for the GWP-GHG indicator is 0.145 kg CO2e/kWh..

FORESTRY

Modelling of carbon flows in the forest has been performed in line with New Zealand's Greenhouse Gas Inventory (MfE, 2021).

Forestry is modelled as being in a steady-state, meaning that – on average – all harvested trees are replanted and that soil carbon stocks remain constant over time at the national level (MfE, 2021).

Biodegradation of forest litter and forest residues are modelled as being aerobic (MfE, 2021) and therefore carbon neutral as carbon dioxide sequestered from the air during tree growth is later released back to the air as carbon dioxide.

ALLOCATION

Upstream data

For refinery products, allocation is applied by mass and net calorific value. Inventories for electricity and thermal energy generation include allocation by economic value for some by-products (e.g. gypsum, boiler ash and fly ash). Allocation by energy is applied for co-generation of heat and power.

Co-products

These include bark, woodchips, sawdust and shavings. As the difference in economic value of the co-products is high (>25% as per EN 15804, Section 6.4.3.2), allocation by economic value has been applied.

CUT-OFF CRITERIA

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR (EPD International, 2019, Section 7.5.4). All other reported data were incorporated and modelled using the best available life cycle inventory data.

PRIMARY DATA

Primary data was used for all manufacturing processes. Sawn timber, kiln-drying and gauged timber data was collected from CHH Timber sawmills located in Kawerau and Nelson, New Zealand.

Finger-jointing process data has been collected from the CHH Timber finger-jointing facility in Nelson, New Zealand.

REPRESENTATIVENESS

Geographical

All primary and secondary data were collected specific to the countries or regions under study. Where country-specific or region-specific data were unavailable, proxy data were used. Geographical representativeness is considered to be high.

Temporal

Primary data for forestry, sawmilling, kiln-drying, planning, finger-jointing, packaging and treatment was collected for the 12 month period from 1st January 2020 to 31st December 2020. All secondary data come from the GaBi 2021 databases and are representative of the years 2015-2020.

Long-term emissions (>100 years) are not taken into consideration in the impact estimate. Waste to landfill is modelled assuming a 100-year time horizon.

Technological

All primary and secondary data were modelled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used. Technological representativeness is considered to be high.

ENVIRONMENTAL IMPACT INDICATORS

An introduction 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.

CLIMATE CHANGE (GLOBAL WARMING POTENTIAL)

(GWP-total, GWPf, GWPb, GWPluc)

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. The Global Warming Potential (GWP) is split into three sub indicators: total (GWPt), fossil (GWPf), biogenic (GWPb), and land-use and land-use change (GWPluluc).

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-fw, EP-fm, EP-tr)

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, ADPf)

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 the results grouped in seven categories, each looking at different types of indicators. The headings below provide descriptions for each of these categories. Each column of numbers represents one declared unit: 1m^3 of timber, packaged and ready for dispatch to the customer.

The first row of the Environmental impact indicators, the Global Warming Potential (total) (GWPT) represents the total carbon footprint of the product. This is the sum of the biogenic carbon footprint (GWPB), mostly from the sequestration of carbon in wood, and the fossil carbon footprint (GWPF), which is mostly from the fossil fuels combusted during the production of the product. It should be noted that the GWPB is largely dependent on the density of the wood, which can vary by a large degree due to a range of factors.

For timber products, the most common value used for the carbon footprint in ratings tools like Green Star and eTool is the fossil carbon footprint (GWPF).

To assess treated product, the indicators for the specific treatment type should be combined with those of the product in question.

ENVIRONMENTAL IMPACT EN15804+A2

The reported impact categories represent impact potentials, i.e., they are approximations of environmental impacts that could occur if the emissions would (a) follow the underlying impact pathway and (b) meet certain conditions in the receiving environment while doing so. The environmental impact results are therefore relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks.

Long-term emissions (>100 years) are not taken into consideration in the impact estimate.

RESOURCE USE

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

Note: Water consumption: The FW indicator in the EPD results tables reports consumption (i.e. net use) of 'blue water' (which includes river water, lake water and ground water). This indicator deliberately excludes consumption of 'green water' (rain water), as net loss should be interpreted as any additional water loss beyond what would occur in the original, natural system. For plantation softwood forestry, the natural system might be a native forest or a grassland (Quinteiro et al. 2015).

WASTE AND OUTPUT FLOW

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.

BIOGENIC CARBON INDICATORS

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.

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

These indicators are voluntarily included to facilitate modularity where an EPD is used as input data for creating another EPD downstream in the value chain (EPD International, 2021).

ENVIRONMENTAL IMPACT EN15804+A1

EN 15804+A1 core environmental impact categories aid with historical comparison and are used within various rating tools.

GREEN STAR

These impact indicators comply with the Additional Life Cycle Impact Reporting requirement listed within the Green Star rating tools for Australia – Green Star Buildings v1, and Greenstar Design and As Built – as well as for New Zealand - Design and As Built Life Cycle Assessment Calculator NZv1.0. (Green Building Council of Australia, 2017; New Zealand Green Building Council, 2019).

KAWERAU

RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 5. Environmental impact (EN15804+A2) covering modules A1-D													
GWP	Global warming potential	kg CO_2 eq	-761	0.334	1.70	849	849	903	844	-21.9	-585	-0.0526	-82.3
GWPf	Global warming potential (fossil)	kg CO_2 eq	80.4	0.335	1.63	5.38	5.38	56.2	0	-21.3	-586	-0.0521	-80.4
GWPb	Global warming potential (biogenic)	kg CO_2 eq	-842	-3.42E-04	0.0721	844	844	847	844	-0.579	1.70	-4.18E-04	-1.94
GWPluc	Global warming potential (land use change)	kg CO_2 eq	0.0230	6.74E-06	2.56E-05	1.57E-04	1.57E-04	0.0403	0	-0.00872	-0.00762	-9.16E-05	-0.0230
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	1.22E-10	4.93E-17	1.91E-16	7.79E-16	7.79E-16	1.39E-13	0	-6.95E-12	-1.28E-14	-2.14E-16	-1.22E-10
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	0.452	0.00168	0.00500	0.0475	0.0475	0.195	0	-0.313	-0.0786	-1.34E-04	-0.452
EPfw	Eutrophication potential - freshwater	kg P eq	1.81E-04	5.51E-08	2.98E-07	9.05E-07	9.05E-07	3.74E-05	0	-5.22E-05	-1.01E-05	-1.82E-07	-1.81E-04
EPm	Eutrophication potential - marine	kg N eq	0.161	7.97E-04	0.00241	0.0231	0.0231	0.0549	0	-0.124	-0.119	-5.40E-05	-0.161
EPt	Eutrophication potential - terrestrial	Mol N eq	2.23	0.00873	0.0265	0.253	0.253	0.601	0	-1.50	-1.31	-5.77E-04	-2.23
POFP	Photochemical ozone formation potential	kg NMVOC eq	0.579	0.00223	0.00465	0.0639	0.0639	0.157	0	-0.528	-0.164	-1.41E-04	-0.579
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	5.54E-06	5.17E-09	2.76E-08	8.21E-08	8.21E-08	5.42E-06	0	-1.09E-06	-6.90E-05	-9.13E-09	-5.54E-06
ADPf*	Abiotic depletion potential – fossil fuels	MJ	920	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-920
WDP*	Water scarcity	m³ world eq	13.7	0.00219	0.0132	0.0347	0.0347	-0.899	0	-11.9	-0.486	-0.0701	-13.7

*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.

INDICATOR		UNIT	A1-A3 Production	C1 Decon-struction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
Table 6. Resource use indicators results covering modules A1-D													
PERE	Renewable primary energy as energy carrier	MJ	2,270	0.0217	0.0960	0.349	0.349	81.6	0	-2,400	-3.98	-2.26	-2,270
PERM	Renewable primary energy resources as material utilization	MJ	8,690	0	0	-8,690	-8,690	0	-8,690	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	11,000	0.0217	0.0960	-8,690	-8,690	81.6	-8,690	-2,400	-3.98	-2.26	-2,270
PENRE	Non-renewable primary energy as energy carrier	MJ	920	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-920
PENRM	Non-renewable primary energy as material utilization	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	920	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-920
SM	Use of secondary material	kg	0	0	0	0	0	0	0	520	0	0	520
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	8,690	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	0.648	4.30E-05	1.98E-04	6.86E-04	6.86E-04	0.0624	0	-0.657	-0.0147	-0.00569	-0.648
Table 7. Waste categories and output flow indicators covering modules A1-D													
HWD	Hazardous waste disposed	kg	1.44E-06	1.60E-11	6.78E-11	6.27E-08	6.27E-08	8.05E-08	0	-1.11E-07	-7.47E-07	-1.69E-10	-1.44E-06
NHWD	Non-hazardous waste disposed	kg	5.69	1.06E-04	3.57E-04	0.00169	0.00169	521	0	-5.74	24.0	-3.54E-04	-5.69
RWD	Radioactive waste disposed*	kg	0.00492	6.12E-07	5.28E-07	9.72E-06	9.72E-06	0.00421	0	-7.36E-05	-7.06E-04	-2.66E-07	-0.00492
CRU	Components for re-use	kg	0	0	0	0	0	0	520	0	0	0	-520
MFR	Materials for recycling	kg	0	0	0	520	0	0	0	0	0	0	0

*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.

MER	Materials for energy recovery	kg	0	0	0	0	520	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	1.24	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0	0	0	0

KAWERAU | RESULTS FOR 1m^3 OF UNTREATED, SAWN, KILN-DRIED SOFTWOOD CONTINUED

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 8. Biogenic carbon content covering modules A1-D													
BCC-prod	Biogenic carbon content - product	kg	230	0	0	0	0	0	0	0	0	0	-230
BCC-pack	Biogenic carbon content - packaging	kg	1.79	0	0	0	0	0	0	0	0	0	-1.79
Table 9. Additional Indicators covering modules A1-D													
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	79.3	0.334	1.63	5.36	5.36	59.4	0	-18.7	-589	-0.0524	-79.3
PM	Respiratory inorganics	Disease incidence	6.18E-06	1.93E-08	2.61E-08	1.13E-06	1.13E-06	1.51E-06	0	-5.65E-06	1.84E-05	-8.12E-10	-6.18E-06
IR	Ionizing radiation - human health	kBq U235 eq	0.546	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0131	-0.0862	-3.05E-05	-0.546
ETf	Ecotoxicity freshwater	CTUe	6,150	1.70	6.03	26.8	26.8	405	0	-2,100	-3,750	-5.53	-6,150
HTc	Human toxicity, cancer	CTUh	9.41E-08	2.89E-11	1.02E-10	3.49E-09	3.49E-09	2.99E-08	0	-3.89E-08	-1.81E-08	-2.67E-11	-9.41E-08
HTnc	Human toxicity, non-canc.	CTUh	1.02E-05	1.49E-09	5.67E-09	2.83E-08	2.83E-08	2.89E-06	0	-4.90E-06	3.33E-06	-1.39E-10	-1.02E-05
LU	Land use	Dimensionless	2,360	0.0114	0.0468	0.213	0.213	45.2	0	-29.3	-7.02	-0.321	-2,360
Table 10. Environmental impact (EN15804+A1) covering modules A1-D													
GWP	Global warming potential (total)	kg CO_2 eq	-767	0.329	1.68	849	849	55.7	844	-18.0	0	0	-576
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	1.79E-10	6.57E-17	2.55E-16	1.04E-15	1.04E-15	1.85E-13	0	-9.27E-12	0	0	-1.71E-14
AP	Acidification potential of land and water	kg SO_2 eq	0.297	0.00118	0.00345	0.0329	0.0329	0.153	0	-0.217	0	0	-0.0169

*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.

Indicator		Unit	A1-A3 Production	C1 Deconstruction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.0684	2.67E-04	8.12E-04	0.00774	0.00774	0.0190	0	-0.0456	0	0	-0.0407
POCP	Photochemical ozone creation potential	kg Ethene eq	0.149	1.10E-04	-0.00133	0.00290	0.00290	0.00979	0	-0.187	0	0	0.0935
ADPe*	Abiotic depletion potential – elements	kg Sb eq	5.57E-06	5.18E-09	2.76E-08	8.22E-08	8.22E-08	5.45E-06	0	-1.09E-06	0	0	-6.91E-05
ADPf*	Abiotic depletion potential – fossil fuels	MJ	907	4.44	22.5	70.0	70.0	792	0	-117	0	0	-10,100

Table 11. Green Star covering modules A1-D

HT	Human Toxicity	CTUh	3.60E-06	1.15E-12	3.33E-12	3.05E-09	3.05E-09	2.5084E-09	0	-2.92E-08	0	0	5.71E-09
LU	Land use	kg C deficit eq	67.7	7.75E-04	0.00401	0.0162	0.0162	0.506	0	-3.02	0	0	-0.427
GS-RDw	Resource depletion - water	m^3 water use	0.137	2.78E-05	1.27E-04	4.41E-04	4.41E-04	-0.0116	0	-0.0980	0	0	-0.00716
IR	Ionising Radiation	kBq U-235 eq	0.546	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0131	0	0	-0.0862
PM	Particulate Matter	kg PM2.5 eq	0.0263	8.58E-05	1.35E-04	0.00485	0.00485	0.00838	0	-0.0248	0	0	0.0814

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RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 12. Environmental impact results covering modules A1-D													
GWP	Global warming potential	kg CO_2 eq	-738	0.334	1.70	849	849	903	844	-21.9	-585	-0.0526	-106
GWPf	Global warming potential (fossil)	kg CO_2 eq	103	0.335	1.63	5.38	5.38	56.2	0	-21.3	-586	-0.0521	-103
GWPb	Global warming potential (biogenic)	kg CO_2 eq	-841	-3.42E-04	0.0721	844	844	847	844	-0.579	1.70	-4.18E-04	-2.48
GWPluc	Global warming potential (land use change)	kg CO_2 eq	0.0343	6.74E-06	2.56E-05	1.57E-04	1.57E-04	0.0403	0	-0.00872	-0.00762	-9.16E-05	-0.0343
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	1.49E-10	4.93E-17	1.91E-16	7.79E-16	7.79E-16	1.39E-13	0	-6.95E-12	-1.28E-14	-2.14E-16	-1.49E-10
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	0.575	0.00168	0.00500	0.0475	0.0475	0.195	0	-0.313	-0.0786	-1.34E-04	-0.575
EPfw	Eutrophication potential - freshwater	kg P eq	2.48E-04	5.51E-08	2.98E-07	9.05E-07	9.05E-07	3.74E-05	0	-5.22E-05	-1.01E-05	-1.82E-07	-2.48E-04
EPm	Eutrophication potential - marine	kg N eq	0.206	7.97E-04	0.00241	0.0231	0.0231	0.0549	0	-0.124	-0.119	-5.40E-05	-0.206
EPt	Eutrophication potential - terrestrial	Mol N eq	2.84	0.00873	0.0265	0.253	0.253	0.601	0	-1.50	-1.31	-5.77E-04	-2.84
POFP	Photochemical ozone formation potential	kg NMVOC eq	0.736	0.00223	0.00465	0.0639	0.0639	0.157	0	-0.528	-0.164	-1.41E-04	-0.736
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	7.36E-06	5.17E-09	2.76E-08	8.21E-08	8.21E-08	5.42E-06	0	-1.09E-06	-6.90E-05	-9.13E-09	-7.36E-06
ADPf*	Abiotic depletion potential – fossil fuels	MJ	1,180	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-1,180
WDP*	Water scarcity	m^3 world eq	22.3	0.00219	0.0132	0.0347	0.0347	-0.899	0	-11.9	-0.486	-0.0701	-22.3

*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.

INDICATOR		UNIT	A1-A3 Production	C1 Deconstruction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
Table 13. Resource use indicators results covering modules A1-D													
PERE	Renewable primary energy as energy carrier	MJ	2,950	0.0217	0.0960	0.349	0.349	81.6	0	-2,400	-3.98	-2.26	-2,950
PERM	Renewable primary energy resources as material utilization	MJ	8,690	0	0	-8,690	-8,690	0	-8,690	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	11,600	0.0217	0.0960	-8,690	-8,690	81.6	-8,690	-2,400	-3.98	-2.26	-2,950
PENRE	Non-renewable primary energy as energy carrier	MJ	1,180	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-1,180
PENRM	Non-renewable primary energy as material utilization	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	1,180	4.44	22.5	70.1	70.1	804	0	-117	-10,100	-0.636	-1,180
SM	Use of secondary material	kg	0	0	0	0	0	0	0	520	0	0	520
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	8,690	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	1.20	4.30E-05	1.98E-04	6.86E-04	6.86E-04	0.0624	0	-0.657	-0.0147	-0.00569	-1.20
Table 14. Waste categories and output flow indicators covering modules A1-D													
HWD	Hazardous waste disposed	kg	1.78E-06	1.60E-11	6.78E-11	6.27E-08	6.27E-08	8.05E-08	0	-1.11E-07	-7.47E-07	-1.69E-10	-1.78E-06
NHWD	Non-hazardous waste disposed	kg	7.05	1.06E-04	3.57E-04	0.00169	0.00169	521	0	-5.74	24.0	-3.54E-04	-7.05
RWD	Radioactive waste disposed*	kg	0.00585	6.12E-07	5.28E-07	9.72E-06	9.72E-06	0.00421	0	-7.36E-05	-7.06E-04	-2.66E-07	-0.00585
CRU	Components for re-use	kg	0	0	0	0	0	0	520	0	0	0	-520
MFR	Materials for recycling	kg	0	0	0	520	0	0	0	0	0	0	0
MER	Materials for energy recovery	kg	0	0	0	0	520	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	1.24	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0	0	0	0

*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.

KAWERAU | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD CONTINUED

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 15. Biogenic carbon content covering modules A1-D													
BCC-prod	Biogenic carbon content - product	kg	230	0	0	0	0	0	0	0	0	0	-230
BCC-pack	Biogenic carbon content - packaging	kg	1.79	0	0	0	0	0	0	0	0	0	-1.79
Table 16. Additional Indicators covering modules A1-D													
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	102	0.334	1.63	5.36	5.36	59.4	0	-18.7	-589	-0.0524	-102
PM	Respiratory inorganics	Disease incidence	7.68E-06	1.93E-08	2.61E-08	1.13E-06	1.13E-06	1.51E-06	0	-5.65E-06	1.84E-05	-8.12E-10	-7.68E-06
IR	Ionizing radiation - human health	kBq U235 eq	0.644	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0131	-0.0862	-3.05E-05	-0.644
ETf	Ecotoxicity freshwater	CTUe	7,950	1.70	6.03	26.8	26.8	405	0	-2,100	-3,750	-5.53	-7,950
HTc	Human toxicity, cancer	CTUh	1.20E-07	2.89E-11	1.02E-10	3.49E-09	3.49E-09	2.99E-08	0	-3.89E-08	-1.81E-08	-2.67E-11	-1.20E-07
HTnc	Human toxicity, non-canc.	CTUh	1.27E-05	1.49E-09	5.67E-09	2.83E-08	2.83E-08	2.89E-06	0	-4.90E-06	3.33E-06	-1.39E-10	-1.27E-05
LU	Land use	Dimensionless	2,900	0.0114	0.0468	0.213	0.213	45.2	0	-29.3	-7.02	-0.321	-2,900
Table 17. Environmental impact (EN15804+A1) covering modules A1-D													
GWP	Global warming potential (total)	kg CO_2 eq	-745	0.329	1.68	849	849	55.7	844	-18.0	0	0	-576
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	2.20E-10	6.57E-17	2.55E-16	1.04E-15	1.04E-15	1.85E-13	0	-9.27E-12	0	0	-1.71E-14
AP	Acidification potential of land and water	kg SO_2 eq	0.379	0.00118	0.00345	0.0329	0.0329	0.153	0	-0.217	0	0	-0.0169
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.0871	2.67E-04	8.12E-04	0.00774	0.00774	0.0190	0	-0.0456	0	0	-0.0407
POCP	Photochemical ozone creation potential	kg Ethene eq	0.184	1.10E-04	-0.00133	0.00290	0.00290	0.00979	0	-0.187	0	0	0.0935
ADPe*	Abiotic depletion potential – elements	kg Sb eq	7.39E-06	5.18E-09	2.76E-08	8.22E-08	8.22E-08	5.45E-06	0	-1.09E-06	0	0	-6.91E-05
ADPf*	Abiotic depletion potential – fossil fuels	MJ	1,160	4.44	22.5	70.0	70.0	792	0	-117	0	0	-10,100

*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.

KAWERAU | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD CONTINUED

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 18. Green Star covering modules A1-D													
HT	Human Toxicity	CTUh	4.44E-06	1.15E-12	3.33E-12	3.05E-09	3.05E-09	2.51E-09	0	-3.59E-06	0	0	5.72E-09
LU	Land use	kg C deficit eq	84.4	7.75E-04	0.00401	0.0162	0.0162	0.506	0	-3.02	0	0	-0.427
GS-RDw	Resource depletion - water	m3 water use	0.209	2.78E-05	1.27E-04	4.41E-04	4.41E-04	-0.0116	0	-0.098	0	0	-0.007
IR	Ionising Radiation	kBq U-235 eq	0.644	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0131	0	0	-0.0862
PM	Particulate Matter	kg PM2.5 eq	0.033	8.58E-05	1.35E-04	0.00485	0.00485	0.008	0	-0.0248	0	0	0.0814

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RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 19. Environmental impact results covering modules A1-D													
GWP	Global warming potential	kg CO_2 eq	-793	0.334	1.70	849	849	903	843	-26.9	-584	-0.0357	-50.6
GWPf	Global warming potential (fossil)	kg CO_2 eq	50.6	0.335	1.63	5.38	5.38	56.2	0	-26.2	-586	-0.0354	-50.6
GWPb	Global warming potential (biogenic)	kg CO_2 eq	-843	-3.42E-04	0.0721	843	843	847	843	-0.693	1.70	-2.84E-04	0.0581
GWPluc	Global warming potential (land use change)	kg CO_2 eq	0.0185	6.74E-06	2.56E-05	1.57E-04	1.57E-04	0.0403	0	-0.00972	-0.00762	-6.22E-05	-0.0185
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	8.53E-11	4.93E-17	1.91E-16	7.79E-16	7.79E-16	1.39E-13	0	-1.62E-11	-1.28E-14	-1.45E-16	-8.53E-11
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	0.467	0.00168	0.00500	0.0475	0.0475	0.195	0	-0.350	-0.0785	-9.13E-05	-0.467
EPfw	Eutrophication potential - freshwater	kg P eq	4.33E-05	5.51E-08	2.98E-07	9.05E-07	9.05E-07	3.74E-05	0	-5.58E-05	-1.01E-05	-1.23E-07	-4.33E-05
EPm	Eutrophication potential - marine	kg N eq	0.216	7.97E-04	0.00241	0.0231	0.0231	0.0548	0	-0.142	-0.119	-3.67E-05	-0.216
EPt	Eutrophication potential - terrestrial	Mol N eq	2.37	0.00873	0.0265	0.253	0.253	0.600	0	-1.69	-1.31	-3.92E-04	-2.37
POFP	Photochemical ozone formation potential	kg NMVOC eq	0.767	0.00223	0.00465	0.0639	0.0639	0.157	0	-0.574	-0.164	-9.58E-05	-0.767
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	3.75E-06	5.17E-09	2.76E-08	8.21E-08	8.21E-08	5.42E-06	0	-1.38E-06	-6.90E-05	-6.20E-09	-3.75E-06
ADPf	Abiotic depletion potential – fossil fuels	MJ	645	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-645
WDP*	Water scarcity	m³ world eq	10.6	0.00219	0.0132	0.0347	0.0347	-0.906	0	-12.8	-0.486	-0.0476	-10.6

*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.

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 20. Resource use indicators results covering modules A1-D													
PERE	Renewable primary energy as energy carrier	MJ	1,340	0.0217	0.0960	0.349	0.349	81.6	0	-2,420	-3.98	-1.53	-1,340
PERM	Renewable primary energy resources as material utilization	MJ	8,690	0	0	-8,690	-8,690	0	-8,690	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	10,000	0.0217	0.0960	-8,690	-8,690	81.6	-8,690	-2,420	-3.98	-1.53	-1,340
PENRE	Non-renewable primary energy as energy carrier	MJ	645	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-645
PENRM	Non-renewable primary energy as material utilization	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	645	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-645
SM	Use of secondary material	kg	0	0	0	0	0	0	0	520	0	0	520
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	8,690	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	0.842	4.30E-05	1.98E-04	6.86E-04	6.86E-04	0.0623	0	-0.702	-0.0147	-0.00386	-0.842
Table 21. Waste categories and output flow indicators covering modules A1-D													
HWD	Hazardous waste disposed	kg	1.21E-06	1.60E-11	6.78E-11	6.27E-08	6.27E-08	8.05E-08	0	-2.39E-07	-7.47E-07	-1.15E-10	-1.21E-06
NHWD	Non-hazardous waste disposed	kg	7.44	1.06E-04	3.57E-04	0.00169	0.00169	521	0	-6.25	24.0	-2.41E-04	-7.44
RWD	Radioactive waste disposed*	kg	0.00151	6.12E-07	5.28E-07	9.72E-06	9.72E-06	0.00421	0	-1.09E-04	-7.06E-04	-1.80E-07	-0.00151
CRU	Components for re-use	kg	0	0	0	0	0	0	520	0	0	0	-520
MFR	Materials for recycling	kg	0	0	0	520	0	0	0	0	0	0	0
MER	Materials for energy recovery	kg	0	0	0	0	520	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	0.843	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0	0	0	0

*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.

NELSON | RESULTS FOR 1 m^3 OF UNTREATED, SAWN, KILN-DRIED SOFTWOOD CONTINUED

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 22. Biogenic carbon content covering modules A1-D													
BCC-prod	Biogenic carbon content - product	kg	230	0	0	0	0	0	0	0	0	0	-230
BCC-pack	Biogenic carbon content - packaging	kg	1.19	0	0	0	0	0	0	0	0	0	-1.19
Table 23. Additional Indicators covering modules A1-D													
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	48.2	0.334	1.63	5.36	5.36	59.4	0	-23.6	-589	-0.0356	-48.2
PM	Respiratory inorganics	Disease incidence	8.79E-06	1.93E-08	2.61E-08	1.13E-06	1.13E-06	1.51E-06	0	-6.31E-06	1.84E-05	-5.51E-10	-8.79E-06
IR	Ionizing radiation - human health	kBq U235 eq	0.204	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0167	-0.0861	-2.07E-05	-0.204
ETf	Ecotoxicity freshwater	CTUe	1,030	1.70	6.03	26.8	26.8	405	0	-2,150	-3,750	-3.75	-1,030
HTc	Human toxicity, cancer	CTUh	7.60E-08	2.89E-11	1.02E-10	3.49E-09	3.49E-09	2.99E-08	0	-4.43E-08	-1.81E-08	-1.82E-11	-7.60E-08
HTnc	Human toxicity, non-canc.	CTUh	7.18E-06	1.49E-09	5.67E-09	2.83E-08	2.83E-08	2.89E-06	0	-5.29E-06	3.33E-06	-9.43E-11	-7.18E-06
LU	Land use	Dimensionless	-650	0.0114	0.0468	0.213	0.213	45.2	0	-31.9	-7.01	-0.218	650
Table 24. Environmental impact (EN15804+A1) covering modules A1-D													
GWP	Global warming potential (total)	kg CO_2 eq	-796	0.329	1.68	849	849	55.6	843	-22.9	0	0	-576
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	1.14E-10	6.57E-17	2.55E-16	1.04E-15	1.04E-15	1.85E-13	0	-2.16E-11	0	0	-1.71E-14
AP	Acidification potential of land and water	kg SO_2 eq	0.328	0.00118	0.00345	0.0329	0.0329	0.153	0	-0.243	0	0	-0.0168
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.0731	2.67E-04	8.12E-04	0.00774	0.00774	0.0190	0	-0.0517	0	0	-0.0407
POCP	Photochemical ozone creation potential	kg Ethene eq	0.180	1.10E-04	-0.00133	0.00290	0.00290	0.00978	0	-0.186	0	0	0.0935
ADPe*	Abiotic depletion potential – elements	kg Sb eq	3.76E-06	5.18E-09	2.76E-08	8.22E-08	8.22E-08	5.45E-06	0	-1.38E-06	0	0	-6.90E-05
ADPf*	Abiotic depletion potential – fossil fuels	MJ	640	4.44	22.5	70.0	70.0	792	0	-182	0	0	-10,000

*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.

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 25. Green Star covering modules A1-D													
HT	Human Toxicity	CTUh	3.61E-06	1.15E-12	3.33E-12	3.05E-09	3.05E-09	2.51E-09	0	-3.60E-06	0	0	5.7201E-09
LU	Land use	kg C deficit eq	-605	7.75E-04	0.00401	0.0162	0.0162	0.506	0	-3.21	0	0	-0.426
GS-RDw	Resource depletion - water	m3 water use	0.0760	2.78E-05	1.27E-04	4.41E-04	4.41E-04	-0.0117	0	-0.105	0	0	-0.00715
IR	Ionising Radiation	kBq U-235 eq	0.204	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0167	0	0	-0.0861
PM	Particulate Matter	kg PM2.5 eq	0.0386	8.58E-05	1.35E-04	0.00485	0.00485	0.00837	0	-0.0277	0	0	0.0814

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RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 26. Environmental impact results covering modules A1-D													
GWP	Global warming potential	kg CO_2 eq	-777	0.334	1.70	849	849	903	843	-26.9	-584	-0.0357	-66.0
GWPf	Global warming potential (fossil)	kg CO_2 eq	65.8	0.335	1.63	5.38	5.38	56.2	0	-26.2	-586	-0.0354	-65.8
GWPb	Global warming potential (biogenic)	kg CO_2 eq	-843	-3.42E-04	0.0721	843	843	847	843	-0.693	1.70	-2.84E-04	-0.181
GWPluc	Global warming potential (land use change)	kg CO_2 eq	0.0273	6.74E-06	2.56E-05	1.57E-04	1.57E-04	0.0403	0	-0.00972	-0.00762	-6.22E-05	-0.0273
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	1.06E-10	4.93E-17	1.91E-16	7.79E-16	7.79E-16	1.39E-13	0	-1.62E-11	-1.28E-14	-1.45E-16	-1.06E-10
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	0.591	0.00168	0.00500	0.0475	0.0475	0.195	0	-0.350	-0.0785	-9.13E-05	-0.591
EPfw	Eutrophication potential - freshwater	kg P eq	6.15E-05	5.51E-08	2.98E-07	9.05E-07	9.05E-07	3.74E-05	0	-5.58E-05	-1.01E-05	-1.23E-07	-6.15E-05
EPm	Eutrophication potential - marine	kg N eq	0.274	7.97E-04	0.00241	0.0231	0.0231	0.0548	0	-0.142	-0.119	-3.67E-05	-0.274
EPt	Eutrophication potential - terrestrial	Mol N eq	3.00	0.00873	0.0265	0.253	0.253	0.600	0	-1.69	-1.31	-3.92E-04	-3.00
POFP	Photochemical ozone formation potential	kg NMVOC eq	0.967	0.00223	0.00465	0.0639	0.0639	0.157	0	-0.574	-0.164	-9.58E-05	-0.967
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	5.04E-06	5.17E-09	2.76E-08	8.21E-08	8.21E-08	5.42E-06	0	-1.38E-06	-6.90E-05	-6.20E-09	-5.04E-06
ADPf	Abiotic depletion potential – fossil fuels	MJ	829	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-829
WDP*	Water scarcity	m³ world eq	16.7	0.00219	0.0132	0.0347	0.0347	-0.906	0	-12.8	-0.486	-0.0476	-16.7

*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.

INDICATOR		UNIT	A1-A3 Production	C1 Deconstruction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
Table 27. Resource use indicators results covering modules A1-D													
PERE	Renewable primary energy as energy carrier	MJ	1,780	0.0217	0.0960	0.349	0.349	81.6	0	-2,420	-3.98	-1.53	-1,780
PERM	Renewable primary energy resources as material utilization	MJ	8,690	0	0	-8,690	-8,690	0	-8,690	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	10,500	0.0217	0.0960	-8,690	-8,690	81.6	-8,690	-2,420	-3.98	-1.53	-1,780
PENRE	Non-renewable primary energy as energy carrier	MJ	829	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-829
PENRM	Non-renewable primary energy as material utilization	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	829	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-829
SM	Use of secondary material	kg	0	0	0	0	0	0	0	520	0	0	520
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	8,690	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	1.33	4.30E-05	1.98E-04	6.86E-04	6.86E-04	0.0623	0	-0.702	-0.0147	-0.00386	-1.33
Table 28. Waste categories and output flow indicators covering modules A1-D													
HWD	Hazardous waste disposed	kg	1.50E-06	1.60E-11	6.78E-11	6.27E-08	6.27E-08	8.05E-08	0	-2.39E-07	-7.47E-07	-1.15E-10	-1.50E-06
NHWD	Non-hazardous waste disposed	kg	9.22	1.06E-04	3.57E-04	0.00169	0.00169	521	0	-6.25	24.0	-2.41E-04	-9.22
RWD	Radioactive waste disposed*	kg	0.00161	6.12E-07	5.28E-07	9.72E-06	9.72E-06	0.00421	0	-1.09E-04	-7.06E-04	-1.80E-07	-0.00161
CRU	Components for re-use	kg	0	0	0	0	0	0	520	0	0	0	-520
MFR	Materials for recycling	kg	0	0	0	520	0	0	0	0	0	0	0
MER	Materials for energy recovery	kg	0	0	0	0	520	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	0.843	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0	0	0	0

*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.

NELSON | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD CONTINUED

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 29. Biogenic carbon content covering modules A1-D													
BCC-prod	Biogenic carbon content - product	kg	230	0	0	0	0	0	0	0	0	0	-230
BCC-pack	Biogenic carbon content - packaging	kg	1.19	0	0	0	0	0	0	0	0	0	-1.19
Table 30. Additional Indicators covering modules A1-D													
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	62.8	0.334	1.63	5.36	5.36	59.4	0	-23.6	-589	-0.0356	-62.8
PM	Respiratory inorganics	Disease incidence	1.09E-05	1.93E-08	2.61E-08	1.13E-06	1.13E-06	1.51E-06	0	-6.31E-06	1.84E-05	-5.51E-10	-1.09E-05
IR	Ionizing radiation - human health	kBq U235 eq	0.214	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0167	-0.0861	-2.07E-05	-0.214
ETf	Ecotoxicity freshwater	CTUe	1,550	1.70	6.03	26.8	26.8	405	0	-2,150	-3,750	-3.75	-1,550
HTc	Human toxicity, cancer	CTUh	9.68E-08	2.89E-11	1.02E-10	3.49E-09	3.49E-09	2.99E-08	0	-4.43E-08	-1.81E-08	-1.82E-11	-9.68E-08
HTnc	Human toxicity, non-canc.	CTUh	8.90E-06	1.49E-09	5.67E-09	2.83E-08	2.83E-08	2.89E-06	0	-5.29E-06	3.33E-06	-9.43E-11	-8.90E-06
LU	Land use	Dimensionless	-886	0.0114	0.0468	0.213	0.213	45.2	0	-31.9	-7.01	-0.218	886
Table 31. Environmental impact (EN15804+A1) covering modules A1-D													
GWP	Global warming potential (total)	kg CO_2 eq	-782	0.329	1.68	849	849	55.6	843	-22.9	0	0	-576
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	1.41E-10	6.57E-17	2.55E-16	1.04E-15	1.04E-15	1.85E-13	0	-2.16E-11	0	0	-1.71E-14
AP	Acidification potential of land and water	kg SO_2 eq	0.416	0.001	0.003	0.033	0.033	0.153	0	-0.243	0	0	-0.017
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.093	2.67E-04	8.12E-04	0.008	0.008	0.019	0	-0.052	0	0	-0.041
POCP	Photochemical ozone creation potential	kg Ethene eq	0.224	1.10E-04	-0.00133	0.003	0.003	0.010	0	-0.186	0	0	0.094
ADPe*	Abiotic depletion potential – elements	kg Sb eq	5.05E-06	5.18E-09	2.76E-08	8.22E-08	8.22E-08	5.45E-06	0	-1.38E-06	0	0	-6.90E-05
ADPf*	Abiotic depletion potential – fossil fuels	MJ	823	4.44	22.5	70	70	792	0	-182	0	0	-10,000

*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.

NELSON | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED SOFTWOOD CONTINUED

Indicator		Unit	A1-A3 Production	C1 Deconstruction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
Table 32. Green Star covering modules A1-D													
HT	Human Toxicity	CTUh	4.48E-06	1.15E-12	3.33E-12	3.05E-09	3.05E-09	2.51E-09	0	-3.60E-06	0	0	5.72E-09
LU	Land use	kg C deficit eq	-752	7.75E-04	0.00401	0.0162	0.0162	0.506	0	-3.21	0	0	-0.426
GS-RDw	Resource depletion - water	m³ water use	0.118	2.78E-05	1.27E-04	4.41E-04	4.41E-04	-0.012	0	-0.105	0	0	-0.007
IR	Ionising Radiation	kBq U-235 eq	0.214	7.18E-05	5.91E-05	0.001	0.001	0.390	0	-0.017	0	0	-0.086
PM	Particulate Matter	kg PM2.5 eq	0.048	8.58E-05	1.35E-04	0.005	0.005	0.008	0	-0.028	0	0	0.081

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RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED AND FINGER-JOINTED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
INDICATOR		UNIT	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 33. Environmental impact results covering modules A1-D													
GWP	Global warming potential	kg CO_2 eq	-600	0.334	1.70	849	849	903	843	-26.9	-584	-0.0357	-243
GWPf	Global warming potential (fossil)	kg CO_2 eq	240	0.335	1.63	5.38	5.38	56.2	0	-26.2	-586	-0.0354	-240
GWPb	Global warming potential (biogenic)	kg CO_2 eq	-840	-3.42E-04	0.0721	843	843	847	843	-0.693	1.70	-2.84E-04	-3.12
GWPluc	Global warming potential (land use change)	kg CO_2 eq	0.167	6.74E-06	2.56E-05	1.57E-04	1.57E-04	0.0403	0	-0.00972	-0.00762	-6.22E-05	-0.167
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	2.60E-10	4.93E-17	1.91E-16	7.79E-16	7.79E-16	1.39E-13	0	-1.62E-11	-1.28E-14	-1.45E-16	-2.60E-10
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	1.64	0.00168	0.00500	0.0475	0.0475	0.195	0	-0.350	-0.0785	-9.13E-05	-1.64
EPfw	Eutrophication potential - freshwater	kg P eq	6.33E-04	5.51E-08	2.98E-07	9.05E-07	9.05E-07	3.74E-05	0	-5.58E-05	-1.01E-05	-1.23E-07	-6.33E-04
EPm	Eutrophication potential - marine	kg N eq	0.779	7.97E-04	0.00241	0.0231	0.0231	0.0548	0	-0.142	-0.119	-3.67E-05	-0.779
EPt	Eutrophication potential - terrestrial	Mol N eq	8.20	0.00873	0.0265	0.253	0.253	0.600	0	-1.69	-1.31	-3.92E-04	-8.20
POFP	Photochemical ozone formation potential	kg NMVOC eq	2.57	0.00223	0.00465	0.0639	0.0639	0.157	0	-0.574	-0.164	-9.58E-05	-2.57
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	2.37E-05	5.17E-09	2.76E-08	8.21E-08	8.21E-08	5.42E-06	0	-1.38E-06	-6.90E-05	-6.20E-09	-2.37E-05
ADPf	Abiotic depletion potential – fossil fuels	MJ	3,060	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-3,060
WDP*	Water scarcity	m³ world eq	119	0.00219	0.0132	0.0347	0.0347	-0.906	0	-12.8	-0.486	-0.0476	-119

*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.

INDICATOR		Unit	A1-A3 Production	C1 Deconstruction	C2 Transport to EOL	C3 Recycling	C3 Energy recovery	C4 Landfill (typical)	C3 Reuse	D Recycling	D Energy recovery	D Landfill (typical)	D Reuse
Table 34. Resource use indicators results covering modules A1-D													
PERE	Renewable primary energy as energy carrier	MJ	6,540	0.0217	0.0960	0.349	0.349	81.6	0	-2,420	-3.98	-1.53	-6,540
PERM	Renewable primary energy resources as material utilization	MJ	8,690	0	0	-8,690	-8,690	0	-8,690	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	15,200	0.0217	0.0960	-8,690	-8,690	81.6	-8,690	-2,420	-3.98	-1.53	-6,540
PENRE	Non-renewable primary energy as energy carrier	MJ	2,930	4.44	22.5	70.1	70.1	804	0	-183	-10,100	-0.432	-2,930
PENRM	Non-renewable primary energy as material utilization	MJ	131	0	0	-131	-131	0	-131	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	3,060	4.44	22.5	-61.0	-61.0	804	-131	-183	-10,100	-0.432	-2,930
SM	Use of secondary material	kg	0	0	0	0	0	0	0	520	0	0	520
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	8,690	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	9.17	4.30E-05	1.98E-04	6.86E-04	6.86E-04	0.0623	0	-0.702	-0.0147	-0.00386	-9.17
Table 35. Waste categories and output flow indicators covering modules A1-D													
HWD	Hazardous waste disposed	kg	3.85E-06	1.60E-11	6.78E-11	6.27E-08	6.27E-08	8.05E-08	0	-2.39E-07	-7.47E-07	-1.15E-10	-3.85E-06
NHWD	Non-hazardous waste disposed	kg	22.5	1.06E-04	3.57E-04	0.00169	0.00169	521	0	-6.25	24.0	-2.41E-04	-22.5
RWD	Radioactive waste disposed*	kg	0.00720	6.12E-07	5.28E-07	9.72E-06	9.72E-06	0.00421	0	-1.09E-04	-7.06E-04	-1.80E-07	-0.00720
CRU	Components for re-use	kg	0	0	0	0	0	0	520	0	0	0	-520
MFR	Materials for recycling	kg	0	0	0	520	0	0	0	0	0	0	0
MER	Materials for energy recovery	kg	0	0	0	0	520	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	0.843	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0	0	0	0

*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.

NELSON | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED AND FINGER-JOINTED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 36. Biogenic carbon content covering modules A1-D													
BCC-prod	Biogenic carbon content - product	kg	230	0	0	0	0	0	0	0	0	0	-230
BCC-pack	Biogenic carbon content - packaging	kg	1.19	0	0	0	0	0	0	0	0	0	-1.19
Table 37. Additional Indicators covering modules A1-D													
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	233	0.334	1.63	5.36	5.36	59.4	0	-23.6	-589	-0.0356	-233
PM	Respiratory inorganics	Disease incidence	2.70E-05	1.93E-08	2.61E-08	1.13E-06	1.13E-06	1.51E-06	0	-6.31E-06	1.84E-05	-5.51E-10	-2.70E-05
IR	Ionizing radiation - human health	kBq U235 eq	0.757	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0167	-0.0861	-2.07E-05	-0.757
ETf	Ecotoxicity freshwater	CTUe	9,590	1.70	6.03	26.8	26.8	405	0	-2,150	-3,750	-3.75	-9,590
HTc	Human toxicity, cancer	CTUh	2.66E-07	2.89E-11	1.02E-10	3.49E-09	3.49E-09	2.99E-08	0	-4.43E-08	-1.81E-08	-1.82E-11	-2.66E-07
HTnc	Human toxicity, non-canc.	CTUh	2.13E-05	1.49E-09	5.67E-09	2.83E-08	2.83E-08	2.89E-06	0	-5.29E-06	3.33E-06	-9.43E-11	-2.13E-05
LU	Land use	Dimensionless	-2,290	0.0114	0.0468	0.213	0.213	45.2	0	-31.9	-7.01	-0.218	2,290
Table 38. Environmental impact (EN15804+A1) covering modules A1-D													
GWP	Global warming potential (total)	kg CO_2 eq	-613	0.329	1.68	849	849	55.6	843	-22.9	0	0	-576
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	3.51E-10	6.57E-17	2.55E-16	1.04E-15	1.04E-15	1.85E-13	0	-2.16E-11	0	0	-1.71E-14
AP	Acidification potential of land and water	kg SO_2 eq	1.16	0.00118	0.00345	0.0329	0.0329	0.153	0	-0.243	0	0	-0.0168
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.269	2.67E-04	8.12E-04	0.00774	0.00774	0.0190	0	-0.0517	0	0	-0.0407
POCP	Photochemical ozone creation potential	kg Ethene eq	0.545	1.10E-04	-0.00133	0.00290	0.00290	0.00978	0	-0.186	0	0	0.0935
ADPe*	Abiotic depletion potential – elements	kg Sb eq	2.37E-05	5.18E-09	2.76E-08	8.22E-08	8.22E-08	5.45E-06	0	-1.38E-06	0	0	-6.90E-05
ADPf*	Abiotic depletion potential – fossil fuels	MJ	3,040	4.44	22.5	70.0	70.0	792	0	-182	0	0	-10,000

*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.

NELSON | RESULTS FOR 1m³ OF UNTREATED, SAWN, KILN-DRIED, GAUGED AND FINGER-JOINTED SOFTWOOD

			A1-A3	C1	C2	C3	C3	C4	C3	D	D	D	D
Indicator		Unit	Production	Decon-struction	Transport to EOL	Recycling	Energy recovery	Landfill (typical)	Reuse	Recycling	Energy recovery	Landfill (typical)	Reuse
Table 39. Green Star covering modules A1-D													
HT	Human Toxicity	CTUh	1.06E-05	1.15E-12	3.33E-12	3.05E-09	3.05E-09	2.51E-09	0	-3.60E-06	0	0	5.72E-09
LU	Land use	kg C deficit eq	-1,770	7.75E-04	0.00401	0.0162	0.0162	0.506	0	-3.21	0	0	-0.426
GS-RDw	Resource depletion - water	m^3 water use	0.858	2.78E-05	1.27E-04	4.41E-04	4.41E-04	-0.0117	0	-0.105	0	0	-0.00715
IR	Ionising Radiation	kBq U-235 eq	0.757	7.18E-05	5.91E-05	0.00114	0.00114	0.390	0	-0.0167	0	0	-0.0861
PM	Particulate Matter	kg PM2.5 eq	0.120	8.58E-05	1.35E-04	0.00485	0.00485	0.00837	0	-0.0277	0	0	0.0814

KAWERAU AND NELSON

RESULTS FOR THE TREATMENT OF 1m³ OF SAWN, KILN-DRIED SOFTWOOD

INDICATOR		UNIT	A1 -A3							
			H1.2 Boron	H3.1 LOSP	H3 CCA	H3 CCA re-dried	H4 CCA	H4 CCA re-dried	H5 CCA	H5 CCA re-dried
Table 40. Environmental impact results covering modules A1-A3										
GWP	Global warming potential	kg CO_2 eq	0.831	37.4	17.8	23.0	38.6	43.8	50.4	55.7
GWPf	Global warming potential (fossil)	kg CO_2 eq	0.814	37.3	17.4	22.5	37.7	42.8	49.3	54.4
GWPb	Global warming potential (biogenic)	kg CO_2 eq	0.0167	0.0840	0.414	0.529	0.895	1.01	1.17	1.29
GWPluc	Global warming potential (land use change)	kg CO_2 eq	6.33E-04	0.00831	0.00484	0.00613	0.0100	0.0113	0.0130	0.0143
ODP	Depletion potential of the stratospheric ozone layer	kg CFC 11 eq	2.24E-12	5.89E-11	3.39E-10	3.39E-10	7.48E-10	7.48E-10	9.82E-10	9.82E-10
AP	Acidification potential - terrestrial and freshwater	Mol H+ eq	0.00935	0.103	0.289	0.342	0.630	0.683	0.826	0.878
EPfw	Eutrophication potential - freshwater	kg P eq	1.61E-06	5.42E-05	1.40E-04	1.48E-04	3.08E-04	3.16E-04	4.04E-04	4.12E-04
EPm	Eutrophication potential - marine	kg N eq	0.00335	0.0228	0.0144	0.0355	0.0286	0.0498	0.0368	0.0579
EPt	Eutrophication potential - terrestrial	Mol N eq	0.0378	0.241	0.169	0.423	0.340	0.594	0.438	0.692
POFP	Photochemical ozone formation potential	kg NMVOC eq	0.00958	8.26	0.0523	0.284	0.106	0.338	0.137	0.369
ADPmm*	Abiotic depletion potential – minerals & metals	kg Sb eq	1.06E-07	1.26E-04	0.00271	0.00271	0.00599	0.00599	0.00786	0.00786
ADPf	Abiotic depletion potential – fossil fuels	MJ	9.85	1,410	213	235	462	484	605	627
WDP*	Water scarcity	m³ world eq	360	364	362	363	364	365	365	367

*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.

INDICATOR		UNIT	A1 -A3							
			H1.2 Boron	H3.1 LOSP	H3 CCA	H3 CCA re-dried	H4 CCA	H4 CCA re-dried	H5 CCA	H5 CCA re-dried
Table 41. Resource use indicators results covering modules A1-A3										
PERE	Renewable primary energy as energy carrier	MJ	37.1	51.9	45.0	429	54.6	439	60.0	444
PERM	Renewable primary energy resources as material utilization	MJ	0	0	0	0	0	0	0	0
PERT	Total use of renewable primary energy resources	MJ	37.1	51.9	45.0	429	54.6	439	60.0	444
PENRE	Non-renewable primary energy as energy carrier	MJ	9.91	1,420	221	243	480	502	628	651
PENRM	Non-renewable primary energy as material utilization	MJ	0	0	0	0	0	0	0	0
PENRT	Total use of non-renewable primary energy resources	MJ	9.91	1,420	221	243	480	502	628	651
SM	Use of secondary material	kg	0	0	0	0	0	0	0	0
RSF	Use of renewable secondary fuels	MJ	0	0	0	0	0	0	0	0
NRSF	Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	0	0
FW	Use of net fresh water	m³	37.8	37.9	37.8	37.9	37.9	38.0	37.9	38.0
Table 42. Waste categories and output flow indicators covering modules A1-A3										
HWD	Hazardous waste disposed	kg	5.10E-09	2.39E-07	1.55E-07	1.58E-07	3.40E-07	3.43E-07	4.46E-07	4.49E-07
NHWD	Non-hazardous waste disposed	kg	0.0959	0.289	1.38	2.26	2.95	3.83	3.84	4.72
RWD	Radioactive waste disposed*	kg	3.09E-05	0.00548	0.00302	0.00303	0.00666	0.00667	0.00874	0.00875
CRU	Components for re-use	kg	0	0	0	0	0	0	0	0
MFR	Materials for recycling	kg	0	0	0	0	0	0	0	0
MER	Materials for energy recovery	kg	0	0	0	0	0	0	0	0
EEE	Exported electrical energy	MJ	0	0	0	0	0	0	0	0
EET	Exported thermal energy	MJ	0	0	0	0	0	0	0	0

*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.

KAWERAU AND NELSON | RESULTS FOR THE TREATMENT OF 1m^3 OF SAWN, KILN-DRIED SOFTWOOD CONTINUED

			A1 -A3							
INDICATOR		UNIT	H1.2 Boron	H3.1 LOSP	H3 CCA	H3 CCA re-dried	H4 CCA	H4 CCA re-dried	H5 CCA	H5 CCA re-dried
Table 43. Biogenic carbon content covering modules A1-D										
BCC-prod	Biogenic carbon content - product	kg	0	0	0	0	0	0	0	0
BCC-pack	Biogenic carbon content - packaging	kg	0	0	0	0	0	0	0	0
Table 44. Additional Indicators covering modules A1-D										
GWP-GHG	IPCC AR5 GWP (excluding biogenic carbon)	kg CO_2 eq	0.799	37.2	17.3	20.5	37.6	40.8	49.1	52.4
PM	Respiratory inorganics	Disease incidence	4.16E-07	7.81E-07	2.74E-06	3.60E-06	5.94E-06	6.80E-06	7.77E-06	8.63E-06
IR	Ionizing radiation - human health	kBq U235 eq	0.00325	0.773	0.256	0.258	0.564	0.566	0.741	0.743
ETf	Ecotoxicity freshwater	CTUe	58.0	827	560	895	1,200	1,530	1,560	1,900
HTc	Human toxicity, cancer	CTUh	9.61E-10	5.80E-06	1.51E-08	3.57E-08	3.26E-08	5.32E-08	4.25E-08	6.32E-08
HTnc	Human toxicity, non-canc.	CTUh	2.23E-08	3.79E-06	6.22E-07	4.40E-06	1.35E-06	5.13E-06	1.77E-06	5.54E-06
LU	Land use	Dimensionless	2.09	20.3	11.4	15.8	23.0	27.3	29.6	33.9
Table 45. Environmental impact (EN15804+A1) covering modules A1-D										
GWP	Global warming potential (total)	kg CO_2 eq	0.792	35.5	17.5	20.6	37.9	41.1	49.6	52.7
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 eq	4.21E-12	1.09E-10	6.36E-10	6.36E-10	1.40E-09	1.40E-09	1.84E-09	1.84E-09
AP	Acidification potential of land and water	kg SO_2 eq	0.00689	0.0839	0.256	0.293	0.560	0.597	0.734	0.771
EP	Eutrophication potential	kg $(PO_4)^{3-}$ eq	0.00119	0.00836	0.00628	0.0140	0.0128	0.0205	0.0166	0.0243
POCP	Photochemical ozone creation potential	kg Ethene eq	8.56E-04	4.85	0.0124	0.170	0.0266	0.185	0.0347	0.193
ADPe*	Abiotic depletion potential – elements	kg Sb eq	1.06E-07	1.26E-04	0.00271	0.00271	0.00599	0.00599	0.00786	0.00786
ADPf*	Abiotic depletion potential – fossil fuels	MJ	9.07	1,400	183	205	397	419	519	541

*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.

			A1 -A3							
INDICATOR		UNIT	H1.2 Boron	H3.1 LOSP	H3 CCA	H3 CCA re-dried	H4 CCA	H4 CCA re-dried	H5 CCA	H5 CCA re-dried
Table 46. Green Star covering modules A1-D										
HT	Human Toxicity	CTUh	6.47E-10	7.27E-06	1.28E-09	3.59E-06	2.04E-09	3.59E-06	2.47E-09	3.59E-06
LU	Land use	kg C deficit eq	0.191	2.33	1.10	1.55	2.19	2.65	2.82	3.28
GS-RDw	Resource depletion - water	m^3 water use	1.42	1.48	1.45	1.46	1.48	1.49	1.50	1.51
IR	Ionising Radiation	kBq U-235 eq	0.00325	0.773	0.256	0.258	0.564	0.566	0.741	0.743
PM	Particulate Matter	kg PM2.5 eq	0.00180	0.00458	0.0169	0.0207	0.0368	0.0406	0.0482	0.0520

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PROGRAMME-RELATED INFORMATION AND VERIFICATION

Declaration owner	Carter Holt Harvey Building Products Limited www.chhwoodproducts.co.nz | www.laserframe.co.nz Private Bag 92-106, Victoria Street West, Auckland 1142, New Zealand
EPD produced by	thinkstep-anz ltd thinkstep-anz.com | anz@thinkstep.com thinkstep-anz ltd, 11 Rawhiti Road, Pukerua Bay, 5026 Wellington, New Zealand
EPD programme operator	EPD Australasia Limited epd-australasia.com | info@epd-australasia.com EPD Australasia Limited, 315a Hardy Street, 7010 Nelson, New Zealand
CEN standard EN 15804+A2	PCR 2019:14, version 1.11 Construction Products. EPD International., 2021-02-05
PCR review conducted by	The Technical Committee of the International EPD® System Massimo Marino | info@environdec.com
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 lifecyclelogic.com.au | Andrew@lifecyclelogic.com.au PO Box 571, Fremantle WA 6959, Australia
Approved by	EPD Australasia
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ yes ☑ no
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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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

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