MITEK.COM.AU

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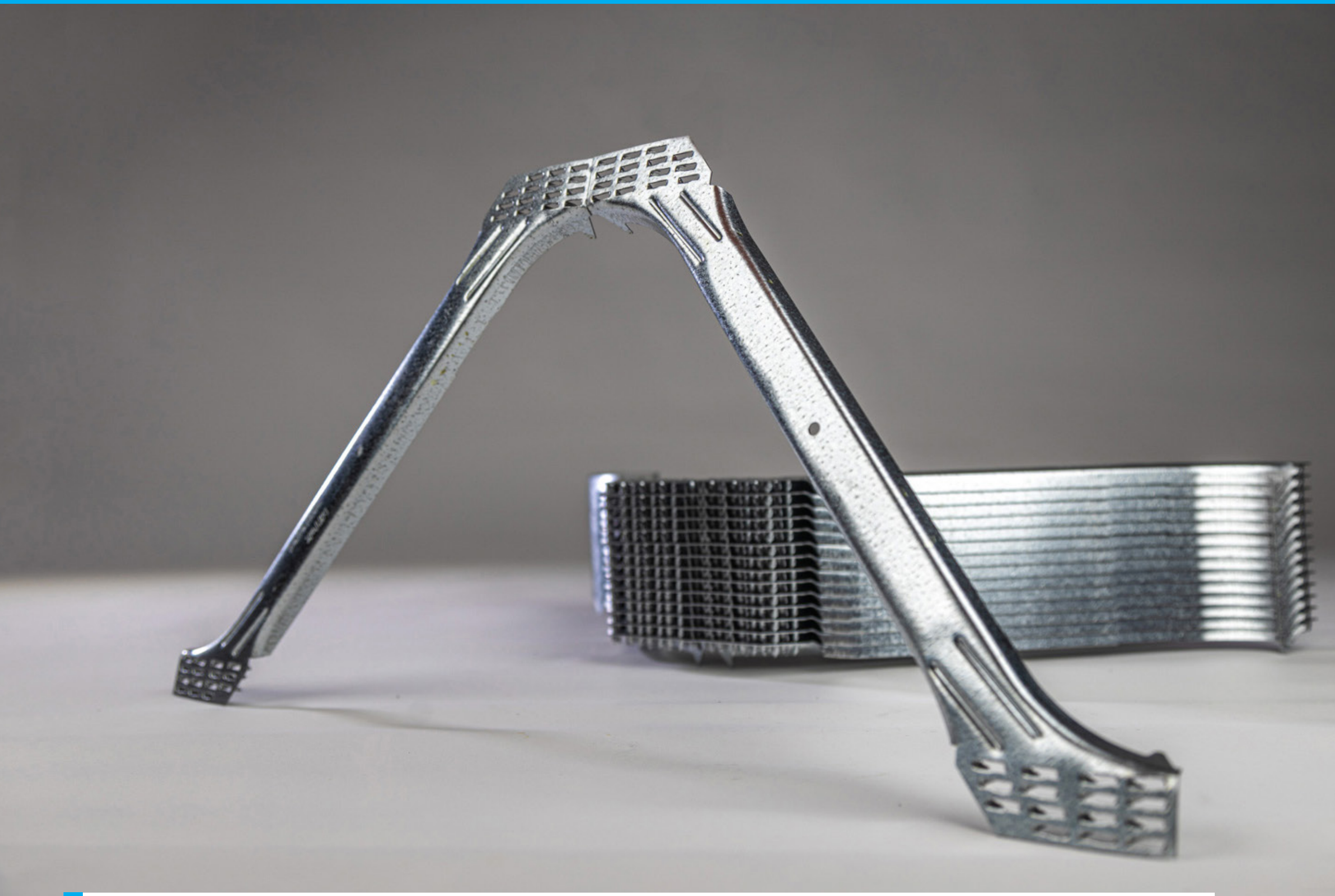

ENVIRONMENTAL PRODUCT DECLARATION

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

MiTek Posi-Strut® Metal Web

PROGRAMME OPERATOR: EPD International AB, www.environdec.com

REGIONAL PROGRAMME: EPD Australasia, www.epd-australasia.com

EPD REGISTRATION NUMBER: EPD-IES-0014471-001

PUBLICATION DATE: 19 July 2024

VALID UNTIL: 09 July 2029

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

CONTENTS

GENERAL INFORMATION

PROGRAMME INFORMATION AND VERIFICATION

Programme Operator	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden E: info@environdec.com
Regional Programme Operator	EPD Australasia Limited 315a Hardy Street, Nelson 7010, New Zealand E: info@epd-australasia.com New Zealand Phone: 09 889 2909 Australia Phone: 02 8005 8206 http://www.epd-australasia.com
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EPD Produced by	Pangolin Associates Level 11/10 Carrington St NSW 2000 Australia info@pangolin.com.au 02 8005 8620 https://pangolinassociates.com/
EPD Registration Number	EPD-IES-0014471-001
EPD version	1.0
Publication Date	2024-07-19
Valid Until	2029-07-09
Reference Year for Data	2022-01-01/2022-12-31
Geographical Scope	Australia, New Zealand
Standard	EN 15804:2012+A2:2019 served as the core Product Category Rules (PCR)
Product Category Rules (PCR)	PCR 2019:14 Construction Products, Version 1.3.3
PCR review was conducted by	The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006	☐ EPD process certification ☒ EPD Verification (External)

Third Party verifier, approved by EPD Australasia	Jonas Bengtsson (Edge Impact Global) jonas.bengtsson@edgeimpact.global
Procedure for follow-up of data during EPD validity involves third party verifier	☒ Yes ☐ No

GENERAL INFORMATION

This EPD is valid for Posi-Struts sold in Australia and New Zealand. The EPD owner, MiTek, has the sole ownership, liability, and responsibility for the EPD.

Comparison best practices:

- 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 characterization factors); have equivalent content declarations; and be valid at the time of comparison.
- Understanding the detail is important in comparisons. Expert analysis is often required to understand the detail and ensure data is truly comparable, to avoid unintended distortions.
- For further information about comparability, see EN 15804 and ISO 14025. For further questions on MiTek's products, contact MiTek at support.au@mii.com.

This EPD also provides:

- EN 15804:2012+A1:2013 compliant results to assist comparability across EPDs and support use in tools such as Green Star and IS Rating.
- Environmental performance information from cradle to gate (modules A1-A3), plus modules C1-C4 and module D.
- Carbon footprint data for use in Scope 3 carbon footprint calculations of your supply chain.

COMPANY INFORMATION

Owner of the EPD: MiTek Australia / MiTek New Zealand

Contact: Varun V Bharti
Technical and Engineering Manager – APAC

DESCRIPTION OF THE ORGANISATION

MiTek is a global leader and provider of integrated engineered building solution for timber industry. Our mission is to transform global communities through efficient and sustainable building solutions. We aim to do so by promoting adoption of advanced off-site construction through our Design-Make-Build philosophy.

We come from a long line of innovators, starting with Cal Jureit who saw a way to build roof trusses that made construction scalable and housing more affordable via the Gang Nail plate. Nearly 70 years later, the GangNail plate that he engineered, along with the software and automation innovations that fueled its adoption, continue to inspire every aspect of our business.

MiTek software, engineered products, automation, and professional services all play an essential role in the Design-Make-Build model. The more integrated they become, the more powerful their impact will be.

Our guiding principles of **Courage**, **Innovation**, **Unity** and **Stewardship** drive our daily decisions to bring efficient building products and solutions through our integrated offer of Timber Design Software (Design), Automated Manufacturing Equipments (Make) and Project Management and Design Services (Build). Our values are carried by our 3500+ strong team across Asia Pacific.

Cal Jureit who saw a way to build roof trusses that made construction scalable and housing more affordable, nearly 70 years ago.

MiTek offices within Australia and New Zealand.

PRODUCT COMPLIANCE AND RELATED MANAGEMENT SYSTEMS

Posi-Struts are proprietary products. Manufacture of Posi-Struts is quality managed through ISO 9001 regulated Quality Management Systems and related QA/QC Systems.

Posi-Struts are tested in accordance with AS1530.4-2014 fire-resistance tests for elements of construction.

PRODUCT INFORMATION

PRODUCT NAME

POSI-STRUT®

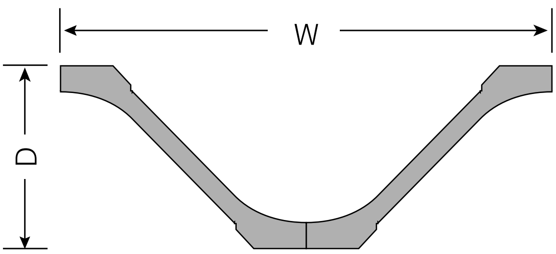
DECLARED UNIT

This EPD provides data for 1kg of packaged Posi-Strut manufactured by MiTek in Australia and sold in Australia and New Zealand. The EPD reports the average results for Posi-Strut sold in Australia and New Zealand.

PRODUCT IDENTIFICATION

UN CPC Code: 421 – structural metal

The following Posi-Struts are included in the EPD:



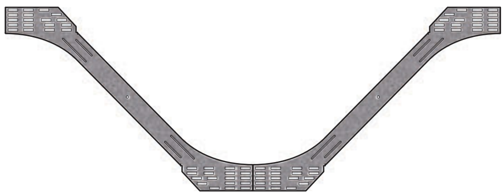
Product Specification

1.0mm G300 Steel Galvanized Z 275 Corrosion Protection

Product Code	Depth (mm)	Width (mm)
PSW3520	185	610
PSW3525	235	610
PSW3530	291	610
PSW4520	184	610
PSW4525	227	610
PSW4530	284	610
PSW4536	340	760
PSW4540	392	760

PRODUCT DESCRIPTION

MiTek POSI-STRUT® Metal Webs are V-shaped channel members with integrally formed metal truss connector plates at the upper and lower ends. Posi-Struts are used as structural web members in off-site prefabrication of parallel chord timber trusses. These trusses are subsequently used as floor joists or roof rafters for light wood frame residential and commercial construction compliant to NCC Australia and NZBC New Zealand.



Parallel Chord Trusses manufactured using Posi-Struts as webs are identified as Posi Trusses and are designed for a performance life of 50 years as per requirements of NCC and NZBC and following additional performance requirements from NCC and NZBC.

NCC Volume One clause:

B1P1 Structural Reliability (1): (a), (b), (c)

B1P1 Structural Reliability (2): (a), (b), (c), (d), (e), (j), (k)

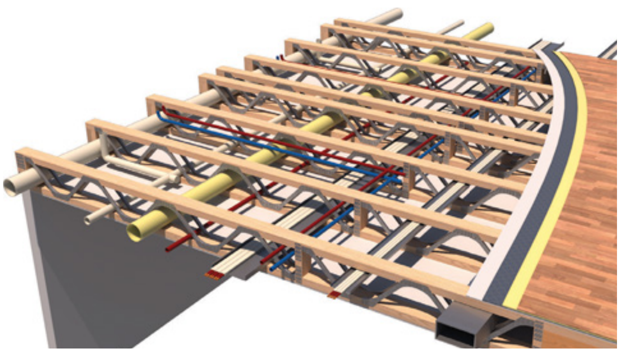
B1P2 Structural Resistance

NZBC Clause B1 – Structure:

Performance B1.3.1, B1.3.2, B1.3.3 (a), (b), (f), (g), (n), (q)

NZBC Clause B2 – Durability:

Performance B2.3.1 (a), B2.3.2 (a)



MANUFACTURING SITE(S) AND PROCESS(ES)

MiTek **Posi-Struts** are manufactured at 46 Monash Drive, Dandenong South VIC 3175 AU and distributed throughout Australia and to the New Zealand business for further distribution (40 Neales Road, East Tamaki, Auckland 2013 NZ).

Externally sourced pre-slit zinc coated, mild steel coils (from Bluescope Australia) of the correct grade and specification (Z275, 0.95mm) are taken to the designated press-lines in the MiTek manufacturing facility in Dandenong South. Press-lines comprise a range of power presses and ancillary equipment such as de-coiler and straightener machines. The machinery is started, and the slit steel coil is loaded onto an automatic de-coiler machine, fed through the straightener machine and into the press tooling by the press setter. The setter operates the press to produce a first-off sample. First off sample is Quality Checked against the product specification to ensure the product complies with the specification, and the batch run proceeds.

As the steel passes through, the tooling will strike the steel to produce the finished component. The finished component is collected at the front of the press by the packaging team. Products are then band packed and stacked onto a pallet. All finished goods manufactured in Australia and New Zealand have a MiTek brand label.

CONTENT INFORMATION

The average composition of 1 kg of Posi-Struts is:

Product Components	Material	Average weight (kg)	Range weight (kg)	Material Origin	Recycled material (pre-and post-consumer)	Biogenic material, weight% and kg C/kg
Hot dip galvanised coil steel	Bluescope ZINCFORM® steel Z275 at 0.95mm BMT	1.0	1.0	Port Kembla, Australia	17.4%[1]	0 resp. 0
Cindol 305D	Machinery fluid	0.00001	0.00001	Melbourne, Australia	-	0 resp. 0

Packaging Components	Material	Average weight (kg)	Range weight (kg)	Material Origin	Packaging (as % of product mass)	Weight biogenic carbon, kg C/kg
Shrink wrap	Plastic	0.0011	0.0011	South Korea	0.11%	0
Angleboard	Cardboard	0.0013	0.0013	Melbourne, Australia	0.13%	0.0007
Steel strap	Steel	0.0012	0.0012	Malaysia	0.12%	0
Plastic strap (New Zealand only)[2]	Plastic	0.00003	0 - 0.00046	South Korea	0.05%	0

For installation guidance, refer to the product website page and the resources available https://www.MiTek.com.au/steel-plates/posi-strut/.

Posi-Struts are compliant with the European REACH regulation.* None of the products contain one or more substances that are listed in the "Candidate List of Substances of Very High Concern for authorisation".**

INFORMATION ON BIOGENIC CARBON CONTENT

Results per functional or declared unit

Biogenic carbon content	Unit	Quantity
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.0007
Biogenic carbon content in packaging	kg CO_2 eq.	0.0024

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

1 Average recycled content across the range of steel products manufactured by BlueScope in Australia - https://cdn.dcs.bluescope.com.au/download/environmental-product-declaration-epd-galvabond-steel.

2 The weighted average weight of the plastic strap is based on the weighting of Posi-struts shipped to Australia (93%, where no plastic strap is applied) and products shipped to New Zealand (7%, where a plastic strap of 0.00046kg is applied). 7% * 0.00046kg = 0.00003kg.

* Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).)

** According to the PCR 2019:14, if one or more substances of the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" are present in a product and their total content exceeds 0.1% of the weight of the product, they must be reported.

LCA INFORMATION

DECLARED UNIT

1 kg of packaged Posi-Struts manufactured by MiTek in Australia. The EPD reports the average results for Posi-Struts sold in Australia and Posi-Struts sold in New Zealand.

TIME REPRESENTATIVENESS

The data sourced from MiTek (manufacturing, production quantities, freight) were for the period of 1st of January 2022 to the 31st of December 2022 (CY2022 = 2022-01-01 to 2022-12-31). Background data were extracted from different databases with varying time boundaries.

GEOGRAPHICAL BOUNDARY

The products analysed in this study are manufactured in Australia using materials made in the same country. Posi-struts are produced in Australia and are distributed to Australia and New Zealand.

DATABASE(S) AND LCA SOFTWARE USED

Simapro software version 9.5.0.2, databases Ecoinvent 3.9.1 and AusLCI 1.4.2.

DESCRIPTION OF SYSTEM BOUNDARIES

This EPD uses a cradle-to-gate (modules A1-A3) with modules C1-C4 and D approach.

The transport to customers (A4), installation (A5) and use phase (modules B1-B7) have been excluded from this assessment because MiTek sell their products to wholesalers and retailers who sell the product on to end customers. It is therefore not possible to predict how the material will be transported, installed, and used following manufacture. It was not possible to obtain activity data to assess the impacts from the transportation, installation, use and maintenance of the Posi-struts and estimating the environmental impacts based on assumptions would have significantly increased the uncertainty of the results.

Module D sits outside the system boundary. It indicates a reuse, recovery and/or recycling potential of the products beyond the system boundary.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage		Construction process stage			Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	AU / NZ / MY / KR		AU/ NZ	-	-	-	-	-	-	-	-	-	AU / NZ	AU / NZ	AU / NZ	AU / NZ	AU / NZ
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-		-	
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-		-	
Variation – sites	<10%			-	-	-	-	-	-	-	-	-	-	-		-	

X = included in the EPD
ND = module is not declared in the study such a declaration should not be regarded as an indicator result of zero)

AU = Australia
KR = Korea
MY = Malaysia
NZ = New Zealand

System diagram:

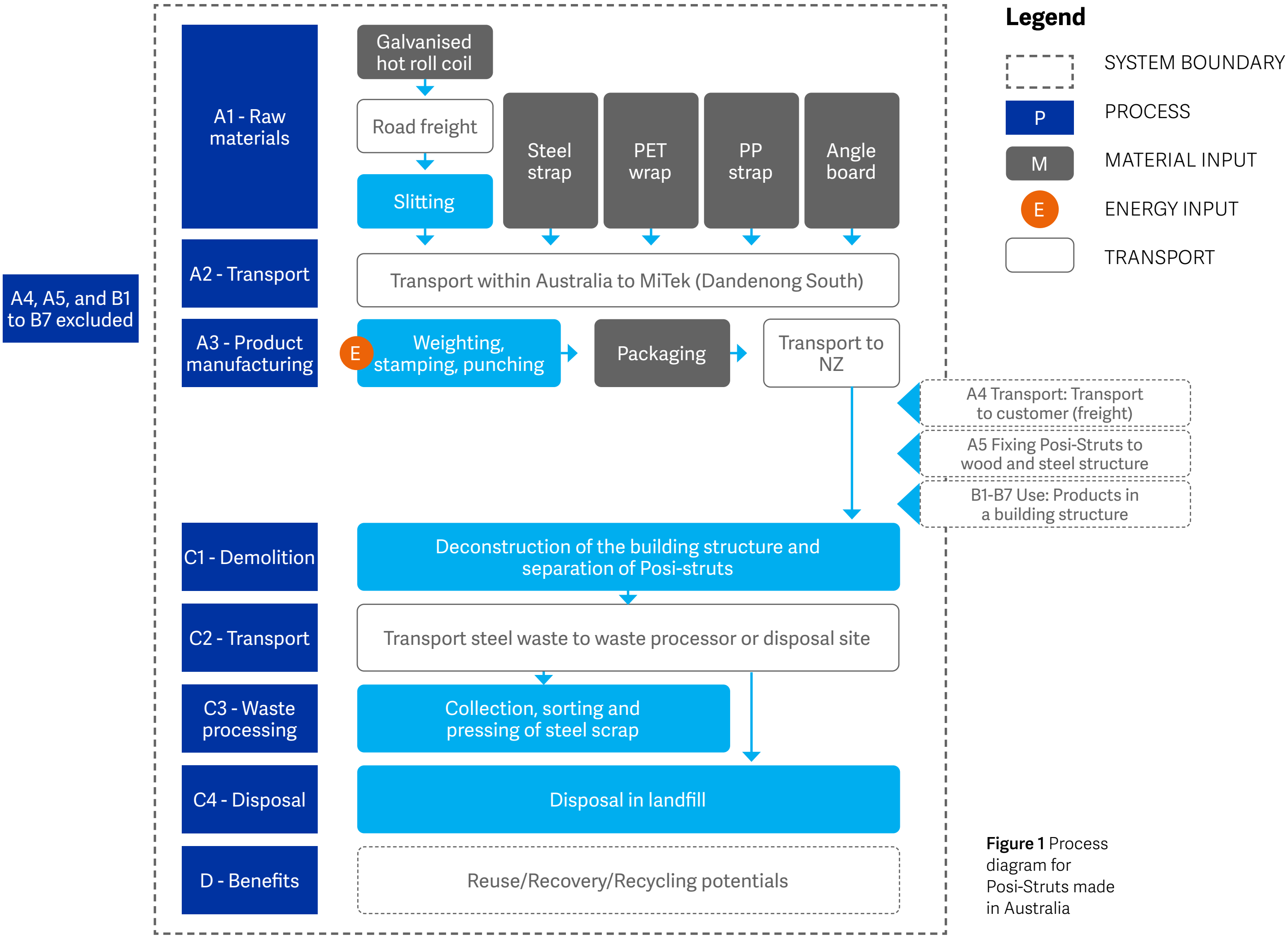


Figure 1 Process diagram for Posi-Struts made in Australia

Stage A1 to A3

Stages A1 to A3 include material supply to produce all the products as well as intermediate products which are manufactured by third party companies. The assembly of those products and conditioning is done on MiTek's sites (Dandenong South, Victoria and New Zealand). Those steps include:

- Extraction, transport, and manufacturing of raw materials
- Upstream energy, and fuel consumption
- Packaging of raw materials
- Transportation of all the materials and input products to MiTek's manufacturing site (Dandenong South, Victoria)
- Weighting, stamping and punching at MiTek's site (Dandenong South, Victoria)
- Energy consumption at the manufacturing site (Dandenong South, Victoria)
- Manufacturing waste
- Packaging for distribution
- Packaging disposal
- Distribution to MiTek site in New Zealand (for 7% of products).

Stage A4 to A5 Excluded

Stage B1 to B7 Excluded

Stage C1 to C4

C1 to C4 include:

- Deconstruction
- Transport to waste treatment or disposal facility
- End-of-life treatment of product and packaging (landfill disposal, incineration or recycling) including collection, sorting and pressing for recycling.

LIFE CYCLE ASSESSMENT (LCA) METHODOLOGY

This EPD has been produced in conformance with the requirements of PCR 2019:14 Construction Products, Version 1.3.3, and the Instructions of the Australasian EPD Programme v4.2.

PRIMARY DATA

The set of foreground data was sourced from MiTek. Foreground data includes the raw materials inputs' specification and quantity (weight of material per product) (see product description above). MiTek provided data on the inbound freight mode of transport and distance from suppliers for the raw material inputs, as well as material and inbound freight data on the packaging of final products. MiTek provided the electricity consumption at the factory in Melbourne, where the products are manufactured and assembled. The total weight of products manufactured at the factory by product group was provided to allocate the utility data accordingly.

SECONDARY DATA

The LCI and life cycle impact studies are performed using SimaPro LCA software version 9.5.0.2. SimaPro offers a range of libraries (LCI databases) and impact assessment methods. The libraries gather data for a wide range of processes and provide emission and extraction factors to quantify the environmental impacts of each unit process.

Pre-existing background data from the software are used to complete foreground data given by MiTek. The background data used are geographically and temporally specific.

This LCA used the background data from the following databases:

- **The Australian Life Cycle Inventory (AusLCI 1.42):** this database is an initiative from the Australian LCA Society (ALCAS) and contains over 430 processes modelled using Australian existing processes. This library is used for Australian-made materials assessed in this study.
- **EcoInvent 3.9.1:** this database is the largest and most consistent LCI market. It contains over 20,000 LCI datasets in energy supply, agriculture, transport, biofuels and biomaterials, bulk and specialty chemicals, construction materials, packaging materials, textiles, primary and precious metals, metals processing, ICT and electronics, dairy, wood, and waste treatment. This database is used for all processes outside of Australia (Canada). The geographical location can be selected to obtain an accurate electricity mix.

ELECTRICITY MODELLING

Electricity consumption mix is modelled using available processes from the AusLCI database for Victoria, i.e. 'electricity, low voltage, Victoria/AU U', as follows.

Australia (VIC) electricity grid mix based on AusLCI

Inputs from technosphere (electricity)	Victoria (AU) Grid Mix 2021
Electricity brown coal Vic, at power plant/AU U	40.55%
Electricity, hydropower, at reservoir power plant, alpine region/RER U/AusSD U	2.81%
Electricity, at wind power plant 2MW, offshore/OCE U/AusSD U	8.00%
Electricity, bagasse, sugarcane, at fermentation plant/BR U/AusSD U	0.40%
Electricity, biogas, allocation exergy, at micro gas turbine 100kWe/CH U/AusSD U	0.66%
Electricity, natural gas, steam, at power plant/AU U	42.1%
Electricity, natural gas, GT, at power plant/AU U	1.71%
Electricity, at heat pump 30kW, allocation electricity/CH U/adapted/AU U	3.06%
Electricity, production mix photovoltaic, at plant/US U/AusSD U	0.71%

The GHG GWP factor of the Australian electricity mix modelled as per above and based on the EN 15804+A2 method is 0.923 kg CO_2 eq./kWh.

Electricity consumption for manufacturing at the Melbourne MiTek site is based on actual electricity consumption at MiTek factory (data from suppliers Origin and AGL). The total consumption is allocated to Posi-struts and Nail plates based on total tonnes manufactured by product (15% for Posi-struts, 46% for Nail plates). Share of electricity consumption is divided by total weight of products manufactured to arrive at kWh per kilogram of steel product (0.0475 kWh/kg).

ALLOCATION

MiTek manufactures building products like Posi-struts and Nail plates in their Dandenong South, Australia factory. Due to limited data, a physical causality allocation method was used for environmental impact assessment. This allocated electricity consumption based on the production weight of Posi-struts in CY2022, disregards potential variations in energy usage across different products.

The inputs and manufacturing processes for both Australia and New Zealand Posi-struts are predominately the same and only differ in the packaging for transport to New Zealand and the sea freight to New Zealand. For Posi-struts shipped to New Zealand additional plastic straps are used to secure the products on pallets for shipment to New Zealand. Additionally, environmental impacts result from the transport to/from port and the shipment by cargo ship between port of Melbourne and Auckland. These additional inputs and processes are allocated to the average product based on physical allocation. 7% of total Posi-struts in kilogram are shipped to New Zealand and 93% remain in Australia.

Manufacturing scrap resulting from slitting, stamping and punching does not form part of the final product, and is sent to recycling by a third-party provider. The scrap is considered a co-product leaving the system with 0 economic value. Using economic co-product allocation, 100% of the impacts of input materials required to produce 1kg of Posi-struts are allocated to declared unit. The end-of-waste state is reached when the scrap is ready for recycling, i.e., is collected, sorted and pressed.

For the allocation of recycled material input, the polluter-pays-principle was applied in this LCA as per EPD guidance, which means that the polluter includes all processes up to the point where the product reaches the end-of-waste stage. For recycled material inputs, the recycled material is used as an input instead of virgin material.

CUT OFF CRITERIA

100% of inflows (mass and energy) have been included in modules A1-A3 and module D. No cut-off criteria have been applied to the impact assessment results, meaning 100% of environmental impacts are included, except for those impacts excluded from the system boundary (see section "Description of system boundaries").

Following the Construction products PCR guidelines (section 4.3.2) the following activities are excluded from the LCA:

- Inventory flows from personnel-related processes, such as transportation to and from work.
- Inventory flows from the production and end-of-life processes of infrastructure or capital goods used in the product system.

END OF LIFE

MiTek's products are assumed to be disposed in line with the latest National Waste Report from 2022[3] for Australia. Data for New Zealand average waste treatment was unavailable, hence Australian waste assumptions were applied to products shipped to New Zealand. Based on this 87% of steel scrap are expected to go to recycling (Module C3), modelled using the Ecoinvent process 'Iron scrap, sorted, pressed {ROW}, sorting and pressing of iron scrap | Cut-off, U', and 13% to landfill (Module C4), modelled using the Ecoinvent process 'Scrap steel {ROW}| treatment of scrap steel, inert material landfill | Cut-off, U.

3 National waste report 2022 https://www.Dcceew.Gov.Au/sites/default/files/documents/national-waste-report-2022.Pdf

KEY ASSUMPTIONS

Activity	Assumptions
BlueScope Steel	Exact material is BlueScope ZINCFORM® steel Z275[4] at 0.95mm BMT for which no EPD is available. Instead the results from stage A1-A3 EPD of GALVABOND® steel Z275 at 0.95mm (closest available) were used. It covers all raw materials emissions incl packaging up to the gate of BlueScope (prior to transport to the slitting process at Braeside).
Cindol 305D	CINDOL 305D is a water-soluble machining coolant formulated for machining operations on ferrous and non-ferrous metals. Cindol 305D was modelled based on the composition of PPSindustries' product: https://www.ppsindustries.co.nz/cdn/images/productdocument/QH-MSDS-CINDOL-305D---2019.pdf. The assumed composition is as follows: 90% base oil, 3% sulfonic acid, petroleum and sodium salts and 1% potassium hydroxide.
Coil slitting	Background research on coil slitting electricity usage did not return any results. Instead, an Ecoinvent process for energy and auxiliary inputs for metal working is used ('Energy and auxiliary inputs, metal working machine {RoW} | with process heat from hard coal | Cut-off, U'). 1kg of this process generates 1kg of metal.
End of life scenarios	The end of life treatment is based on the National Waste Report for Australia (2022) (https://www.dcceew.gov.au/sites/default/files/documents/national-waste-report-2022.pdf), assuming the following splits: Plastics: 13% recycling, 87% landfill. Cardboard: 55% recycling, 7.2% incineration, 38% landfill. Metals: 87% recycling, 13% landfill. Metals: 87% recycling, 13% landfill. Modules A1-A3 include: Scrap waste from slitting, stamping and punching, packaging waste. Module C2 includes: 100km transport to waste treatment by road freight. Module C3 includes: End of life steel waste to recycling. Module C4 includes: End of life steel waste to landfill.
Module D	Module D includes the benefits from recycling steel, cardboard and plastic and from using recycled cardboard as an input. Additionally, benefits from electricity generation from incineration and biogas landfill sites are included. **Electricity from cardboard incineration:** 23% incineration efficiency, lower heating value of 14.74 (https://cdn.revolutionise.com.au/cups/bioenergy/files/4reyuetqtzsbcjh5.pdf) and 7.2% of cardboard to landfill based on National Waste Report Australia 2022 (https://www.dcceew.gov.au/sites/default/files/documents/national-waste-report-2022.pdf). **Electricity from plastics and cardboard landfill:** 76% disposal in biogas landfill sites (https://www.wmrr.asn.au/common/Uploaded%20files/ALTS/2021/Tiana%20Nairn.pdf), 20% biogas collection efficiency (https://mraconsulting.com.au/energy-from-waste-in-australia-is-there-a-future/), 17.6 MJ/kg calorific value for cardboard (https://link.springer.com/article/10.1007/s13762-023-04963-0) and 40MJ/kg for plastics (https://www.sciencedirect.com/science/article/abs/pii/S2213138819309774). Avoided electricity is modelled using AusLCI process 'electricity, high voltage, Victoria/AU U'.
Demolition	Data on average demolition inputs was unavailable. Therefore, demolition was modelled in line with the BlueScope EPD, assuming the usage of 100 kW of a construction excavator and a fuel consumption of 0.172 kg diesel per tonne steel.

4 Https://cdn.Dcs.Bluescope.Com.Au/download/environmental-product-declaration-epd-galvabond-steel

ASSESSMENT INDICATORS

The background LCA serves as the foundation for this EPD. An LCA analyses the environmental processes in the value chain of a product. It provides a comprehensive evaluation of all upstream and downstream material and energy inputs and outputs. The results are provided for a range of environmental impact categories, in line with EN 15804:2012+A2:2019. 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.

Potential environmental impacts – core indicators according to EN15804:2012+A2:2019

Environmental Indicators	Abbrev	Unit	Assessment Method
Global Warming Potential - total	GWP-total	kg CO_2 eq.	PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1)
Global Warming Potential – fossil fuels	GWP-fossil	kg CO_2 eq.	PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1)
Global Warming Potential - biogenic	GWP-biogenic	kg CO_2 eq.	PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1)
Global Warming Potential - land use and land use change	GWP-luluc	kg CO_2 eq.	PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1)
Depletion Potential of the Stratospheric Ozone Layer	ODP	kg CFC-11 eq.	WMO 2014
Acidification potential	AP	mol H+ eq.	Accumulated Exceedance
Eutrophication potential - freshwater	EP-freshwater	kg P eq.	EUREND model (ReCiPe)
Eutrophication potential - marine	EP-marine	kg N eq.	EUREND model (ReCiPe)
Eutrophication potential - terrestrial	EP-terrestrial	mol N eq.	Accumulated Exceedance
Formation potential of tropospheric ozone	POCP	kg NMVOC eq.	LOTOS-EUROS
Abiotic depletion potential of non-fossil resources*	ADP-minerals & metals	kg Sb eq.	CML 2002a
Abiotic depletion potential of fossil resources*	ADP-fossil	MJ	CML 2002a
Water use (deprivation potential)*	WDP	m^3 world deprived	AWARE adjusted for Australia (by Lifecycles)

Potential environmental impacts – additional indicators according to EN15804:2012+A2:2019

Environmental Indicators	Abbrev	Unit	Assessment Method
Climate impact**	GWP-GHG (AR5)	kg CO_2 eq.	Based on IPCC AR5, excluding biogenic emissions (biogenic CO_2 is set to zero)
Climate impact***	GWP-GHG	kg CO_2 eq.	PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1) with characterisation factor (CF) for biogenic CO_2 set to zero
Particulate Matter	PM	Disease incidence	SETAC-UNEP, Fantke et al. 2016
Ionising Radiation – human health*	IRP	kBq U-235 eq.	Human Health Effect model
Eco-toxicity - freshwater	ETP-fw	CTUe	USEtox
Human toxicity potential – cancer effects*	HTP-c	CTUh	USEtox
Human toxicity potential – non-cancer effects*	HTP-nc	CTUh	USEtox
Land use related impacts / soil quality*	SQP	dimensionless	Soil quality index (LANCA®)

Resource use parameters

Environmental Indicators	Abbrev	Unit	Assessment Method
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ	=PERT-PERM
Use of renewable primary energy resources used as raw materials	PERM	MJ	For PERM certain materials like wood, paper are allocated to PERM. In order to calculate this impact categories, their lower heating values (LHV) are obtained from www.phyllis.nl. When materials are added, the heating value is added as a positive substance and when they leave the system through incineration, the same amount of heating values are subtracted.
Total use of renewable primary energy resources	PERT	MJ	Renewable Cumulative Energy Demand (CED) adjusted by PRé consultants and by start2see consultants as per EPD instructions[6]
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ	=PENRT-PENRM
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ	Non-renewable materials like Nylon, Rubber, etc are allocated to PENRM. In order to calculate this impact category, the materials' lower heating values (LHV) are obtained from www.phyllis.nl. When materials are added, the heating value is added as a positive substance and when they leave the system through incineration, the same amount of heating values are subtracted.
Total use of non-renewable primary energy resources	PENRT	MJ	Non-renewable Cumulative Energy Demand (CED) adjusted by PRé consultants and by start2see consultants as per EPD instructions[5]
Use of secondary material	SM	kg	Manual for direct inputs
Use of renewable secondary fuels	RSF	MJ	Manual for direct inputs
Use of non-renewable secondary fuels	NRSF	MJ	Manual for direct inputs
Net use of freshwater	FW	m^3	ReCiPe 2016

5 IPCC 2013 AR5: https://epd-australasia.com/wp-content/uploads/2024/02/EPDA-Technical-Guidance-on-GWP-GHG-IPCC-AR5-2024-02-07.pdf

Waste categories and output flow parameters

Environmental Indicators	Abbrev	Unit	Assessment Method
Hazardous waste disposed	HWD	kg	EDIP 2003 (hazardous waste + slags/ashes)
Non-hazardous waste disposed	NHWD	kg	EDIP 2003 (bulk waste)
Radioactive waste disposed	RWD	kg	EDIP 2003 (radioactive waste)
Components for re-use	CRU	kg	Manual for direct components for re-use
Materials for recycling	MFR	kg	Manual for direct material for recycling
Materials for energy recovery	MER	kg	Manual for direct material for energy recovery
Exported energy – electrical	EEE	MJ	n/a
Exported energy – thermal	EET	MJ	n/a

Additional Environmental indicator in accordance to EN 15804:2012+A2:2019

Environmental Indicators	Abbrev	Unit	Assessment Method
Global warming potential	GWP (AR4)	kg CO_2 eq.	CML-IA baseline version 4.2 based on IPCC AR4 adjusted by PRé consultants and by start2see consultants
Ozone layer depletion	ODP	kg CFC-11 eq.	CML-IA baseline version 4.2 WMO 2003
Acidification potential	AP	kg SO_2 eq.	CML 2002b
Eutrophication potential	EP	kg PO_4^{3-} eq.	CML 2002b
Photochemical ozone creation potential	POCP	kg C_2H_4 eq.	CML 2002b
Abiotic depletion potential for non-fossil resources	ADPE	kg Sb eq.	CML 2002b
Abiotic depletion potential for non-fossil resources	ADPF	MJ	CML 2002b

* 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.

** This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR. The indicator is more likely to be in line with other GHG reporting in Australia and New Zealand.

*** The indicator is calculated in line with PCR 2019:14 v.1.3.3 and EN 15804+A2 (based on EF 3.1) with characterisation factor (CF) for biogenic CO_2 set to zero.

ENVIRONMENTAL INFORMATION RESULTS

Use of results generated by modules A1-A3 is discouraged without considering the results of module C.

Potential environmental impact – mandatory indicators according to EN 15804 to EN15804:2012+A2:2019
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	5.17E+00	1.51E-04	1.54E-02	1.50E-02	2.25E-03	-1.70E+00
GWP-fossil	kg CO_2 eq.	5.17E+00	1.51E-04	1.54E-02	1.50E-02	2.24E-03	-1.70E+00
GWP-biogenic	kg CO_2 eq.	2.50E-03	9.13E-07	1.15E-05	1.72E-06	1.72E-06	-3.89E-04
GWP-luluc	kg CO_2 eq.	2.43E-03	2.50E-08	5.29E-07	1.84E-05	2.75E-06	-4.37E-04
ODP	kg CFC 11 eq.	1.40E-08	1.05E-11	2.10E-10	1.75E-10	2.62E-11	-4.10E-08
AP	mol H+ eq.	1.85E-02	8.59E-07	4.50E-05	1.08E-04	1.62E-05	-6.46E-03
EP-freshwater	kg P eq.	4.64E-04	4.25E-09	3.04E-07	2.45E-06	3.67E-07	-6.37E-04
EP-marine	kg N eq.	3.94E-03	1.65E-07	1.66E-05	4.31E-05	6.44E-06	-1.53E-03
EP-terrestrial	mol N eq.	4.29E-02	1.50E-06	1.76E-04	4.63E-04	6.92E-05	-1.59E-02
POCP	kg NMVOC eq.	1.33E-02	1.39E-06	6.31E-05	1.37E-04	2.04E-05	-9.10E-03
ADP - minerals & metals*	kg Sb eq.	1.11E-04	2.66E-11	9.15E-10	5.73E-10	8.56E-11	-2.69E-07
ADP-fossil*	MJ	5.55E+01	1.02E-02	2.05E-01	1.91E-01	2.86E-02	-1.76E+01
WDP*	m^3	4.27E-01	8.73E-06	2.92E-04	1.11E-03	1.66E-04	-1.06E-02

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary indicators
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG[6]	kg CO_2 eq.	5.08E+00	1.51E-04	1.54E-02	1.50E-02	2.24E-03	-1.70E+00
GWP-GHG (AR5)	kg CO_2 eq.	5.17E+00	1.52E-04	1.54E-02	1.50E-02	2.25E-03	-1.71E+00
PM	Disease incidence	2.18E-07	5.42E-12	1.03E-09	2.43E-09	3.63E-10	-1.36E-07
IRP	kBq U-235 eq.	1.34E-01	1.88E-06	3.70E-05	6.02E-04	9.00E-05	-1.29E-02
ETP-fw	CTUe	1.49E+01	1.03E-02	2.16E-01	1.56E-01	2.33E-02	-1.09E+01
HTP-c	CTUh	6.35E-10	1.82E-14	1.15E-12	1.56E-12	2.33E-13	-9.52E-09
HTP-nc	CTUh	8.09E-08	9.79E-13	1.11E-10	6.84E-11	1.02E-11	-5.93E-09
SQP	dimensionless	2.53E+00	1.34E-05	7.94E-04	1.19E-02	1.77E-03	-1.80E+00

6 The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Resource use
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.77E+00	1.52E-05	3.01E-04	7.94E-03	1.19E-03	-1.95E-01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.77E+00	1.52E-05	3.01E-04	7.94E-03	1.19E-03	-1.95E-01
PENRE	MJ	5.55E+01	1.02E-02	2.05E-01	1.91E-01	2.86E-02	-1.76E+01
PENRM	MJ.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.55E+01	1.02E-02	2.05E-01	1.91E-01	2.86E-02	-1.76E+01
SM	kg	2.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	6.54E-03	3.09E-07	1.05E-05	4.05E-05	6.06E-06	-1.49E-03

WASTE CATEGORIES AND OUTPUT FLOWS

Waste production
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	4.52E-04	7.25E-08	1.62E-06	2.93E-06	4.37E-07	-2.81E-04
NHWD	kg	1.07E-01	6.30E-07	5.37E-05	1.13E-01	1.69E-02	-4.67E-02
RWD	kg	2.01E-04	3.74E-10	7.35E-09	1.45E-07	2.17E-08	-3.14E-06

Output flows
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	6.67E-01	0.00E+00	0.00E+00	8.70E-01	0.00E+00	0.00E+00
MER	kg	1.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Potential environmental impact – additional in accordance to EN 15804:2012+A2:2019
(results per 1 kg of Average Posi-Strut made in Australia for Australia and New Zealand)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP	kg CO_2 eq.	5.04E+00	1.42E-04	1.52E-02	1.48E-02	2.22E-03	-1.67E+00
ODP	kg CFC-11 eq.	1.16E-08	8.28E-12	1.67E-10	1.40E-10	2.09E-11	-5.76E-08
AP	kg SO_2 eq.	1.49E-02	7.23E-07	3.38E-05	7.97E-05	1.19E-05	-5.21E-03
EP	kg PO_4^{3-} eq.	2.84E-03	8.36E-08	6.99E-06	2.23E-05	3.33E-06	-2.54E-03
POCP	kg C_2H_4 eq.	2.19E-03	4.52E-07	9.85E-06	1.25E-05	1.86E-06	-2.64E-03
ADPE	kg Sb eq.	1.11E-04	2.66E-11	9.16E-10	6.11E-10	9.14E-11	-2.71E-07
ADPF	MJ	5.78E+01	1.00E-02	2.03E-01	2.03E-01	3.04E-02	-2.51E+01

End of Life

Parameter	Unit	Total
Steel collection separately	kg	1.0460
Steel collected with mixed construction waste	kg	0.1563
Recovery for re-use	kg	-
Recovery for recycling	kg	1.0460
Recovery for energy recovery	kg	-
Disposal to landfill	kg	0.1563
Assumptions for scenario	87% of steel recycled, 13% steel to landfill.	

Biogenic Carbon Content

Indicator	Unit	A1-A3
Biogenic carbon in product	kg C	-
Biogenic carbon in packaging	kg C	0.0007
Biogenic carbon in packaging	kg CO_2 eq.*	0.0024

*__Note__: 1kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

LIMITATIONS

The following limitations and data gaps have been identified in this LCA:

- Modelling of steel is based on Galvabond EPD instead of Zincform (but Bluescope indicated minimal differences between the two products).
- Installation stage data was unavailable and has been excluded.
- Demolition data was unavailable and has been based on the assumptions taken in the GALVABOND steel EPD by Bluescope.
- End-of-life assumptions are based on average market data in Australia.
- New Zealand end-of-life scenarios and transport impacts are based on data sets for Australia.

These limitations were partly tested for significance in the sensitivity or uncertainty analysis and recommendations for data completeness and quality improvements were derived.

INTERPRETATION OF RESULTS

The majority of production (A1-A3) impacts arise from the combustion of fossil fuels and use of raw materials, either directly or in the upstream production of electricity and materials. The most significant contributor to most environmental impact indicators is the BlueScope steel coil. Further information on the environmental impacts of BlueScope steel that is used for MiTek Posi-struts can be found in the GALVABOND steel EPD[7].

Results are directly influenced by the thickness of steel used to manufacture Posi-Struts, hence where a thicker steel sheet is not required, a lower thickness of steel should be considered. The manufacturing of the zinc coating applied to the steel substrate for corrosion protection has the most significant contribution to ADP-minerals & metals, IRP, and SQP, and also contributed significantly to most indicators.

7 https://cdn.dcs.bluescope.com.au/download/environmental-product-declaration-epd-galvabond-steel

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