AUSREO

Build with confidence

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804+A2:2019 for:

REINFORCING BAR AND PREFABRICATED STEEL REINFORCEMENT CAGES

AUSTRALASIA EPD®

ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

Programme: The International EPD® System
Programme operator: EPD Australasia Limited
EPD registration number: S-P-08459
Publication date: 2023/06/26 **Valid until:** 2028/06/25
Geographical scope of EPD: Australia

GENERAL **INFORMATION**

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

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

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

Declaration owner:	AUSREO Web: ausreo.com.au Email: wetherillpark@ausreo.com.au Post: 133-145 Newton Road, Wetherill Park, NSW 2164
Reference Year for Data	2021
EPD produced by:	thinkstep Pty Ltd Web: thinkstep-anz.com Email: anz@thinkstep-anz.com Post: 25 Jubilee Street, Perth, Western Australia 6151, Australia
EPD programme operator:	EPD Australasia Limited Web: epd-australasia.com Email: info@epd-australasia.com Post: EPD Australasia Limited, 315a Hardy Street, Nelson 7010, New Zealand

CEN standard EN 15804+A2 served as the core PCR

PCR:	PCR 2019.14 Construction Products Version 1.11, 2021-02-05
PCR review was conducted by:	The Technical Committee of the International EPD® System
Chair:	Martin Erlandsson. Contact via info@environdec.com

Independent verification of the declaration and data, according to ISO 14025:

☐ EPD process certification (Internal) ☑ EPD verification (External)

Third party verifier:	Rob Rouwette
Web:	start2see.com.au
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Approved by:	EPD Australasia

Procedure for follow-up of data during EPD validity involved third-party verifier ☐ Yes ☑ No

Version History 1.0

BUILD WITH **CONFIDENCE**

In 2000, our founding members saw an opportunity to do things differently in the steel reinforcement industry. They knew they could make a difference by providing customers with exceptional service, innovative products, and a 'can-do' attitude.

With our founding members still actively involved in the day-to-day management of the business, this entrepreneurial spirit is as strong as ever.

We take pride in finding ways to reduce our impact on the environment.

For example, we utilise proprietary **3D steel detailing software (ADDA)** to identify clashes and reduce waste. ADDA analyses structural drawings to determine rebar elements we should prefabricate, as well as which non-standard bar lengths we should custom order from the mill.

The prefabrication and bar bending and cutting programs are electronically sent to **automated manufacturing machines** in our factories, thereby, ensuring the accuracy of your delivered steel.

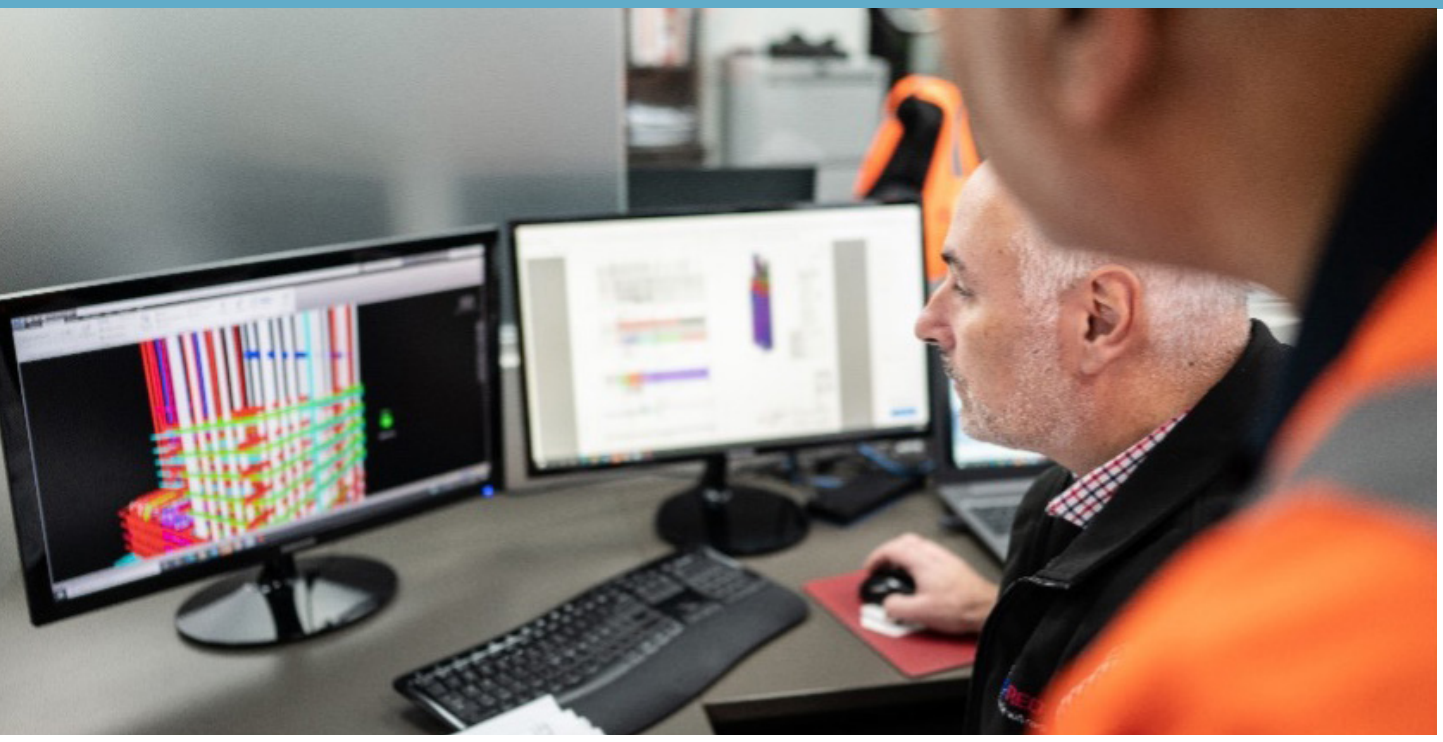
From start to finish, you can rely on our local team of estimators, schedulers, engineers, project managers, account managers and delivery drivers to do whatever it takes to make your project (and business) successful and sustainable.

AUSREO sources steel reinforcement from local Australian steel mills, which is manufactured using **recycled steel content** through electric arc furnace steelmaking.

Our steel reinforcement is 3rd party certified by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS), which means our steel mesh and bar conforms to AS/NZS 4671 Steel reinforcing materials, AS 3600 Concrete structures, AS 5100.5 Bridge design, concrete and AS 2870 Residential slabs and footings.

We are **100% Australian owned and operated** with 19 locations along the East Coast of Australia.

AUSREO is **ISO 9001 Quality Management Systems certified**.



Reinforcing steel bar and prefabricated steel reinforcement cages

Product Description

This EPD covers REINFORCING STEEL BAR and PREFABRICATED STEEL REINFORCEMENT CAGES processed by AUSREO.

Steel reinforcement bars are used in reinforced concrete buildings and structures, including bridges, tunnels, and roads. The steel bars provide tensile strength for reinforced concrete beams, columns, and slabs.

Reinforcing bar is often processed (cut, bent, straightened, or threaded) and/or fabricated to suit the specific requirements of your reinforcing element.

We process and supply a comprehensive range of standard N grade, 500 MPa deformed reinforcing bar (D500N), as well as N grade 250 MPa plain round bar (D250N).

Prefabricated steel reinforcement cages are typically used for piles cages, diaphragm walls, columns, beams, precast elements, tunnels, bridges and barriers.

The service life of a well maintained reinforced concrete building or structure can be hundreds of years. Johnstons Creek Sewer Aqueduct in Annandale, Sydney was the first reinforced concrete structure built in Australia in 1895. The 128 year old aqueduct continues to serve the local community today.

Processed to the Australian Standard AS/NZS 4671 *Steel reinforcing materials* and certified by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS), our reinforcing bar product range is available in multiple grades (D500N and D250N) and diameters (6.5mm to 50mm).

Reinforcing steel bars and cages form part of the following standard industry classifications:

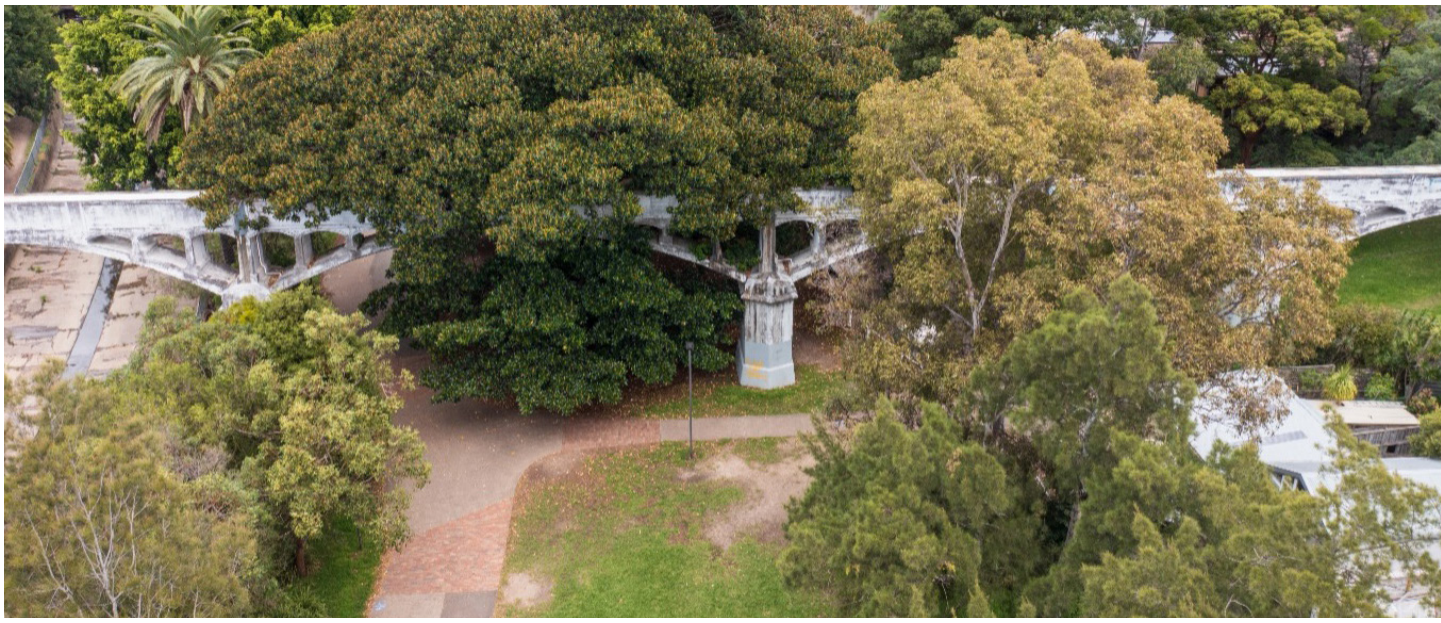
Industry classifications

Table 1: Industry classifications

Product	Classification	Code	Category
Reinforcing bar and prefabricated cages	UN CPC Ver.2.1	4124	Bars and rods, hot-rolled, of iron or steel
	ANZSIC 2006	2221	Structural Steel Fabricating

Declared Unit

The declared unit for the EPD is 1 tonne (t) of reinforcing steel bar and prefabricated cage products dispatched to an average customer.



↑ First reinforced concrete structure in Australia: Johnstons Creek Sewer Aqueduct, built in 1895 (Annandale, NSW 2021)

Content Declaration

Table 2: Content declaration for 1 tonne of reinforcing bar and prefabricated cage

Substances	Weight (kg)	Post-consumer material*, weight %	Biogenic material, weight% and kg C/kg
Carbon manganese steel	1,000	0%	0%

*The total amount of recycled content is approximately 83% for both products, but since the percentage post-consumer material content cannot be determined, this is stated as 0% in the EPD.

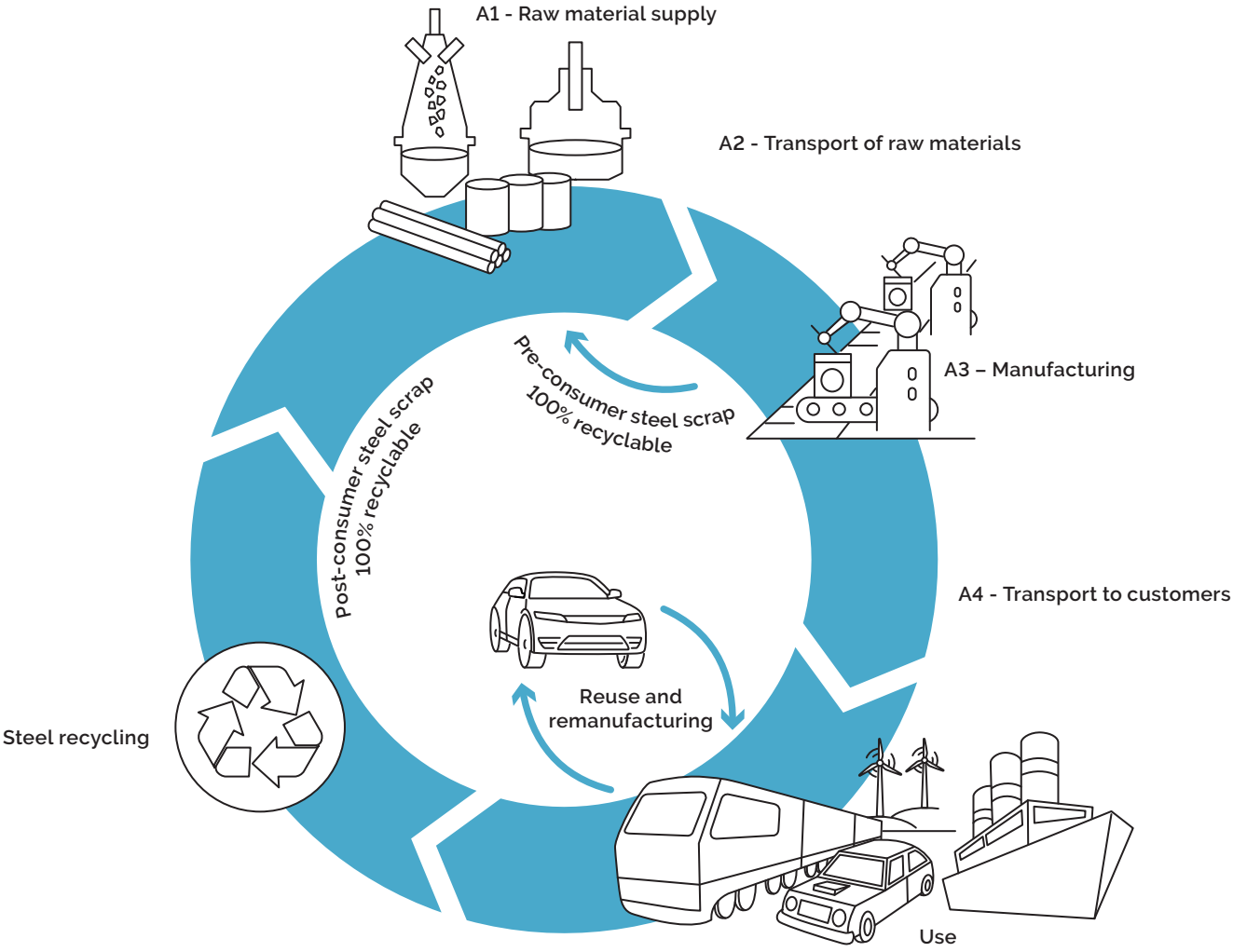
Table 3: Average packaging for 1 tonne of reinforcing bar and prefabricated cage

Packaging materials	Reinforcing bar packaging weight (kg)	Prefabricated cage packaging weight (kg)	Weight% (versus the product)	Weight biogenic carbon (kg C/kg)
Timber pallets	0.038	0.028	<1%	0.42
Plastic strapping	0.008	0.006	<1%	-
Plastic wrap	0.002	0.001	<1%	-
Timber dunnage	1.390	1.015	<1%	0.42
One-way slings	0.394	0.517	<1%	-
Total	1.832	1.567	<1%	

None of the materials in this product are on the Candidate List of substances of very high concern (SVHC), by the European REACH Regulation at a concentration greater than 0.1% by mass.

Steel Life Cycle

AUSREO's reinforcing bars and prefabricated cages are produced using steel produced via electricity arc furnace (EAF) from Australia (AU), Turkey (TR) and South Korea (KR).



System boundaries

As shown in the table below, this EPD is of the 'cradle-to-gate' type with options. The system boundary includes A1-A3 for production of AUSREO products for Australia; A4 for transporting product to customers (option); end of life stage covering modules C1-C4; and resource recovery stage D.

Other life cycle stages (Modules A5 and B1-B7) are dependent on particular scenarios and best modelled at the infrastructure level.

The geography, data and variation values for reinforcing bars and cages are identical for both products.

Table 4: Modules included in the scope of the EPD
Please replace with this table and include the text from below too.

	Product stage			Construction process stage		Use stage							End of life stage				Recovery Stage
	Raw material supply	Transport	Manufacturing	Transport	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	AU, KR, TR	GLO	AU	AU	-	-	-	-	-	-	-	-	AU	AU	AU	AU	GLO
Specific data	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Production (Module A)

The production stage includes the environmental impacts associated with raw materials extraction and processing of steel billet, transport to, between and within the different manufacturing sites and facilities, manufacturing processes for producing reinforcing bar and prefabricating cages (A1-A3) and transport of product to customer (A4).

Production process

A1 - RAW MATERIAL SUPPLY
Steel billet manufactured is predominantly through electric arc furnace steelmaking.

A2 – TRANSPORT OF RAW MATERIALS
Steel input is delivered to AUSREO manufacturing and prefabrication facilities.

A3 - MANUFACTURING

BAR PROCESSING
Automated bending and cutting of steel bars.

PREFABRICATION
Custom welding and prefabrication of steel bars.

A4 – TRANSPORT TO CUSTOMER
Distribution (A4) considers sales weighted average transport via truck and ship to destinations in Sydney, Adelaide, Melbourne and Perth:
- Distance Truck (km): 1,130
- Distance Sea (km): 2,123

This is an average distribution scenario that may not be representative for a given customer. Customers should individually establish the transport requirements between AUSREO and their site rather than relying on the average.

End of Life (Module C)

When a building reaches its end-of-life, it will be demolished (C1) and the demolition waste transported to a processing facility (C2). The waste processing (C3) includes the separation of steel waste from other building materials and shredding activities.

Material that cannot be recycled will be disposed (C4).

The end-of-life stage (Modules C1-C4) and resource recovery stage (Module D) are modeled using a scenario reflecting end of life recycling/ landfilling rates for steel products in the construction sector.

The rates are based on a waste and recycling report prepared for the Australian Government (Department of the Environment and Energy). A recycling rate of 90% has been applied for this study (Pickin, Randell, Trinh, & Grant, 2018). The remaining 10% is assumed to be landfilled (C4). This is an Australian average scenario for metal products and therefore appropriate for all products included in the EPD.

Table 5: End of life scenarios for products

Processes	Unit (expressed per declared unit of components products or materials by type of material)
Excavator	100-kW construction excavator (0.172 kg diesel input per tonne of material)
Recovery system specified by type	0.90 tonnes recycled
Disposal specified by type	0.1 tonnes to landfill
Assumptions for scenario development	The distance for transporting waste to processing and landfill is assumed to be 100km.

Recovery and Recycling potential (Module D)

Module D considers the environmental impact (benefit or burden) of steel in its second life cycle.

It declares a potential credit or burden for the net scrap associated with a product. "Net scrap" is the amount of scrap left after scrap from post-consumer needs are removed from scrap available from product at end of life. Here, secondary material used in product manufacture is subtracted from the overall amount of recycled product after the first life cycle.

If the net balance is positive, a credit is given. The credit is calculated by comparing the impacts associated with primary product produced. If more scrap input is required compared to what's available, then a burden is created in Module D.

With almost 90% scrap input and 90% recycling, there is limited net scrap generated (0.02 to 0.03 tonnes per tonne of product). This results in a negative result for Module D.

Reinforced concrete structures can be adapted and reused. For example, the Quay Quarter Tower building in Circular Quay, Sydney is a reinforced concrete structure built in the 1970's that was adapted and re-purposed in 2021.

While reuse can be an option, the end of life scenario in this EPD considers 90% recycling and 10% landfill. The EPD does not cover reuse.

Life cycle inventory (LCI) data and assumptions

Primary data were used for all manufacturing operations up to the factory gate, including upstream data for steel. Primary data for AUSREO operations was sourced from the period 1 January 2021 to 31 December 2021 (2021 calendar year) covering the two sites in Victoria and New South Wales. Background data was used for input materials sourced from other suppliers.

All data in the background system were from the GaBi Life Cycle Inventory Database 2021 (Sphera, 2021). Most datasets have a reference year between 2017 and 2020 and all fall within the 10-year limit allowable for generic data under EN 15804.

Upstream data

90% of steel input comes from Australia, 6-8% from Turkey and 2-4% from South Korea. Data for Australian input is taken from InfraBuild Steel EPD S-P-00855 v1.2 – Reinforcing rod, bar and wire, updated to EN 15804+A2 (InfraBuild, 2022). Steel input from Turkey and South Korea are modelled using background data from the ecoinvent database.

With the exception of energy (which reflect Australian conditions), minor upstream (supply chain) data used were European due to a lack of consistent LCI data for Australasia at the time this study was conducted.

Electricity

Australian State specific electricity mixes were used per location of manufacture:

- Sunshine North, Victoria
- Wetherill Park, New South Wales

The VIC electricity grid consumption mix (2018) is made up of lignite (71.56%), wind (8%), hydro (5.12%), natural gas (5.94%), import from SA (3.22%), import from NSW (3.29%), import from TAS (2.58%), photovoltaics (0.27%) and hard coal (0.02%).

The emission factor for the VIC grid for the GWP-GHG indicator is 1.23kg CO2e/kWh.

The NSW electricity grid consumption mix (2018) is made up of hard coal (78.28%), natural gas (2.91%), import from VIC (3.01%), Hydro (3.56%), import from QLD (8.42%), wind (2.84%), heavy fuel oil (0.09%), photovoltaics (0.83%) and biogas, biomass (solid) and coal gases (0.06%).

The emission factor for the NSW grid for the GWP-GHG indicator is 1.02kg CO_2e/kWh.

Recycling

Recycling rate of products is assumed to be 90%, with 10% sent to landfill. (Pickin, Randell, Trinh, & Grant, 2018).

Transport

Primary transport data was used for transport of production inputs (A2), and for transport of products to the customer (A4). Any wastes from the production process (A3) are assumed to be transported over a 100 km distance to a treatment or disposal site. For distribution, sales weighted average distances were calculated.

Transport modes:

- Truck (diesel), Euro 0 - 6 mix, 20 - 26t gross weight / 17.3t payload capacity.
- Container ship (heavy fuel oil), 5,000 to 200,000 dwt payload capacity, ocean going.

Explanation of Average / Representative Products & Variation

The EPD presents average reinforcing bar and prefabricated cage results from two sites. Variation between the sites for the GWP-GHG indicator is less than 10%. While results are presented for reinforcing bar and prefabricated cages separately, variation between products is also less than 10% for the GWP-GHG indicator.

Cut off criteria

High-quality infrastructure-related data isn't always available and there is no clear cut-off for what to include. For this reason, capital goods data are applied to LCA studies inconsistently. This is expected to lead to reduced consistency and comparability of EPDs. Capital goods were previously excluded from EPDs, thus including capital goods in current EPDs would further reduce their comparability. Therefore, thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process, ('capital goods') regardless of potential significance. All other reported data were incorporated and modelled using the best available life cycle inventory data.

Allocation

Data was provided at site level, covering the production of reinforcing bar and prefabricated cages. Weighted average reinforcing product and prefabricated cages were calculated based on production. Most inputs related to welding is utilised for prefabrication cage production (98%). Other inputs have been allocated to products based on production (mass).

Steel scrap from processing is treated as waste and cut-off. Non-metal wastes (e.g., waste oil) sent for recycling in module A1-A3 are also cut-off after transport to a recycling facility.

Approximately 90% of steel composition reflects that of InfraBuild Steel EPD (S-P-00855 v1.2 – Reinforcing rod, bar and wire) while the remaining 10% are from South Korea and Turkey. Scrap input for steel making in the upstream is burden free.

Allocation is needed since the inputs and outputs are only measured at the site level. Impacts associated with inputs and outputs have been allocated on a mass basis.

Allocation of background data (i.e. energy and materials) taken from the GaBi LCI Database 2021.2 (Sphera, 2021) is documented online.

Software and Database

The LCA software used is the GaBi Lifecycle Assessment 10 from Sphera, using the CUP 2021.2 database

Assessment Indicators

The result tables describe the different environmental indicators per declared unit, for each declared module.

Table 6 contains the environmental impact indicators describing the potential environmental impacts of the products.

Table 7 shows the resource indicators, describing the use of renewable and non-renewable material resources, renewable and non renewable primary energy and water.

Table 8 displays indicators for waste and other outputs.

The additional environment impact indicators in Table 9 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).

EN 15804+A1 Core environmental impact categories (Table 10) are provided to aid comparison and backwards compatibility with rating tools.

Table 6: Indicators for life cycle impact assessment

Impact category	Abbreviation	Abbreviation
Climate change – total	GWP-total	kg CO_2-eq.
Climate change - fossil	GWP-fossil	kg CO_2-eq.
Climate change - biogenic	GWP-biogenic	kg CO_2-eq.
Climate change - land use and land use change	GWP-luluc	kg CO_2-eq.
Ozone Depletion	ODP	kg CFC11-eq.
Acidification	AP	Mole of H^+ eq.
Eutrophication aquatic freshwater	EP-fw	kg P eq.
Eutrophication aquatic marine	EP-fm	kg N eq.
Eutrophication terrestrial	EP-tr	Mole of N eq.
Photochemical ozone formation	POCP	kg NMVOC eq.
Depletion of abiotic resources - minerals and metals*	ADP-mm	kg Sb-eq.
Depletion of abiotic resources - fossil fuels*	ADP-fossil	MJ
Water use*	WDP	m^3 world equiv.

*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.

Table 7: Life cycle inventory indicators on use of resources

Indicator	Abbreviation	Unit
Renewable primary energy as energy carrier	PERE	MJ, net calorific value
Renewable primary energy resources as material utilization	PERM	MJ, net calorific value
Total use of renewable primary energy resources	PERT	MJ, net calorific value
Non-renewable primary energy as energy carrier	PENRE	MJ, net calorific value
Non-renewable primary energy as material utilization	PENRM	MJ, net calorific value
Total use of non-renewable primary energy resources	PENRT	MJ, net calorific value
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ, net calorific value
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value
Use of net fresh water	FW	m^3

Table 8: Life cycle inventory indicators on waste categories and output flows

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

Table 9: Additional Environmental Impact Indicators

Indicator	Abbreviation	Unit
IPCC AR5 GWP-GHG**	GWP-GHG	kg CO_2-eq
Respiratory inorganics	PM	Disease incidences
Ionizing radiation - human health***	IRP	kBq U235 eq.
Eco-toxicity – freshwater*	ETP-fw	CTUe
Human toxicity, cancer*	HTPc	CTUh
Human toxicity, non-canc.*	HTPnc	CTUh
Land use related impacts / soil quality*	SQP	Dimensionless

*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.
***This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator

Table 10: EN15804+A1 environmental indicators

EN15804+A1	Abbreviation	Unit
Global warming potential (total)	GWP	kg CO_2-eq.
Depletion potential of the stratospheric ozone layer	ODP	kg CFC11-eq.
Acidification potential of land and water	AP	kg SO_2-eq.
Eutrophication potential	EP	kg PO_4^{3-}- eq.
Photochemical ozone creation potential	POCP	kg C_2H_4-eq.
Abiotic depletion potential – elements	ADP-mm	kg Sb-eq.
Abiotic depletion potential – fossil fuels	ADPf	MJ

For reinforcing products, the following indicators are not relevant, hence result in zero values: Components for re-use (CRU), Materials for energy recovery (MER), Exported electrical energy (EEE), Exported thermal energy (EET)

Environmental performance

Results for 1 tonne of prefabricated cages

Environmental impact								
Abbreviation	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2-eq.	1,670	111	0.644	8.43	2.69	4.42	-118
GWP-fossil	kg CO_2-eq.	1,660	111	0.644	8.43	2.67	4.42	-117
GWP-biogenic	kg CO_2-eq.	2.18	0.0565	1.46E-04	0	0.00685	0	-0.0609
GWP-luluc	kg CO_2-eq.	0.291	0.00225	1.30E-05	1.77E-04	0.0146	0.00287	-0.00258
ODP	kg CFC11-eq.	3.34E-06	1.50E-14	9.48E-17	1.29E-15	1.19E-14	1.10E-14	-2.99E-13
AP	Mole of H+ eq.	6.76	1.62	0.00323	0.0158	0.0249	0.0217	0.0954
EP-freshwater	kg P eq.	0.0470	2.00E-05	1.06E-07	1.45E-06	6.08E-06	1.33E-05	-2.55E-05
EP-marine	kg N eq.	1.57	0.529	0.00153	0.00656	0.0123	0.00763	0.0385
EP-terrestrial	Mole of N eq.	17.1	5.80	0.0168	0.0723	0.135	0.0651	0.458
POCP	kg NMVOC eq.	5.35	1.27	0.00429	0.0154	0.0358	0.0163	0.0351
ADP-minerals&metals	kg Sb-eq.	5.40E-04	2.14E-06	9.95E-09	1.36E-07	2.94E-06	1.15E-06	-3.01E-05
ADP-fossil	MJ	18,100	1,440	8.54	117	50.3	65.4	-1,130
WDP	m^3 world equiv.	288	0.580	0.00421	0.0576	0.448	0.259	-343
Resource use								
PERE	MJ	1,040	6.51	0.0417	0.569	4.45	5.59	77.9
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	1,040	6.51	0.0417	0.569	4.45	5.59	77.9
PENRE	MJ	18,100	1,440	8.54	117	50.4	67.3	-1,130
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	18,100	1,440	8.54	117	50.4	67.3	-1,130
SM	kg	886	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	59.0	0	0	0	0	0	0
FW	m^3	6.42	0.0125	8.28E-05	0.00113	0.0131	0.00924	-8.02
Waste categories and output flows								
HWD	kg	5.49E-04	6.67E-09	3.08E-11	4.21E-10	2.92E-09	6.36E-09	2.70E-07
NHWD	kg	349	0.0617	2.04E-04	0.00279	0.0145	100	15.7
RWD	kg	0.0393	5.45E-04	1.18E-06	1.61E-05	3.71E-04	5.61E-04	2.47E-04
CRU	kg	0	0	0	0	0	0	0
MFR	kg	94.2	0	0	0	900	0	0
MER	kg	0.271	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0

Results for 1 tonne of prefabricated cages (continued)

Biogenic carbon content*								
Abbreviation	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
BCC-prod	kg C	0						
BCC-pack	kg C	0.462						
Additional Indicators								
GWP-GHG	kg CO_2-eq.	1,630	110	0.642	8.42	2.66	4.40	-115
PM	Disease incidences	1.55E-04	2.16E-05	3.72E-08	1.12E-07	5.66E-07	2.27E-07	1.05E-06
IRP	kBq U235 eq.	10.1	0.0740	1.38E-04	0.00189	0.0342	0.0493	2.34
ETP-fw	CTUe	4,830	671	3.26	44.6	39.6	48.6	-5.38
HTPc	CTUh	4.58E-07	1.19E-08	5.57E-11	7.61E-10	8.47E-10	3.94E-09	-6.70E-08
HTPnc	CTUh	2.99E-05	5.84E-07	2.86E-09	2.76E-08	4.87E-08	3.55E-07	-1.46E-06
SQP	Pt	1,260	3.72	0.0219	0.299	11.1	7.32	18.8
Potential environmental impacts according to EN15804+A1:2013								
GWP	kg CO_2-eq.	1,610	109	0.634	8.31	2.60	4.29	-112
ODP	kg CFC11-eq.	3.41E-06	2.01E-14	1.26E-16	1.73E-15	1.59E-14	1.47E-14	-3.99E-13
AP	kg SO_2-eq.	5.43	1.24	0.00226	0.0114	0.0171	0.0171	0.0685
EP	kg PO_4^{3-}-eq.	0.703	0.178	5.14E-04	0.00223	0.00420	0.00396	0.0138
POCP	kg C_2H_4-eq.	0.941	-0.0895	2.12E-04	-0.00182	0.00191	1.63E-04	-0.0426
ADPE	kg Sb-eq.	5.66E-04	2.15E-06	9.96E-09	1.36E-07	2.94E-06	1.15E-06	-3.00E-05
ADPF	MJ	18,000	1,440	8.53	117	49.3	50.9	-1,140

Results for 1 tonne of reinforcing bar

Environmental impact								
Abbreviation	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2-eq.	1,660	111	0.644	8.43	2.69	4.42	-118
GWP-fossil	kg CO_2-eq.	1,660	111	0.644	8.43	2.67	4.42	-117
GWP-biogenic	kg CO_2-eq.	2.22	0.0565	1.46E-04	0	0.00685	0	-0.0609
GWP-luluc	kg CO_2-eq.	0.285	0.00225	1.30E-05	1.77E-04	0.0146	0.00287	-0.00258
ODP	kg CFC11-eq.	3.21E-06	1.50E-14	9.48E-17	1.29E-15	1.19E-14	1.10E-14	-2.99E-13
AP	Mole of H+ eq.	6.74	1.62	0.00323	0.0158	0.0249	0.0217	0.0955
EP-freshwater	kg P eq.	0.0459	2.00E-05	1.06E-07	1.45E-06	6.08E-06	1.33E-05	-2.55E-05
EP-marine	kg N eq.	1.57	0.529	0.00153	0.00656	0.0123	0.00763	0.0385
EP-terrestrial	Mole of N eq.	17.1	5.80	0.0168	0.0723	0.135	0.0651	0.458
POCP	kg NMVOC eq.	5.34	1.27	0.00429	0.0154	0.0358	0.0163	0.0351
ADP-minerals&metals	kg Sb-eq.	4.64E-04	2.14E-06	9.95E-09	1.36E-07	2.94E-06	1.15E-06	-2.52E-05
ADP-fossil	MJ	18,000	1,440	8.54	117	50.3	65.4	-1,130
WDP	m^3 world equiv.	286	0.580	0.00421	0.0576	0.448	0.259	-343

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

Results for 1 tonne of reinforcing bar (continued)

Resource use								
Abbreviation	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,020	6.51	0.0417	0.569	4.45	5.59	77.9
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	1,020	6.51	0.0417	0.569	4.45	5.59	77.9
PENRE	MJ	18,000	1,440	8.54	117	50.4	67.3	-1,130
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	18,000	1,440	8.54	117	50.4	67.3	-1,130
SM	kg	886	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	59.0	0	0	0	0	0	0
FW	m^3	6.39	0.0125	8.28E-05	0.00113	0.0131	0.00924	-8.02
Waste categories and output flows								
HWD	kg	5.30E-04	6.67E-09	3.08E-11	4.21E-10	2.92E-09	6.36E-09	2.70E-07
NHWD	kg	349	0.0617	2.04E-04	0.00279	0.0145	100	15.7
RWD	kg	0.0346	5.46E-04	1.18E-06	1.61E-05	3.71E-04	5.61E-04	2.47E-04
CRU	kg	0	0	0	0	0	0	0
MFR	kg	94.2	0	0	0	900	0	0
MER	kg	0.271	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0
Biogenic carbon content*								
BCC-prod	kg C	0						
BCC-pack	kg C	0.627						
Additional Indicators								
GWP-GHG	kg CO_2-eq.	1,620	110	0.642	8.42	2.66	4.40	-115
PM	Disease incidences	1.54E-04	2.16E-05	3.72E-08	1.12E-07	5.66E-07	2.27E-07	1.05E-06
IRP	kBq U235 eq.	8.89	0.0740	1.38E-04	0.00189	0.0342	0.0493	2.34
ETP-fw	CTUe	4,790	671	3.26	44.6	39.6	48.6	-5.39
HTPc	CTUh	4.45E-07	1.19E-08	5.57E-11	7.61E-10	8.47E-10	3.94E-09	-6.70E-08
HTPnc	CTUh	2.98E-05	5.84E-07	2.86E-09	2.76E-08	4.87E-08	3.55E-07	-1.46E-06
SQP	Pt	1,240	3.72	0.0219	0.299	11.1	7.32	18.8
Potential environmental impacts according to EN15804+A1:2013								
GWP	kg CO_2-eq.	1,600	109	0.634	8.31	2.60	4.29	-112
ODP	kg CFC11-eq.	3.28E-06	2.01E-14	1.26E-16	1.73E-15	1.59E-14	1.47E-14	-3.99E-13
AP	kg SO_2-eq.	5.42	1.24	0.00226	0.0114	0.0171	0.0171	0.0685
EP	kg PO_4^{3-}- eq.	0.698	0.178	5.14E-04	0.00223	0.00420	0.00396	0.0138
POCP	kg C_2H_4-eq.	0.937	-0.0896	2.12E-04	-0.00182	0.00191	1.63E-04	-0.0426
ADPE	kg Sb-eq.	4.90E-04	2.15E-06	9.96E-09	1.36E-07	2.94E-06	1.15E-06	-2.51E-05
ADPF	MJ	17,900	1,440	8.53	117	49.3	50.9	-1,140

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

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