BESTBAR

ENVIRONMENTAL PRODUCT DECLARATION

REINFORCED BAR AND MESH

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In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for Bestbar's Bar/Coil D500N 10mm-50mm and Mesh D500L 5.6mm-9.6mm

AUSTRALASIA EPD® ENVIRONMENTAL PRODUCT DECLARATION

EPD® THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

EPD of multiple products, based on the average results of the product group.

A full list of products covered by this EPD is presented within this document on page 07.

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

WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

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

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

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

This EPD covers the environmental impacts of Bestbar's steel reinforcement products.

This EPD is based on a 'cradle-to-gate' Life Cycle Assessment (LCA), with distribution, end-of-life and resource recovery stages included (modules A1-A3, A4, C1-C4 and D). 'Cradle' refers to the raw material extraction and 'gate' are the Bestbar facilities as the products leave and go out to customers.

As the EPD owner, Bestbar has the sole ownership, liability and responsibility for the EPD.

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ABOUT US

BESTBAR IS A LEADING AUSTRALIAN STEEL REINFORCEMENT SUPPLIER WITH A NATIONWIDE BRANCH NETWORK.

Founded by the Johnston family in 1995, we have grown into the country's second-largest steel reinforcing fabricator, proudly serving the civil, commercial, and residential construction sectors.

Our success has been built on the resilience of our employees, hard work, and a drive to challenge industry standards.

As a family-owned business, we consider Australia our backyard and prioritise responsible practices that help build resilient communities and create a better future.

With a team of over 500 experts spanning engineering, logistics, business, finance, equipment operation, and manufacturing, we blend innovation with proven expertise. Through the latest machinery, custom-built systems for seamless collaboration, and a trusted dual supply chain, we ensure a reliable supply that keeps Australia's construction projects on program.

We are affiliated and accredited with the Steel Reinforcement Institute of Australia (SRIA) and the Australasian Certification Authority for Reinforcing and Structural Steel (ACRS).

SRIA Steel Reinforcement Institute of Australia

ACRS

OUR COMMITMENT TO SUSTAINABILITY

Our sustainability efforts are supported by robust certifications, partnerships and initiatives.

We hold the highest level of Steel Sustainability Australia (SSA) Certification (Level 3), helping builders select responsible products. Over the past five years, we have implemented processes to reduce carbon emissions and focused on resource management by recycling, reusing, and reselling materials.

We prioritise recycling in our production processes, maximising waste recovery while minimising landfill disposal. Our recycling program helps conserve resources and reduce environmental pollution.

We believe in renewable pathways and are working towards negotiating solar benefits into our leasing agreements and assessing the market for other green energy opportunities.

Our smart facilities incorporate energy-efficient solutions. We're also improving our production processes to cut carbon emissions by using superior equipment and smart automation, making us more efficient.

Our Modern Slavery statement shows our dedication to ethical operations.

Through these initiatives, we continue to work towards delivering high-quality, responsible solutions to our customers.

CUSTOMER FOCUSED INNOVATIONS

We use In-house built platforms to create a better customer experience and ensure product integrity:

→ ReoNet: Our self-service portal allows clients to monitor and manage project progress. ReoNet provides real-time access to all project documentation, offering comprehensive visibility into the entire product life cycle.

→ Our GPS tracking software Oova tracks delivery trucks in real time and provides proof of delivery with sign-on-glass and on-site photos, ensuring customers have full visibility through our ReoNet portal.

MANUFACTURING

We source our steel from local and international suppliers. Our suppliers have verified their sustainability efforts through a suite of EPDs and environmental systems implemented and certified to the ISO14001 standard. They are also members of the World Steel Association (WSA) climate action program.

We use the latest machinery from leading manufacturers like Schnell, MEP, and Schilt to produce our ACRS-certified, high-quality steel reinforcement products.

A first-of-its-kind factory in South Australia, equipped with advanced robotics and software, will begin operations by mid-2025, delivering new levels of safety and efficiency in steel reinforcement production.

Commercially sensitive information (such as supplier names, locations and quantities) are not disclosed in this EPD.

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MANUFACTURING LOCATIONS

Perth

Wangara
100 Callaway Street,
Wangara, WA 6065

East Rockingham
2 Venture Place, East
Rockingham, WA 6168

Darwin

Northern Territory
6 Sadgroves Crescent,
Winnellie, NT 0821

Adelaide

Pooraka
35-37 Maxwell Road,
Pooraka, SA 5095

Melbourne

Truganina
1-3 Distribution Drive,
Truganina, VIC 3029

Somerton
8 Newton Drive, Somerton, VIC 3062

Keysborough
94 Indian Drive,
Keysborough, VIC 3173

Sydney

Prestons
Building 2, 43-47 Lyn Parade,
Prestons, NSW 2170

Ingleburn
2/7 Williamson Road,
Ingleburn NSW 2565

QUALITY CONTROL AND CERTIFICATIONS

Our reinforcing bar and mesh are manufactured in compliance with AS/NZS 4671:2019, the standard for steel reinforcing materials.

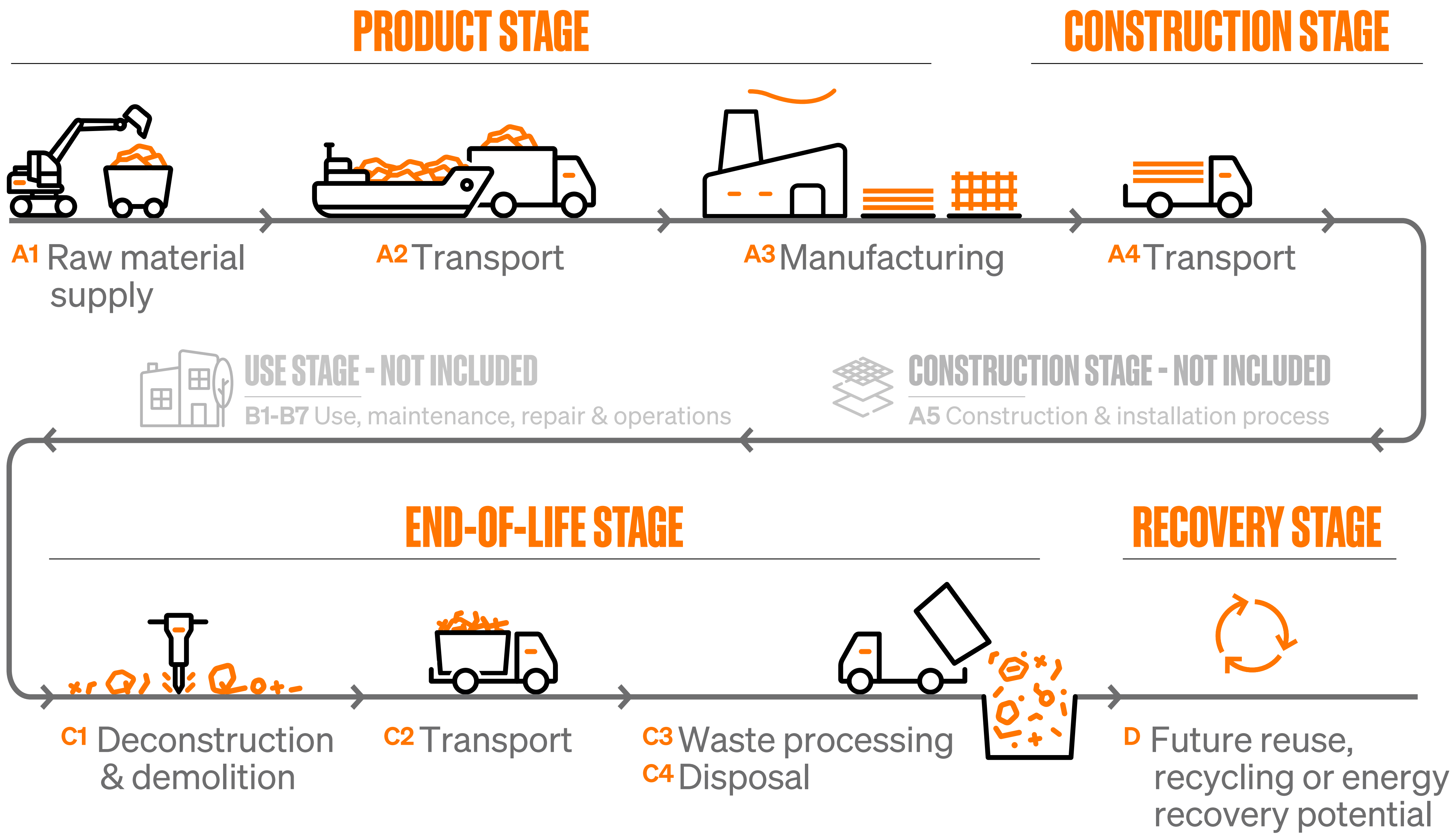
Our adherence to AS/NZS 4671:2019 is validated through third-party certification by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS). This certification confirms that our products consistently meet the standard's stringent requirements.

We work to internationally recognised standards, holding ISO 14001 for environmental management, ISO 9001 for quality management, and ISO 45001 for safety management systems. As one of Australia's national reinforcement suppliers with all three ISO certifications, we demonstrate our leadership in quality, safety, and environmental management.

PRODUCT LIFE CYCLE

This EPD looks at the environmental impacts of extracting and processing raw materials, transporting these to the Bestbar facilities and fabricating reinforcing bar, coil and mesh. It also includes distributing Bestbar products to clients across Australia. The end-of-life environmental impacts and its recovery and recycling potential are also included in this EPD.

Figure 1. Product life cycle with module numbers



OUR PRODUCTS

Our range of steel reinforcement products is designed to meet the needs of the civil, commercial, and residential construction industries.

Our products are used to reinforce structures such as buildings, bridges, roads, as well as in other infrastructure projects. With a focus on quality and reliability, we strengthen construction projects nationwide, ensuring they stand the test of time safely and securely.

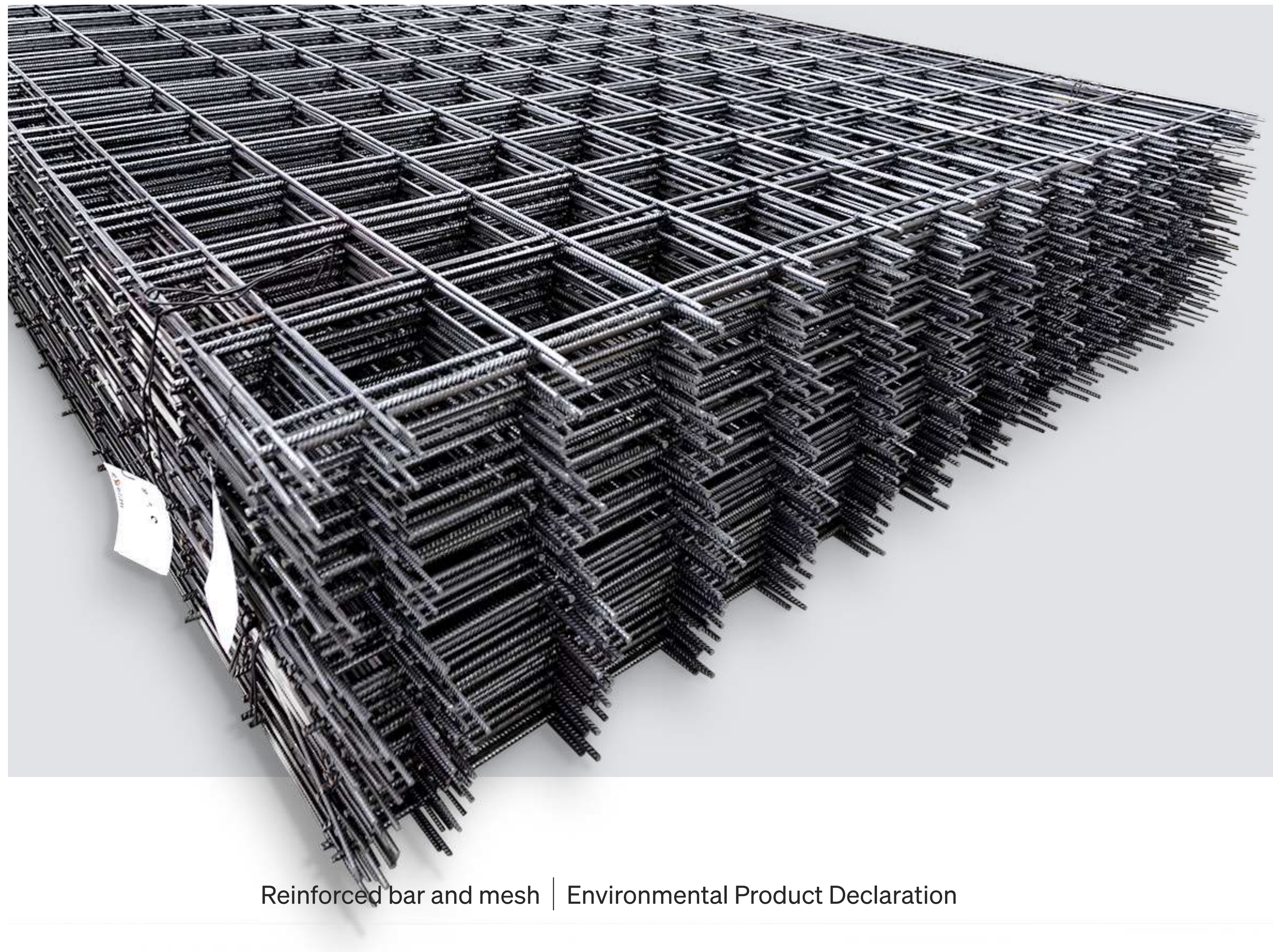
ENHANCE THE DURABILITY AND STRUCTURAL STRENGTH OF YOUR CONCRETE WITH OUR SELECTION OF AUSTRALIAN CERTIFIED REINFORCING BARS AND MESH.

The products included in this EPD are:

Reinforcing bars (rebar)

We supply reinforcement bars along with accessories that can be cast into in situ concrete. These bars enhance the tensile strength of concrete structures across residential, commercial, and civil projects.

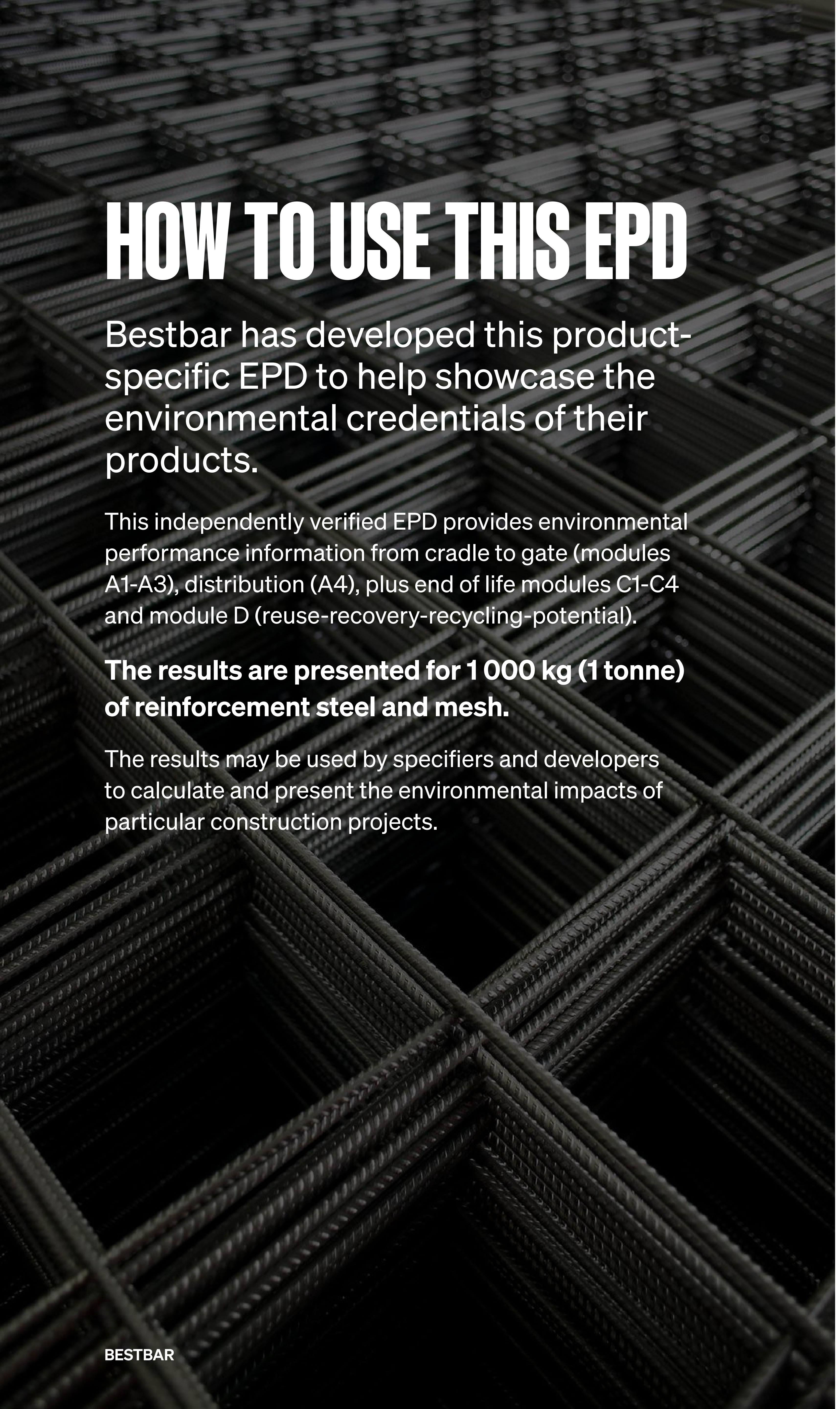
→ Bar/coil D500N 10mm-50mm manufactured at all sites in NSW, NT, SA, VIC and WA



Reinforcing mesh

Available in square and rectangular. Our mesh products are used for strengthening concrete in various applications, including walls, precast panels, house slabs, and driveways.

→ Mesh D500L 5.6mm-9.6mm manufactured at NSW, VIC and WA sites



HOW TO USE THIS EPD

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

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

The results are presented for 1 000 kg (1 tonne) of reinforcement steel and mesh.

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

EPDs are not always comparable

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

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

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

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

How to benefit from using this EPD

→ **Verified Environmental Impact**
The EPD provides an independently verified assessment of the environmental impact of Bestbar's products, ensuring transparency and reliability for your project.

→ **Green Star Compliance**
It meets the criteria for a valid EPD as recognised in the Green Star Design & As Built v1.3 and the Innovation Challenge of Green Star legacy tools by the Green Building Council of Australia (GBCA).

→ **IS Rating Tool Compliance**
The EPD meets the requirements of the Infrastructure Sustainability (IS) rating tool by the Infrastructure Sustainability Council (ISC), facilitating its use in projects seeking IS certification.

By incorporating this EPD, you can confidently demonstrate the environmental credentials of Bestbar's products in your construction projects.

Green Building Council Australia

Infrastructure Sustainability Council

TECHNICAL INFORMATION

Declared unit and reference service life

ISO 14040 defines a functional unit as 'quantified performance of a product system for use as a reference unit'. EPDs that do not cover the full product life cycle from raw material extraction through to end-of-life use the term 'declared unit' instead.

The declared unit and reference flow is
1 000 kg (1 tonne) of steel reinforcement products.

Table 1 shows the relevant Australian standard and application for the products in this EPD.

Table 1. Industry classification

Product	Classification	Code	Category
Steel reinforcement products	UN CPC Ver. 2	4124	Bars and rods, hot-rolled, of iron or steel
	ANZSIC 2006	2221	Structural Steel Fabricating

Table 2. Technical specifications applying to the products in this background report

Product group	Relevant standards
Steel reinforcement products by Bestbar	AS/NZS 4671:2019 – Steel for the reinforcement of concrete

Content declaration

According to the General Programme Instructions, the EPD shall include a content declaration with a list of materials and chemical substances including information on their hazardous properties. Table 3 shows the composition of Bestbar products, with packaging associated in Table 4. All Bestbar steel reinforcement products have the same material composition, as presented in Table 3.

Dangerous substances from the candidate list of SVHC for authorisation

The products declared within this EPD:

→ Do not release dangerous substances to soil and water

→ Do not contain hazardous substances requiring labelling

→ Do not contain materials identified in the European Chemicals Agency's Candidate List of Substances of Very High Concern in the products at a concentration greater than 0.1% (ECHA, 2022).

Table 3. Content declaration

Product components	Weight, kg	Post-consumer recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/ declared unit
Iron	980	93.1%	0	0
Other additives (including manganese, carbon and other additives)	20	0%	0	0
Sum	1 000	93.1%*	0	0

* In theory, steel is a 100% recyclable material, with no loss in material strength or quality. Our overseas supplier uses 95% post-consumer scrap; however, the percentage post-consumer material content of the Australian steel was not reported in the EPD and it was estimated based on the secondary material input indicator result, which is 95%. Using this information, the post-consumer recycled material content of Bestbar products was calculated as 93.1% (980 kg iron * 95%).

Table 4. Content declaration of packaging (per 1 kg of product)

Packaging materials	Weight, kg	Weight-% (versus the product)	Biogenic material, kg C/ kg product
Tie wire (steel)	1.65E-05	0.00165	0
Metal strapping (steel)	7.61E-06	7.61E-04	0
Timber dunnage	0.00189	0.189	0.46
One-way slings (nylon)	0.00119	0.119	0
Sum	0.00311	0.311	8.71E-04

MANUFACTURING PROCESS

Steel reinforcement bars/coils are produced and supplied by our overseas and local suppliers, using steel billet which is manufactured predominantly via electric arc furnace steelmaking process. Feed materials (steel bars and coils) and other raw materials are delivered to Bestbar manufacturing sites across Australia via sea and road.

Once feed materials are received, including coils 5 mm to 20 mm and bars 5 mm to 40 mm, Bestbar will cut, bend and fabricate the bar, coil and mesh products. A cutting machine is used for straightening, fixing length and cutting steel wire rods into straight bars in the shear line. Coil feedstock is also cut according to customer requirements. For mesh products, square and rectangular mesh are fabricated manually according to customer requirements.

Copper block is used during the welding process of fabrication. Steel couplers are also installed into the products if needed. After cutting and fabricating process, bars, coil and mesh products are fed into bending machines if needed. Hydraulic oil is also used in cutting and bending machines.

Figure 2. Basic manufacturing, distribution and end of life/recovering with module numbers

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 here, this EPD is of the type (b) – Cradle to gate with options, modules C1-C4, module D and with optional modules (A1-A3 + C + D and additional modules). The additional module is A4. Other life cycle stages (Modules A5, B1-B7) are dependent on particular scenarios and best modelled at the building level.

The processes below are included in the product system to be studied.

For modules beyond A3, the scenarios included are currently in use and are representative for one of the most probable alternatives.

Table 5. Modules included in the scope of the EPD
(X = included in the EPD | ND = module not declared)

	Product stage			Construction		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	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	AU	AU	–	–	–	–	–	–	–	–	AU	AU	AU	AU	AU
Share of specific data		60%*		–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation – products		-7% to 2%†		–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation – sites		-21% to 24%‡		–	–	–	–	–	–	–	–	–	–	–	–	–	–

* This study uses the EPDs of the overseas and local steel suppliers as key data source for steel inputs. The percentage of specific data is assumed to be 60%, but it cannot be proved since both EPDs lack information on the percentage of specific data used.

† This is the variation across weighted mesh and bar/coil products at national level.

‡ This is the variation between individual products produced across eight sites in Australia.

Product stage (Modules A1-A3)

Raw material supply (Module A1)

→ Extraction and processing of raw materials, such as the production of reinforced bars (5mm – 40mm) and coils (5mm – 20mm).

Generation of electricity from primary energy resources, also including their extraction, refining and transport. This includes energy needed for raw material supply and energy for manufacturing in core process.

Transportation (Module A2)

→ Transport of raw materials to Bestbar facilities in NSW, NT, SA, VIC and WA.

Manufacturing (Module A3)

→ Cutting, which involves cutting bars and coils and fabricating square and rectangular mesh as per customer requirements.

→ Bending, which involves bending straight cut bars as per customer requirements.

→ Welding, which involves joining the cut/bent bars as per customer requirements.

→ Packaging, including tying of steel reinforcement products with webbing slings in a maximum weight of 1 000 kg per bundle. Other packaging materials, such as tie wire, metal strapping and timber dunnage, are also used.

Product distribution stage (Module A4)

Distribution (Module A4)

Distribution, which involves the transport of steel reinforcement products to clients across Australia. The product is transported an average (sales weighted average) distance of 175 km to the building/ construction site by truck.

Note that this is an average scenario that may not be representative for any given customer. Customers should individually establish the transport requirements between Bestbar distribution centre and their building/construction site rather than relying on the average.

Table 6. Transport to building site

Scenario information	Unit*
Vehicle type used for transport	Truck-trailer, Euro 0-6 mix, 34-40 t gross weight / 27 t payload capacity
Distance	175 km
Capacity utilisation (including empty returns)	55%
Weight of transported products	1 000 kg

* Unit expressed per declared unit.

End of Life (Modules C1-C4)

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. Material that cannot be recycled will be disposed (C4). The end-of-life stage (Modules C1-C4) and resource recovery stage (Module D) are modelled using a scenario reflecting end-of-life recycling/ landfilling rates for steel products in the construction sector (Table 7). This scenario is currently in use and is representative for one of the most likely scenario alternatives (DCCEEW, 2022).

Table 7. End of life scenarios for products

Process	Unit*
Excavator	Equivalent of 1 000 kg of reinforcing products
Recovery system specified by type	90% for recycling†
	10% for landfill
Disposal specified by type	10% modelled as ferrous metals in landfill
Assumptions for scenario development	C1 Demolishing with an Excavator (100 kW) – Fuel consumption is calculated at 0.172 kg diesel input per tonne of material
	C2 100 km of transport by truck
	C3 Waste processing for recycling
	C4 50 km using 17.3 t payload capacity truck with 50% utilisation

* Unit expressed per declared unit.

† The European Union Guidance on PEF identifies an R2 value of 85% for steel (material) and 90-95% for steel products in EU (European Commission, 2020). In this study, we have used 90% which correctly reflects the Australian context. The recycling yield (Y) is 100%.

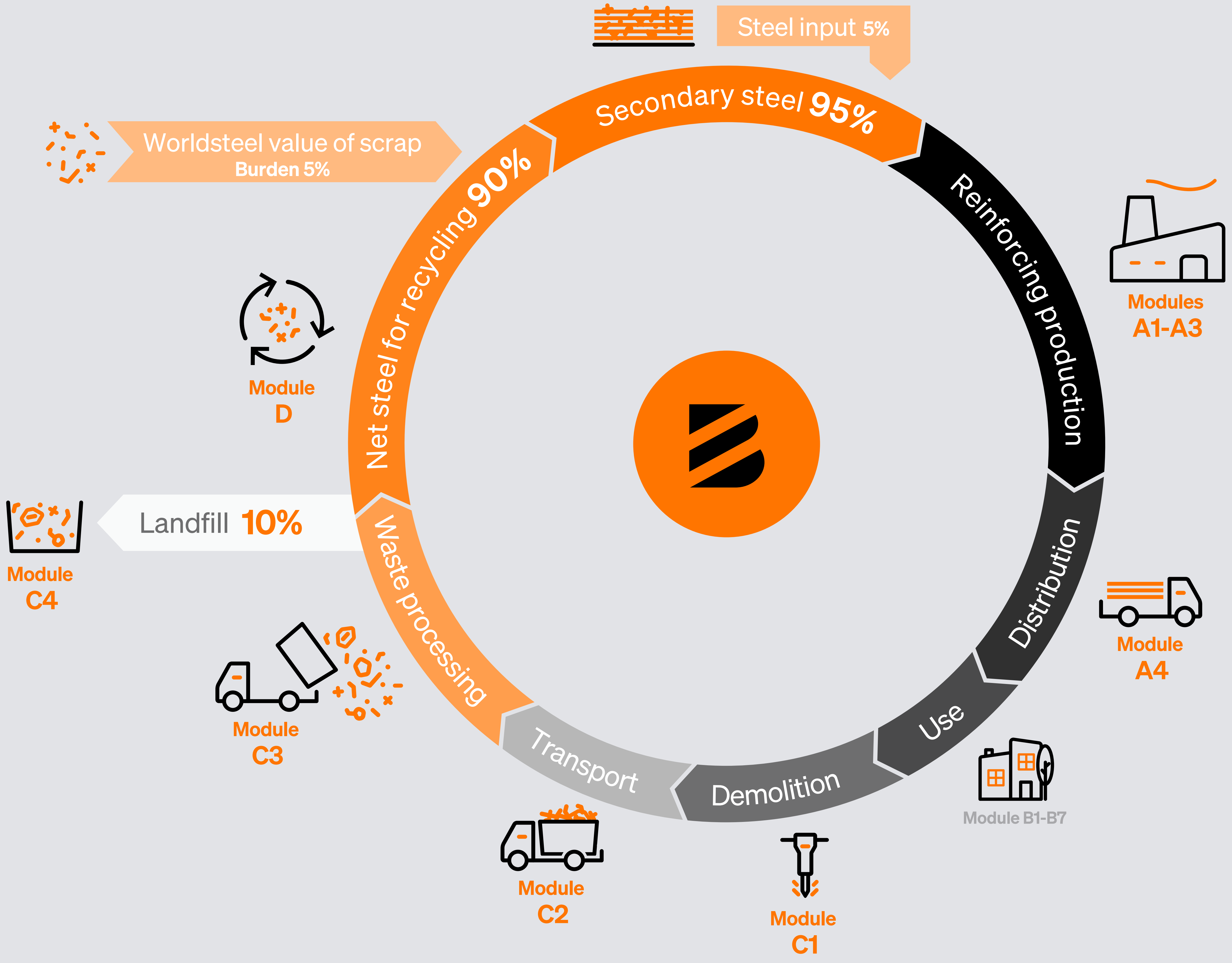
C3 Waste processing
C4 Disposal

D Future reuse, recycling or energy recovery potential

Recovery and Recycling potential (Module D)

Module D declares a potential credit or burden for the net steel scrap associated with Bestbar reinforcement product. Net scrap is the amount of scrap left after scrap from post-consumer needs are removed from scrap produced from product. That is, secondary product used in product manufacture is subtracted from the overall amount of recycled product after the first life cycle. For Bestbar products, the net balance is negative; hence burden for the net scrap is calculated, as shown in Figure 3.

Figure 3. End-of-life flow diagram



LIFE CYCLE INVENTORY

Primary data were collected for Bestbar products manufactured for the 12-month period between 1 July 2021 to 30 June 2022 (FY2022). No changes to production technology have occurred since the data collection period and hence the data continues to be representative of current practice.

Upstream data

LCI data for production of steel bar and coil inputs are obtained from published EPDs for the overseas and local suppliers. Commercially sensitive information (such as supplier names, locations and quantities) are not disclosed in this EPD.

Background data was used for input materials sourced from other suppliers – such as steel coupler, copper block and hydraulic oil.

With the exception of steel, electricity and water (which correctly 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.

LCA software and database

The LCA model was created using the Life Cycle for Experts (LCA FE version 10.0.9.31) (formerly known as GaBi) Software for life cycle engineering, developed by Sphera Solutions, Inc. The Managed LCA Content (MLC) database version 2023.2 (Sphera, 2023), formerly known as GaBi LCI database, and EPD database provide the life cycle inventory data for several of the raw and process materials obtained from the background system. Most datasets have a reference year between 2015 and 2022 and all fall within the 10-year limit allowable for generic data under EN 15804.

Electricity

The residual electricity mix on the market is used for the A3 processes that Bestbar has control over. Since a residual grid mix has not been published for Australian states, the residual supply mix (RSM) is modelled using the specific electricity grid mix subtracting renewables from the consumption mix in the market (conservative estimation based on PCR v1.3.4 section 4.8.1 (EPD International, 2024).

Location-based grid mix EFs (using the published grid mix) is used for other electricity consumption including modules C and D.

The composition of the residual electricity grid of New South Wales mix is modelled in LCA FE based on published data for the financial year 1 July 2022 – 30 June 2023 (Government of Australia, 2024). The New South Wales residual electricity mix is made up of coal (86.7%), natural gas (2.66%), heavy fuel oil (0.151%), and coal gases (0.00302%). Of the remaining electricity, 5.29% is imported from Victoria, and 5.16% is imported from Queensland.

Onsite consumption (4.15%) is calculated based on the same source as the grid mix (Government of Australia, 2024). The medium voltage (1kV-60kV) grid's transmission and distribution losses (1.83%) are calculated based on data from the Australian Energy Market Operator (AEMO, 2022). The emission factor for the New South Wales mix residual grid mix for the GWP-GHG indicator is 1.09 kg CO_2 eq/kWh (based on EF3.1).

The composition of the residual electricity grid mix of the Northern Territory is modelled in LCA FE based on published data for the financial year 1 July 2022 – 30 June 2023 (Government of Australia, 2024). The Northern Territory residual electricity mix is made up of natural gas (96.7%), and heavy fuel oil (3.33%).

Onsite consumption (2.86%) is calculated based on the same source as the grid mix (Government of Australia, 2024). The medium voltage (1kV-60kV) grid's transmission and distribution losses (2.33%) are calculated based on weighted average of all other Australian states as there is no available data of losses for the NT grid. The emission factor for the Northern Territory residual grid mix for the GWP-GHG indicator is 0.744 kg CO_2 eq/kWh (based on EF3.1).

The composition of the residual electricity grid mix of Southern Australia (SA) is modelled in LCA FE based on published data for the financial year 1 July 2022 – 30 June 2023 (Government of Australia, 2024). The SA residual electricity mix is made up of natural gas (85.3%), and heavy fuel oil (0.711%). The remaining 14.0% of electricity is imported from Victoria.

Onsite consumption (2.93%) is calculated based on the same source as the grid mix (Government of Australia, 2024). The medium voltage (1kV-60kV) grid's transmission and distribution losses 4.79% are calculated based on data based on data from the Australian Energy Market Operator (AEMO, 2022). The emission factor for the SA residual grid mix for the GWP-GHG indicator is 0.862 kg CO_2 eq/kWh (based on EF3.1).

The composition of the residual electricity grid mix of Victoria is modelled in LCA FE based on published data for the financial year 1 July 2022 – 30 June 2023 (Government of Australia, 2024). The Victorian residual electricity mix is made up of lignite (91.6%), and natural gas (3.07%). Of the remaining electricity, 2.38% is imported from Southern Australia, 1.56% is imported from Tasmania, and 1.43% is imported from New South Wales.

Onsite consumption (5.57%) is calculated based on the same source as the grid mix (Government of Australia, 2024). The medium voltage (1kV-60kV) grid's transmission and distribution losses (2.31%) are calculated based on data from the Australian Energy Market Operator (AEMO, 2022). The emission factor for the Victoria residual grid mix for the GWP-GHG indicator is 1.42 kg CO_2 eq/kWh (based on EF3.1).

The composition of the residual electricity grid mix of Western Australia is modelled in LCA FE based on published data for the financial year 1 July 2022 – 30 June 2023 (Government of Australia, 2024). The Western Australian residual electricity mix is made up of hard coal (40.6%), natural gas (59.4%), and heavy fuel oil (0.0339%).

Onsite consumption (0.302%) is calculated based on the same source as the grid mix (Government of Australia, 2024). The medium voltage (1kV-60kV) grid's transmission and distribution losses (1.88%) are calculated based on Western Power data (Western Power, 2023). The emission factor for the Western Australian residual grid mix for the GWP-GHG indicator is 0.847 kg CO_2 eq/kWh (based on EF3.1).

Recycling and recycled inputs

According to DCCEEW (2022), recycling rate of Bestbar products is assumed to be 90%, with 10% sent to landfill. The recovered steel scrap (90%) following module C3 will be first used to satisfy the input of secondary steel needed for steel production.

As presented in Figure 3, the net scrap generated is about -0.5 tonnes per tonne of product. This means the generated steel scrap is not enough to meet the needs of steel production. Therefore, a burden with positive results is calculated in Module D, using Sphera's *GLO: value of scrap* dataset (Sphera, 2023), which is a mix of both post-industrial and post-consumer scraps. Note that this is a assumption based on 95% steel scrap inputs for steel production are post-consumer scrap according to suppliers' EPDs.

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 50 km distance to a treatment or disposal site. For distribution, sales weighted average distances were calculated.

Transport modes:

Container ship
5 000-200 000 dwt payload capacity, deep sea

Truck-trailer
Euro 0-6 mix, 34-40 t gross weight / 27 t payload capacity

Truck
Euro 0-6 mix, 20-26 t gross weight / 17.3 t payload capacity

Explanation of Average / Representative Products & Variation

The EPD presents average reinforcing bar/coil and reinforcing mesh results from eights sites across Australia. Variation across weighted bar/coil and mesh and products at national level is within the ±10% range, for the GWP-GHG indicator. However, variation between individual products manufactured across eights sites is between -21% to 24%, for the GWP-GHG indicator.

Cut off criteria

Personnel-related processes are excluded as per section 4.3.2 in the PCR (EPD International, 2024). thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the foreground production process, ('capital goods') regardless of potential significance. 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.

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

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

* The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes. (CEN, 2019).

Allocation

Multi-output allocation generally follows the requirements of PCR 2019:14 v1.3.4 (EPD International, 2024) section 4.5.1. When allocation becomes necessary during the data collection phase, the allocation rule most suitable for the respective process step is applied.

A small amount of steel scrap, i.e., about 2.56%, was generated as a co-product during the cutting and bending processes. Since the difference in revenue from the co-product is high, economic allocation is adopted in related joint co-production processes. The share of economic allocation for steel reinforcement products and steel scrap in cutting and bending processes is calculated based on the share of revenue (yearly production (t) × price ($)) for each of the product. Due to confidentiality reasons, price information is excluded from the EPD.

End-of-life allocation generally follows the requirements of ISO 14044, section 4.3.4.3 (ISO, 2006).

Material recycling (avoided burden approach): Open scrap inputs from the production stage are subtracted from scrap to be recycled at end-of-life to give the net scrap output from the product life cycle. This remaining net scrap is sent to material recycling. Given net scrap is negative (e.g. the production stage scrap inputs are higher than the scrap available for recycling at end-of-life), module D is assigned a burden. The module D impacts are modelled using industry average inventories.

Landfilling (avoided burden approach): In cases where materials are sent to landfills, they are linked to an inventory that accounts for waste composition, regional leachate rates, landfill gas capture as well as utilisation rates (flaring vs. power production). A credit is assigned for power output using the regional grid mix.

Allocation of background data (energy and materials) taken from the MLC databases is documented online here.

Assumptions

It is assumed that 95% steel scrap inputs for steel production are post-consumer scrap according to the EPDs of overseas and local suppliers.

As shown in Figure 3, the net scrap generated is about -0.05 tonnes per tonne of product. It was assumed that this scrap demand will be fulfilled by a mix of both post-industrial and post-consumer scraps, due to limited data.

Environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process (‘capital goods’) have been excluded from this study, regardless of potential significance.

The land use and land use change impacts reported in this EPD should be considered conservative given Bestbar’s throughput is expected to increase in future years, due to the likelihood of increased demand for product.

ASSESSMENT INDICATORS

An introduction the core environmental impact indicators is provided here.

The best-known effect of each indicator is listed in the descriptions and the abbreviations, in brackets, correspond to the labels in the following results tables. The results tables describe the different environmental indicators for each product per declared unit, for each declared module. The EN 15804 reference package based on EF 3.1 is used.

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

The use of primary energy is separated into energy used as raw material and energy used as energy carrier as per option C in Annex 3 in the PCR (EPD International, 2024).

Energy indicators (MJ) are always given as net calorific value.

Table 8. Environmental impact indicators described

Climate change (Global Warming Potential)

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

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

Ozone Depletion Potential

(ODP)

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

Acidification potential

(AP)

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

Abiotic Resource Depletion

(ADPE, 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.

Eutrophication Potential

(EP-fw, EP-m, 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.

EPD RESULTS

The following tables show the results grouped in seven categories, each looking at different types of indicators.

The results tables describe the different environmental indicators for 1 000 kg of Bestbar reinforcement product, for each declared module. The EN 15804 reference package based on EF 3.1 is used.

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.

Since Module C is included in the EPD, the use of Module A1-A3 (A1-A5 for services) results without considering the results of Module C is discouraged.

Environmental impact indicators

Table 9. Environmental impact (EN15804+A2) covering modules A1-4, C1-4 and D.

			Production	Distribution	End-of-life				Recovery
Environmental impact	**Abb.**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change (total)	GWP-total	kg CO_2 eq	799	20.2	0.627	10.7	2.56	2.12	99.5
Climate change (fossil)	GWP-fossil	kg CO_2 eq	797	20.2	0.601	10.7	2.55	2.12	100
Climate change (biogenic)	GWP-biogenic	kg CO_2 eq	2.32	0.00314	0.0266	0.00166	8.01E-05	3.12E-06	-0.563
Climate change (land use and land use change)	GWP-luluc	kg CO_2 eq	0.279	2.66E-04	8.11E-06	1.41E-04	0.0125	7.92E-04	0.0129
Ozone depletion potential	ODP	kg CFC-11 eq	3.96E-05	1.73E-12	5.29E-14	9.17E-13	7.79E-12	4.89E-12	-1.27E-10
Acidification potential of land and water	AP	Mole of H+ eq	5.01	0.126	0.00319	0.0661	0.0130	0.0129	0.313
Eutrophication potential (freshwater)	EP-freshwater	kg P eq	0.112	3.34E-06	1.02E-07	1.76E-06	6.74E-06	3.83E-06	2.36E-05
Eutrophication aquatic (marine)	EP-marine	kg N eq	1.30	0.0624	0.00153	0.0328	0.00606	0.00440	0.0663
Eutrophication (terrestrial)	EP-terrestrial	Mole of N eq	14.0	0.686	0.0167	0.360	0.0668	0.0354	0.651
Photochemical ozone formation	POCP	kg NMVOC eq	4.16	0.120	0.00427	0.0631	0.0163	0.00981	0.231
Depletion abiotic resources – minerals and metals*	ADPE	kg Sb eq	8.24E-05	7.43E-08	2.27E-09	3.93E-08	2.77E-06	1.21E-07	5.45E-04
Depletion abiotic resources – fossil fuels*	ADPF	MJ	7 450	278	8.48	147	49.8	32.9	1 010
Water user deprivation*	WDP	m^3 world eq	212	0.0820	0.00250	0.0434	0.452	0.112	6.52

* 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.

The variations between A-C results of core environmental indicators are less than 10% for most indicators. The exception is ADP-mm, which has a higher variation.

Resource use indicators

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

Table 10. Resource use indicators covering modules A1-4, C1-4 and D

			Production	Distribution	End-of-life				Recovery
Resource	**Abb.**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Renewable primary energy as energy carrier	PERE	MJ	520	1.01	0.0308	0.534	5.48	3.92	-36.2
Renewable primary energy resources as material utilisation	PERM	MJ	0	0	0	0	0	0	0
Total use of renewable primary energy resources	PERT	MJ	520	1.01	0.0308	0.534	5.48	3.92	-36.2
Non-renewable primary energy as energy carrier	PENRE	MJ	7 450	278	8.48	147	49.8	33.5	1 010
Non-renewable primary energy as material utilisation	PENRM	MJ	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources	PENRT	MJ	7 450	278	8.48	147	49.8	33.5	1 010
Use of secondary material	SM	kg	966	0	0	0	0	0	0
Use of renewable secondary fuels	RSF	MJ	4.43E-04	0	0	0	0	0	0
Use of non-renewable secondary fuels	NRSF	MJ	10.4	0	0	0	0	0	0
Use of net fresh water	FW	m^3	4.73	0.00163	4.96E-05	8.61E-04	0.0132	0.00415	9.73

Waste material and output flow indicators

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

Table 11. Waste material and output flow indicators covering modules A1-4, C1-4 and D

			Production	Distribution	End-of-life				Recovery
Inventory	**Abb.**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	HWD	kg	7.45E-07	2.01E-10	6.13E-12	1.06E-10	0	8.35E-10	7.15E-06
Non-hazardous waste disposed	NHWD	kg	131	0.00601	1.83E-04	0.00318	0.0140	100	-11.6
Radioactive waste disposed	RWD	kg	0.0291	4.05E-05	1.23E-06	2.14E-05	4.08E-04	3.71E-04	3.00E-04
Components for re-use	CRU	kg	0	0	0	0	0	0	0
Materials for recycling	MFR	kg	194	0	0	0	900	0	0
Materials for energy recovery	MER	kg	0.0476	0	0	0	0	0	0
Exported electrical energy	EEE	MJ	0.0566	0	0	0	0	0	0
Exported thermal energy	EET	MJ	0.255	0	0	0	0	0	0

Biogenic carbon content

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

Table 12. Biogenic carbon content for modules A1-3

			Production
Indicator	**Abb.**	**Unit**	**Total A1-A3**
BiogenicC – product	BCC-prod	kg	0
BiogenicC – packaging	BCC-pack	kg	0.982

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

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 (CEN, 2013).

Table 13. Additional environmental indicators covering modules A1-4, C1-4 and D

			Production	Distribution	End-of-life				Recovery
Indicator	**Abb.**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter emissions	PM	Disease incidences	1.06E-04	8.37E-07	3.67E-08	4.39E-07	2.51E-07	1.45E-07	3.96E-06
Ionising radiation – human health*	IRP	kBq U235 eq	38.7	0.00506	1.54E-04	0.00267	0.0429	0.0358	-2.09
Ecotoxicity – freshwater†	ETP-fw	CTUe	9 810	121	3.68	63.9	35.8	23.5	82.2
Human toxicity, cancer effects†	HTP-c	CTUh	4.34E-06	2.00E-09	6.06E-11	1.06E-09	7.83E-10	2.59E-09	-3.87E-08
Human toxicity, non-cancer effects†	HTP-nc	CTUh	5.90E-06	4.24E-08	1.30E-09	2.24E-08	2.73E-08	2.25E-07	-1.70E-07
Land use related impacts / soil quality†	SQP	Pt	1 730	0.512	0.0156	0.271	12.6	2.80	13.4
GWP-GHG‡	GWP-GHG	kg CO_2 eq	797	20.2	0.601	10.7	2.56	2.12	100
IPCC AR5 GWP-GHG§	GWP-GHG (IPCC AR5)	kg CO_2 eq	797	20.2	0.601	10.7	2.56	2.12	100

* 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.

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

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

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PROGRAMME INFORMATION

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

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

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

Declaration owner		Bestbar Pty Ltd		
BESTBAR®	Web:	www.bestbar.com.au	Email:	admin@bestbar.com.au
	Post:	Building 2, 43-47 Lyn Parade, Prestons 2170 NSW, Australia		
Geographical scope		Australia		
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thinkstep anz	LCA Practitioner:	Barbara Nebel Gayathri Gamage Chanjief Chandrakumar, Tanya Kogileru, Haoran Lei		
	Web:	www.thinkstep-anz.com	Email:	anz@thinkstep-anz.com
	Post:	25 Jubilee Street, South Perth, Western Australia 6151 Australia		
EPD programme operator		The International EPD ® System		
EPD® THE INTERNATIONAL EPD® SYSTEM	Operator:	EPD International AB		
	Web:	www.environdec.com	Email:	info@environdec.com
	Post:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden		
Regional programme		EPD Australasia Limited		
AUSTRALASIA EPD ENVIRONMENTAL PRODUCT DECLARATION	Web:	www.epd-australasia.com	Email:	info@epd-australasia.com
	Post:	EPD Australasia, 315a Hardy Street, Nelson 7010 New Zealand		
	Phone:	NZ: +64 9 889 2909	AU:+61 2 8005 8206	
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Independent verification of the declaration and data, according to ISO 14025:2006		☐ EPD process certification (Internal) ☑ EPD verification (External)		
Third party verifier		Claudia A. Peña, PINDA LCT SpA	Email:	pinda.lct@gmail.com
Approved by		EPD Australasia Limited		
Procedure for follow-up of data during EPD validity involved third-party verifier		☐ Yes ☑ No		

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Bestbar Head Office

2 Venture Place
East Rockingham
Western Australia 6168

E | support@bestbar.com.au
T | 1800 237 8227