

HOT ROLLED STRUCTURAL AND RAIL

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN15804:2012+A2:2019/AC:2021



Type of EPD:	EPD of a single product from a manufacturer
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An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



GENERAL INFORMATION


Programme Information

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Product Category Rules (PCR) CEN standard EN 15804 serves as the Core Product Category Rules

PCR:	PCR 2019:14 Construction products, Version 2.0.1 (published on 2025-06-05, valid until 2030-04-07)
PCR review was conducted by:	The Technical Committee of the International EPD System. See www.environdec.com for a list of members.
Review Chair:	Rob Rouwette, start2see Pty Ltd (chair) Noa Meron, thinkstep Ltd (co-chair) The review panel may be contacted via Contact us EPD International

Verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:	<input checked="" type="checkbox"/> Individual EPD verification without a pre-verified LCA/EPD tool <input type="checkbox"/> Individual EPD verification with a pre-verified LCA/EPD tool <input type="checkbox"/> EPD Process Certification* without a pre-verified LCA/EPD tool <input type="checkbox"/> EPD Process Certification* with a pre-verified LCA/EPD tool <input type="checkbox"/> Fully pre-verified EPD tool
Third party verifier: 	Rob Rouwette (start2see Pty Ltd) Web: https://www.start2see.com.au/ Email: rob.rouwette@start2see.com.au
Verifier approved by:	EPD Australasia and The International EPD System
Procedure for follow-up during EPD validity involves third party verifier:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

EPDs are not always comparable

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 PCR (Product Category Rules). The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

For further information about comparability, see EN 15804 (bsi, 2021) and ISO 14025 (ISO, 2006a).

The results for EN15804+A1 compliant EPDs are not comparable with EN15804+A2 compliant studies as the methodologies are different. To support backwards comparability and compatibility, environmental performance results have also been provided for the indicators required in EN15804+A1, although the study does not claim compliance with this standard.



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INFORMATION ABOUT EPD OWNER

EPD Owner	
Declaration Owner: 	OneSteel Manufacturing Pty Ltd (Administrators Appointed) Web: onesteelmanufacturing.com.au Address: Port Augusta Road, Whyalla 5600, Australia Email: hrs@onesteelmanufacturing.com.au rail@onesteelmanufacturing.com.au
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Geographical Scope:	Australia
Reference Year of Data:	2022-07-01 to 2023-06-30

Company Information

OneSteel Manufacturing Pty Ltd (Administrators Appointed) (“OneSteel”) is a fully integrated steel manufacturer located in Whyalla, South Australia. OneSteel produces cast steel, special grade billets and a range of steel long products, including hot rolled structural, rail and sleeper sections. OneSteel operates an integrated, locally based supply chain, and maintains premium product quality and technical capability to support the manufacture of products for Australia’s construction and infrastructure industries.

The publication of this Environmental Product Declaration (EPD) demonstrates OneSteel’s commitment to transparency disclosure and responsible operation in the transition to a low-carbon economy. It provides the construction industry and other stakeholders with robust, independently verified data on the environmental impacts of its products, supporting informed decision-making and sustainable procurement. This EPD also builds on previous declarations by maintaining methodological continuity and consistency for users while reflecting current operations, updated data and OneSteel’s broader sustainability strategy. By maintaining accurate and accessible product data, OneSteel reinforces its role in supporting both industry decarbonisation and the wider sustainability goals of the communities it serves.

OneSteel’s EPD is independently verified and is a premier contributor to our holistic commitment to the environmentally sustainable manufacture and application of our products. Alongside our sustainable manufacturing practices, as well as our expertise in technical product applications and customisation, this EPD is another way we are here to deliver value to our customers and the wider industry. Recognising our customers’ needs and the increasing demand for standardisation and greater transparency around environmental performance, OneSteel is proud to publish the sustainability credentials of our supply chain and products.



www.onesteelmanufacturing.com.au



Compliance and Certification

OneSteel has developed and maintains numerous accreditations and certifications, which are [available here](#).

ISO 14001

ISO 14001 is the international standard that specifies requirements for an effective Environmental Management System (EMS) that help organisations administer and control a company’s environmental impact and compliance with regulations.



Although it is a voluntary standard that organisations can certify to, the GBCA Green Star Design & As Built tool uses ISO 14001 as one criteria to define a ‘Responsible Steel Maker’.

This requirement states: “The steel making facilities where the structural and/or reinforcing steel for the project is sourced have a currently valid and certified ISO 14001 Environmental Management System (EMS) in place. Valid ISO 14001 Environmental Management System (EMS) certificates must be provided from the steel making facilities where the structural and/or reinforcing steels in the project were produced.”

Steel Sustainability Australia

OneSteel Manufacturing was the first Australian steel manufacturer to be Steel Sustainability Australia certified. The SSA program is designed to identify sustainable steel suppliers by assessing the environmental and social impact of their steelworks manufacturing and processing operations.



World Steel Association

OneSteel Manufacturing is a Regular Member of the World Steel Association (worldsteel) and participates in the worldsteel Climate Action data



collection programme, which recognises steel producers that have fulfilled their commitment to participate in the worldsteel CO₂ emissions data collection programme.

Australian Steel Institute

OneSteel Manufacturing is an active member of the ASI. The ASI is the peak body representing the Australian steel industry. The ASI provides marketing and technical leadership to promote Australian-made steel as the preferred material to building, construction and manufacturing industries and policy advocacy to government.



Australasian Rail Association

OneSteel Manufacturing is a long-term member of the ARA. The ARA is the peak body for the rail sector in Australia and New Zealand, and advocate for member organisations across the rail industry.

Australasian Certification Authority for Reinforcing and Structural Steels

OneSteel Manufacturing’s range of hot rolled products are manufactured at the Whyalla Steelworks site which has ACRS (Australasian Certification Authority for Reinforcing and Structural Steels) third party certification compliance demonstrating that OneSteel Manufacturing has an independently verified history of supplying steel complying to AS/NZS Standards requirements.



Benefits of using this EPD

Provides an independently verified representation of the environmental impact of the OneSteel product going into your project.

Complies with the requirements of a valid EPD that is recognised in the Green Star Buildings and Innovation Challenge of Green Star legacy tools by the Green Building Council of Australia (GBCA).

Complies with the requirements of IS® rating tool by the Infrastructure Sustainability Council (ISC).

Green Building Council Australia

Green Star® Points

This EPD complies with requirements under the Green Building Council of Australia's rating tools, Green Star Buildings:

Green Star points for EPDs can be claimed under the Sustainable Products credit when the following criteria are met:

- ✓ EN 15804 and ISO 14025 compliant.
- ✓ Verified by an independent third party.
- ✓ Cradle-to-gate scope.

Infrastructure Sustainability Council

This EPD complies with requirements under the Infrastructure Sustainability Council's IS® rating scheme:

- ✓ EN 15804 and ISO 14025 compliant.
- ✓ Verified by an independent third party.

This EPD may help your project achieve credits under the IS® rating scheme.



Perth Stadium



PRODUCT INFORMATION

This EPD includes data on two product groups within the hot rolled structural and rail product category.

These include:

- Hot Rolled Structural sections
- Rail and sleeper sections

Each of the products included in this EPD are available in a range of sizes, grades and lengths.

Under the United Nations Central Product Classification (UN CPC) system of classification these products fit into two categories:

- 41251 – Angles, shapes and sections, of iron or nonalloy steel, not further worked than hot-rolled, hot-drawn or extruded
- 41253 – Railway and tram track construction material of iron or steel.

Under the Australian and New Zealand Standard Industrial Classification (ANZSIC), the products within this EPD are described by the following Class Codes and Titles:

- 2221 Structural Steel Fabrication
- 2299 Other Fabricated Metal Product Manufacture

The products are manufactured by OneSteel at its steelmaking and processing site in Whyalla, South Australia. The steel products are specific products from one manufacturer (OneSteel), rather than an industry average. A detailed description of the products can be found on next pages. More information on OneSteel's products is available at www.onesteelmanufacturing.com.au





This EPD relates to products manufactured by OneSteel and therefore does not include imported products or components. The production process is described conceptually hereafter in Figure 1.

Structural Sections

OneSteel produce Universal Beams (UB), Universal Columns (UC), Parallel Flange Channels (PFC) and Equal Angles (EA) via a hot-rolled steel section manufacturing process. These products are manufactured in accordance with AS/NZS 3679.1 *Structural steel Part 1: Hot rolled bars and sections* and are third-party certified by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS), independently confirming compliance with the requirements of the Standard. Structural steel products are typically used in non-residential and residential construction, engineering construction, infrastructure, mining plant and equipment, manufacturing and agriculture applications.

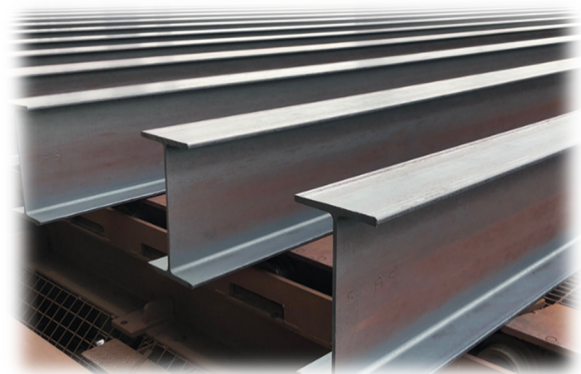
Range of Grades: Available in multiple strength and toughness grades, including Grade 300, Grade 350, Grade 300 L0, Grade 300 L15, Grade 350 L0, and Grade 350 L15, to meet diverse project specifications.

Table 1 Sections and sizes of structural steel products

Product	Size range (mm)	Section
Equal Angles	125 × 125 × 10 to 200 × 200 × 26	
Parallel Flange Channels	150 × 75 to 380 × 100	
Universal Beams	150 × 75 to 612 × 229	
Universal Columns	97 × 99 to 327 × 311	



Equal angles



Universal Beams

Rail Products

OneSteel produce hot-rolled, high-strength steel rail products via a hot-rolled steel shapes manufacturing process, followed by a subsequent finishing processes. Rail products are designed for use as railway tracks or track components to support and guide train wheels for freight and passenger applications.

Rail is manufactured in accordance with the respective OneSteel Technical Agreement Specifications (RT23 for 60kg, 50kg and 41kg Rail, RT19 for 68kg Rail, RT25 for 53kg Rail, RT27 for 47kg Rail and RT24 for 50kg NZ Rail). These Technical Specifications are based on Australian Standard AS1085.1 *Railway permanent way material*, with clarifications and enhancements included therein. Copies of the specifications are available on request.

OneSteel produces both Plain Carbon ('As Rolled') and Head Hardened rails.



OneSteel also produces Trak-Lok® steel sleepers that form part of the structure of a railway track.

Steel sleepers are manufactured to AS 1085.17 *Railway track material. Part 17: Steel sleepers*.



Rail products

Table 2 Sections and sizes of rail products

Product	Size range (mm)	Section
Rail	137 × 127 to 185 × 152	
Sleeper	258 × 97 to 300 × 122	



Sleepers

Steelmaking Processes

OneSteel has historically produced steel through an integrated steel mill, which includes key unit processes such as coke manufacture, Blast Furnace (BF) and Basic Oxygen Steelmaking (BOS). This integrated process configuration is reflected in the FY23 operational data used for this EPD and primarily uses raw materials such as coal and iron ore. Refer to the Key Assumption section for more information on data processes.

Manufacturers and designers alike play a key role in the efficient use of steel and steel structures. Designers are encouraged to select the most suitable steel grade for an application to optimise structural performance and material efficiency. OneSteel provides a range of steel products, including higher strength steel solutions that may support reduced material requirements for certain applications.

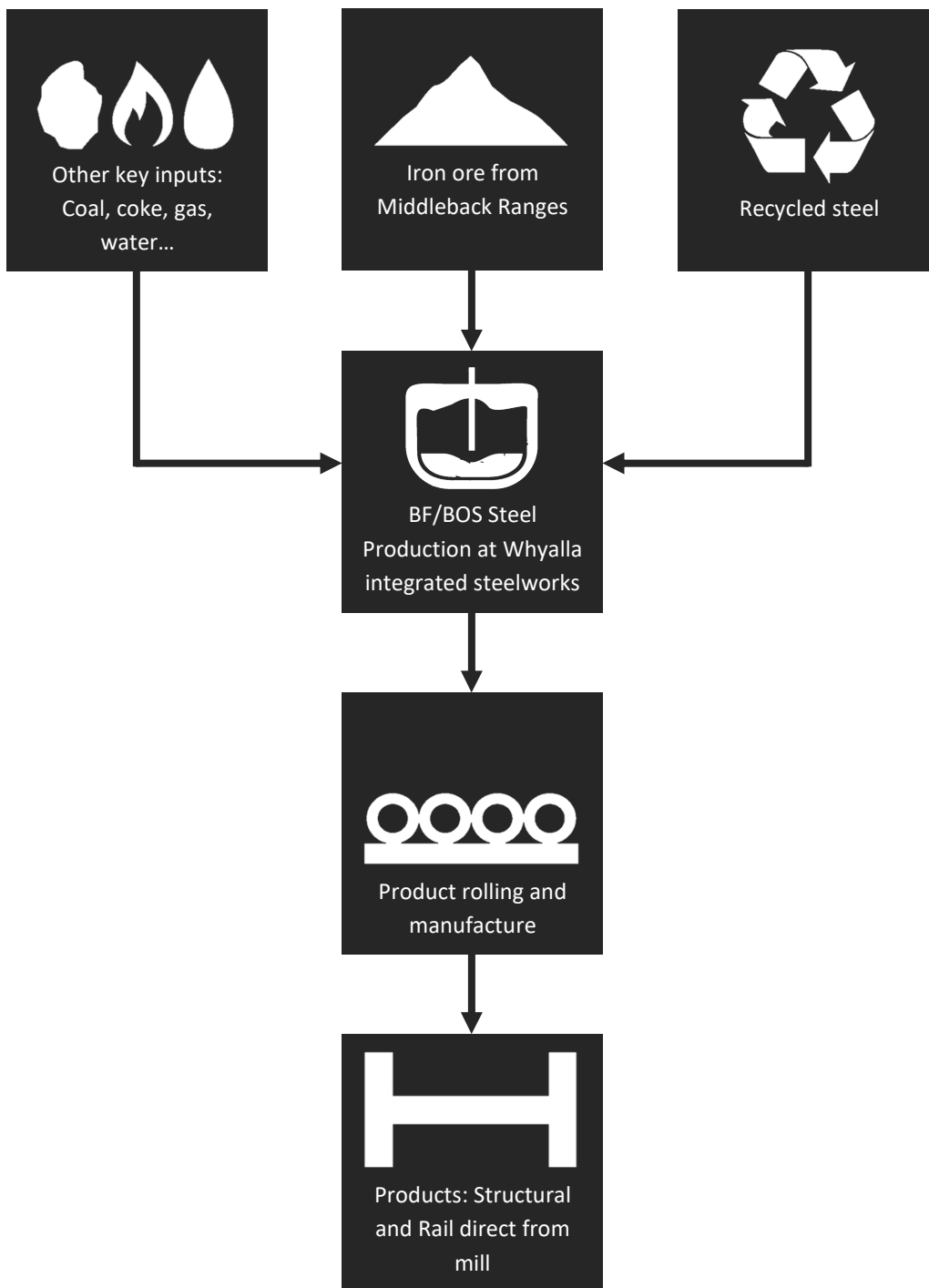


Figure 1: Basic manufacturing process for structural and rail products

CONTENT DECLARATION

Table 3: Typical steel composition of products

Composition	Typical Content %
Iron	>97
Manganese	<1.6
Carbon	<0.82
Other	<0.65
Total	100

Table 4: Content declaration for 1,000 kg of steel product

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Structural steel and steel rail product	1000	6.13%	0%

Table 5: Content declaration of packaging for 1,000 kg of steel product

Packaging Materials
There are no packaging materials declared.

Table 6: Dangerous substances from the candidate list of SVHC for authorisation

Dangerous substances from the candidate list of SVHC for Authorisation
No substances from the SVHC list to report.

A range of alloys are used to manufacture the products and grades represented in this EPD. The use of alloys has been aggregated and averaged in this EPD.

The products represented in this EPD are manufactured using common upstream production processes and equivalent steelmaking routes. Differences in product geometry, dimensions, and end-use application do not materially influence the environmental results reported in this study.

LCA INFORMATION

Declared unit

This EPD is valid for a declared unit of one metric tonne of product ready for dispatch to a customer.

Time representativeness: FY2023

Database and LCA software used: ecoinvent 3.11 and AusLCI 2.45 modelled within Simapro 10.3.0.1

System boundaries:

As shown in the table below, this EPD is of the type: Cradle to gate with modules C1-C4 and module D (A1–A3 + C + D). Other life cycle stages (Modules A4-A5, B1-B7) are dependent on particular scenarios and best modelled at the building level.

Table 7 Modules included in the scope of the EPD

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	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
Module declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	AU GLO	AU	AU	-	-	-	-	-	-	-	-	-	AU	AU	AU	AU	AU

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

Product stage (Modules A1–A3):

Modules A1–A3 cover the product stage for OneSteel structural and rail products, from raw material supply through to finished steel product at the exit gate.

Module A1 includes the extraction and processing of raw materials used in steel production. This includes OneSteel-controlled raw material supply, such as iron ore mining and processing at the Middleback Ranges, magnetite concentrate slurry production, dolomite and quartz supply, as well as externally sourced materials including coal, limestone, bentonite, scrap steel, alloying materials and other process additives.

Module A2 includes transport of all raw materials and purchased production inputs to the Whyalla Steelworks. This includes both bulk materials and smaller-volume imported or domestic inputs, such as ferro-alloys, aluminium products, bauxite, calcium carbide, molybdenum, graphite electrodes, sulfuric acid and other alloying or process additives. Transport is modelled by road, rail and/or sea freight depending on supplier location and material type.

Module A3 includes manufacturing at the Whyalla Steelworks. The production route includes raw material preparation, pellet production, coke production, ironmaking in the blast furnace, lime production, basic oxygen steelmaking, casting, and rolling into the final declared products. The A3 model also includes the site utilities network, including electricity, steam, compressed air, oxygen, nitrogen and internally generated process gases.

The finished product is represented at the point it leaves the rolling mill and is ready for dispatch. Distribution beyond the factory gate, installation and use-stage processes are outside the A1–A3 product stage.

End of life (Modules C1–C4):

When a structure reaches its end-of-life, the majority of the steel used in the structure is assumed to be recovered and sent for recycling. A recovery rate of 90% has been applied for this EPD, with the remaining 10% assumed to be sent to landfill.

Module C1 includes demolition/deconstruction of the steel product, modelled using 1.1 kWh of diesel per tonne of steel.

Module C2 includes transport of recovered and discarded steel to waste processing or disposal, modelled using an 80 km transport distance by 16-32 tonne EURO 5 diesel lorry.

Module C3 represents waste processing prior to recycling for the recovered 900 kg of steel per tonne of product. This includes loading and unloading at the sorting facility, mechanical sorting, and treatment prior to recycling, modelled using 1.62 kWh diesel, 1.98 kWh electricity and 0.72 kWh diesel, respectively.

Module C4 represents disposal of the remaining 100 kg of steel not recovered for recycling, modelled as landfill using 0.16 kWh diesel per tonne of product.

The C3 stage therefore accounts for the processing of the recovered steel fraction, while C4 accounts only for the unrecovered fraction assumed to be landfilled.

Recovery and recycling potential (Module D):

Module D considers the environmental impact and benefit of steel recycling in its second life cycle.

This EPD excludes the construction process and use phase environmental impacts of the product, which are considered to be too variable to provide meaningful representation.

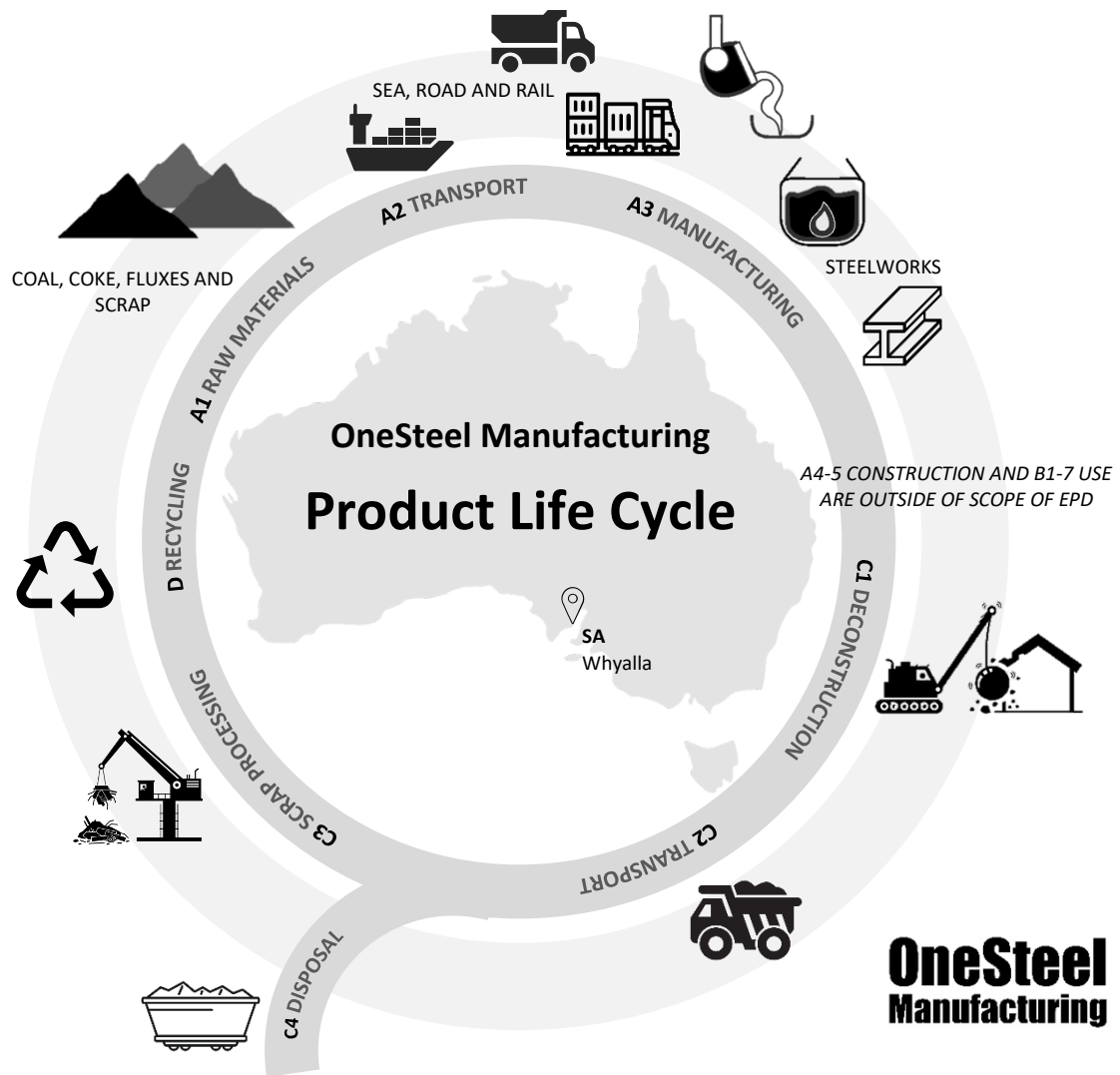


Figure 2: Life cycle of OneSteel products

Key Assumptions

Data for core processes:

FY23 was selected as the reference year for the study as it represents the most recent year of stable and continuous steel production with a complete operational dataset across the integrated steelmaking process. Operational changes occurred during FY24 and FY25, including changes to coke supply arrangements following the shutdown of the onsite coke ovens in September 2023. FY23 was considered the most appropriate reference year as it reflects a stable process configuration and consistent annual production dataset.

Site-specific data was obtained from OneSteel for all material and energy inputs and outputs associated with production (A1–A3), including point-source emissions reported under the Australian National Pollutant Inventory (NPI) framework and process wastewater information for operations requiring treatment. The current EPD is considered representative of the declared products and manufacturing system at the time of assessment. Future updates may be undertaken as operational changes stabilise and additional data becomes available for the revised production configuration.

Data for upstream and downstream processes:

Generic background datasets were applied for raw materials, energy generation, and transportation processes, in accordance with allowances under the relevant PCR. Life cycle inventory data was sourced primarily from ecoinvent v3.11 (“Ecoinvent Database,” n.d.), with additional regional datasets from AusLCI v2.45 (ALCAS, n.d.), and modelled using SimaPro software (*SimaPro 10.3.0.1*, 2025). The datasets reflect industry conditions broadly representative of the 2019 to 2023 period. Australian-specific data was prioritised where available, with proxy datasets from global or alternative regions applied only where local inventories were not present.

Data for credit and burden:

The module D credit reinstates the 2014 approach using global industry average emissions to calculate the emissions profile (and subsequent credit) for steel production for a more realistic steel scrap recovery market.

The following calculations were applied as per EN 15804:2012+A2:2019, Annex D (equation D.6):

Parameter	Definition	Qty (per 1 kg product)
$M_{MR,out}$	Steel collected after demolition and sent to recycling	0.90 kg
$M_{MR,in}$	Recycled content entering product system (purchased scrap)	0.0613 kg
Y	Recycling facility yield	0.95
M_{C4}	Steel disposed (not recovered)	0.10 kg
Q_R/Q_{sub}	Quality ratio (secondary vs primary steel)	1.0

Net Recyclable Flow Calculation

$$(M_{MR,out} - M_{MR,in}) = 0.90 - 0.0613 = 0.8387$$

Applying PCR calculation:

$$M_D = Y \cdot (M_{MR,out} - M_{MR,in})$$

$$M_D = 0.95 \cdot 0.8387 = 0.7968 \text{ kg}$$

Net yield-adjusted recyclable steel leaving the system = 0.7968 kg per 1 kg product

Electricity mixes:

The electricity consumption for OneSteel has been modelled using the residual supply electricity mix for South Australia, comprising 41% solar and 59% natural gas. This generation profile was implemented in SimaPro to develop a representative electricity dataset, resulting in a GWP-GHG emission factor of 0.463 kg CO₂-e per kWh.

Recycling:

At end-of-life, steel components are assumed to be largely recovered for recycling. A recycling rate of 90% has been applied based on contemporary national waste and resource recovery data for metals in Australia (*Waste Account, Australia, Experimental Estimates, 2018-19 Financial Year | Australian Bureau of Statistics, 2020*). The remaining 10% is assumed to be disposed to landfill and modelled in Module C4.

Allocation:

Allocation procedures were applied in accordance with EN 15804+A2:2019 where unit processes generated multiple co-products. Wherever possible, physical relationships between inputs, outputs and process functions were maintained through subdivision of unit processes and internal flow tracking within the integrated steelworks model. Where subdivision was not practicable and co-products were generated from the same process, economic allocation was applied based on the relative economic value of the co-products produced during the reference period.

Economic allocation was applied to key multi-output processes within the integrated steelworks, including the coke ovens, blast furnace, lime kiln and rolling mill operations. Allocation factors were derived from annual production quantities and representative product values for the FY2023 reference period and implemented directly within the LCA model.

Within the blast furnace process, environmental burdens were primarily allocated to liquid iron production, with smaller allocations assigned to blast furnace gas recovered for onsite energy use. Blast furnace slag (BFS) was treated as a no-value co-product and therefore received no allocated burden under the economic allocation approach applied in the study. Economic allocation was applied within the following processes lime kiln process between burnt lime and burnt dolomite outputs. Economic allocation was also applied for products leaving the BOS and caster. Mass allocation was applied at the rolling mill for structural steel and rail products.

Incoming scrap was assumed to originate from a scrap yard and therefore treated as burden-free with respect to prior life-cycle stages, meaning no upstream production burdens from the original steel manufacture were assigned to the recycled scrap input. However, transport and handling associated with delivery of purchased scrap to the steelworks were included within Modules A1–A2 where relevant. Internal process scrap recycled within the steelworks was treated as an internal flow and was not assigned additional upstream burdens.

Cut off criteria:

In accordance with PCR 2019:14 (EPD International, 2025) and EN 15804+A2 requirements, and consistent with current methodological discussion regarding the treatment of capital goods in EPD studies (Tokede & Rouwette, 2024), capital goods, site infrastructure, buildings, and production equipment were excluded from the system boundary. Personnel-related activities were also excluded. Minor ancillary consumables and associated packaging were excluded where assessed as environmentally insignificant under the applied cut-off criteria.

Data Quality Assessment

Primary data for the manufacturing stage was collected from OneSteel's operations for the financial year 2023. The data collection period therefore represents one full year of production and no deviation from the one-year data collection period was applied. The foreground inventory includes material quantities, energy use, water use, transport activity, emissions and waste flows associated with production of the declared products at the Whyalla Steelworks.

Data quality was assessed in accordance with EN 15941 and EN 15804 (bsi, 2024) using geographical, technological and temporal representativeness criteria. Primary site data was prioritised for processes under OneSteel's operational control. Where supplier-specific or site-specific data was not available, representative secondary datasets were selected from AusLCI v2.45 and ecoinvent v3.11, with preference given to datasets that were geographically and technologically relevant to the Australian steel production system.

Processes contributing more than 10% to the GWP-GHG result for modules A1–A3 are summarised below. Coal-derived energy is the only process contribution above this threshold, representing approximately 69% of A1–A3 GWP-GHG. Other key contributors, including natural gas, electricity and mining/pellet production, were below the 10% reporting threshold.

Table 8 Data sources and share of primary data

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Coal derived energy (electricity + heat + steam)	Client supplied	NGER "Coal Site Specific factor"	2023	Primary data	69%
Natural gas	Database	AusLCI 2.45	2023	Primary data	7%
Electricity	Database	AusLCI 2.45	2023	Primary data	6%
Coal mining	Database	AusLCI 2.45	2023	Secondary data	0%
Ferro-manganese	Database	AusLCI 2.45	2023	Secondary data	0%
Ferro-silicon	Database	AusLCI 2.45	2023	Secondary data	0%
Silico manganese	Database	AusLCI 2.45	2023	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3¹					82%

¹ The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

Table 9 Data quality information

Data set	Criteria	Data quality level	Reason for level	Reason for using	Relevance A1-A3
Coal-derived energy / coke-related energy	Time / technology	Very good	Coal energy and CO ₂ emissions are based on OneSteel FY2023 site-specific data. A modified ecoinvent combustion dataset was used only for minor non-CO ₂ greenhouse gases where site-specific measured data was not available.	Site-specific NGER-based coal energy and carbon data provides the most representative basis for the dominant energy input. Generic factors were only retained where no more specific CH ₄ and N ₂ O data was available.	Approx. 69% of GWP-GHG; 58% of ADPF, less than 10% other core indicators
Natural gas combustion	Geography / technology / time	Good	Australian natural gas combustion data was used and adjusted to reflect South Australian conditions where relevant.	No more specific process-level combustion dataset was available for each consuming unit process. The dataset is considered representative for Australian natural gas use.	Approx. 7% of GWP-GHG; 6% of AP; less than 5% other core indicators
Electricity, South Australia residual mix	Geography / time	Good	South Australian residual electricity mix was used. The dataset reflects regional electricity supply but is based on database modelling rather than direct supplier-specific electricity data.	Regional electricity data provides the most appropriate available representation of electricity supplied to the site.	Approx. 6–8% of GWP-GHG; 12% water use; less than 5% other core indicators.
Iron ore mining, beneficiation and pellet production	Geography / technology	Fair	Primary activity data was provided for OneSteel-controlled mining and processing operations. Some background datasets were modified to avoid double counting of site-specific fuel and electricity inputs.	OneSteel-controlled raw material production is represented using site-specific activity data, supported by background datasets where needed.	Approx. 6% of GWP-GHG; 20% of ODP; 50% of water use; 30% AP; other core indicators less than 5%
Lime and burnt dolomite production	Geography / technology / time	Fair	Lime kiln activity data was provided by OneSteel, including limestone and dolomite inputs and energy use. Background datasets were used for upstream limestone and dolomite supply.	Site-specific lime kiln data provides the most representative basis for the foreground process; secondary datasets were required for upstream quarrying and supply.	Approx. 3–4% of GWP-GHG; other core indicators less than 5%
Ferro-alloys and alloying materials	Time / technology	Poor	Several ferro-alloy datasets are based on older background data and may not fully reflect current supplier-specific production routes.	Supplier-specific LCI data was not available. The selected datasets represent the best available material-specific datasets in the applied databases.	Individually below 10% of GWP-GHG; collectively relevant to some non-GWP indicators such as ADP elements and eutrophication.
Transport of raw materials and imported inputs	Geography / technology	Fair / Poor	Transport distances were based on supplier locations and modelled using road, rail and sea freight datasets. Some transport datasets are generic or RoW-based.	Material-specific transport distances were available, but mode-specific datasets are based on representative secondary data.	Approx 69% ODP, less than 10% of GWP-GHG and other core indicators.

Table 10 Assumptions, choices and limitations

Assumption or limitation	Impact on LCA results	Discussion
Raw material data for OneSteel's products production	Minor	The OneSteel team provided the composition of the products and other manufacturing inputs. No generalised data was used. Energy and utility used as well as waste generated during the production of products were allocated to the different products using economic allocation method.
Background datasets representing upstream raw materials	Minor	Generic background datasets (e.g. ecoinvent EN15804 system model datasets) were used to represent upstream production of raw materials and energy carriers. In some cases, these datasets may not precisely reflect the exact geographic or technological configuration of the specific material supplied to the site and therefore function as proxy representations. Where multiple dataset options were available, the most technically representative dataset (material type, production route and geography) was selected.
Representation of coal-derived energy combustion	Minor	No sensitivity analysis was undertaken for coal dataset selection, as CO ₂ emissions were aligned with site-specific NGER data and therefore do not vary between datasets. Given that CO ₂ represents the dominant contribution to GWP, this removes the primary source of variability. The remaining differences between coal datasets relate only to non-CO ₂ greenhouse gases, primarily methane (CH ₄) and nitrous oxide (N ₂ O). Under the NGER framework, these emissions are not measured but are instead estimated using default emission factors for stationary combustion. As such, they remain inherently generic and are not specific to the fuel source or site conditions. Consequently, any comparison between alternative coal datasets would effectively represent a comparison between different sets of generic emission factors for CH ₄ and N ₂ O. Given the minor contribution of these gases to total GWP and the absence of more specific data under NGER, such an exercise was not considered to provide meaningful additional insight.
Economic allocation sensitivity	Moderate	Economic allocation factors were derived from production-year prices (mass × price). A sensitivity analysis was undertaken to assess the influence of price variability on allocation outcomes. Selected co-product prices were varied, including an extreme zero-value scenario for minor co-products, to evaluate the impact on final product results. This analysis demonstrates the robustness of results to fluctuations in market-based allocation parameters and confirms that overall conclusions are not disproportionately sensitive to reasonable price variation.
Exclusion of employees, capital good and infrastructure at manufacturing site	Minor	Allowed/required as per EPD rules.
Deconstruction energy	Minor	Allocation of diesel consumption was based on proportion of structure type by weight, assuming the demolition energy requirement is directly proportionally to weight for a given area.

Environmental Impact Indicators

Characterisation factors (CFs) applied to the calculation of potential environmental impacts are based on version 3.1 of the reference package for CFs used in the Product Environmental Footprint (PEF) framework (EF 3.1).

Mandatory impact category indicators according to EN 15804+A2

Table 11 EN15804+A2 Core environmental impact indicators

Impact Category	Indicator (Abbreviation)	Measurement Unit
Total global warming potential	GWP-total	kg CO ₂ -eq.
Global warming potential (fossil)	GWP-fossil	kg CO ₂ -eq.
Global warming potential (biogenic)	GWP-biogenic	kg CO ₂ -eq.
Global warming potential (Land use and land use change)	GWP-luluc	kg CO ₂ -eq.
Ozone depletion	ODP	kg CFC 11-eq.
Acidification potential	AP	mol H ⁺ -eq.
Eutrophication – aquatic freshwater	EP–freshwater	kg P-eq.
Eutrophication – aquatic marine	EP–marine	kg N-eq.
Eutrophication – terrestrial	EP–terrestrial	mol N-eq.
Photochemical ozone formation	POCP	kg NMVOC-eq.
Depletion of abiotic resources – minerals and metals*	ADP-minerals & metals	kg Sb-eq.
Depletion of abiotic resources – fossil fuels*	ADP-fossil	MJ
Water Depletion Potential*	WDP	m ³ world equiv.

Table 12 Life cycle inventory indicators on use of resources

Impact Category	Indicator (Abbreviation)	Measurement Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non- renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Use of net fresh water	FW	m ³

Table 13 Life cycle inventory indicators on waste categories and output flows

Impact Category	Indicator (Abbreviation)	Measurement Unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed/stored	RWD	kg
Components for re-use	CRU	kg
Material for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy - electricity	EEE	MJ
Exported energy – thermal	EET	MJ

Table 14 EN15804+A2 additional environmental impact indicators

Impact Category	Indicator (Abbreviation)	Measurement Unit
Global warming potential, excluding biogenic uptake, emissions and storage	GWP-GHG	kg CO ₂ -eq.
Global warming potential, aligned with the IPCC 2013 Fifth Assessment Report	GWP-GHG (IPCC AR5)	kg CO ₂ -eq.
Particulate matter emissions	PM	Disease incidence
Ionising radiation – human health**	IRP	kBq U-235 eq
Eco-toxicity (freshwater)*	ETP-fw	CTUe
Human toxicity – cancer effects*	HTP-c	CTUh
Human toxicity potential - non cancer effects*	HTP-nc	CTUh
Soil quality*	SQP	Dimensionless

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

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

Additional impact category indicators according to EN 15804+A1

Table 15 EN15804+A1 environmental impact indicators

Impact Category	Indicator (Abbreviation)	Measurement Unit
Global warming potential (GWP100)	GWP (EN15804+A1)	kg CO ₂ -eq.
Ozone layer depletion	ODP (EN15804+A1)	kg CFC 11-eq.
Acidification potential	AP (EN15804+A1)	kg SO ₂ -eq.
Eutrophication potential	EP (EN15804+A1)	kg PO ₄ ³⁻ -eq.
Photochemical ozone creation potential	POCP (EN15804+A1)	kg C ₂ H ₄ -eq.
Abiotic depletion potential for non-fossil resources	ADPE (EN15804+A1)	kg Sb-eq.
Abiotic depletion potential for fossil resources	ADPF (EN15804+A1)	MJ

Note: the indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., the results of the "A1 indicators" shall not be claimed to be compliant with EN 15804:2012+A1:2013.

Additional impact category indicators according to Green Star 2.0

Table 16 Green Star 2.0 impact category indicators

Impact Category	Measurement Unit
Human Toxicity cancer	CTUh
Human Toxicity non-cancer	CTUh
Land use	kg C deficit eq.
Ionising radiation	kBq U-235-eq
Particulate Matter	kg PM2.5-eq.
Resource depletion - water	m ³

ENVIRONMENTAL PERFORMANCE

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.

LCA results for 1 tonne of steel product¹

Mandatory impact category indicators according to EN 15804+A2

Table 17 EN15804+A2 Core environmental impact indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	3.31E+03	3.72E-01	6.39E+00	1.63E+00	5.56E-01	-7.17E+02
GWP-fossil	kg CO ₂ -eq.	3.31E+03	3.72E-01	6.39E+00	1.62E+00	5.55E-01	-7.17E+02
GWP-biogenic	kg CO ₂ -eq.	4.82E-01	1.60E-05	3.00E-04	6.60E-04	3.94E-04	8.19E-01
GWP-luluc	kg CO ₂ -eq.	1.64E-01	1.29E-05	3.02E-06	1.70E-04	4.22E-07	-1.42E-02
ODP	kg CFC 11-eq.	2.68E-06	5.84E-09	1.01E-06	1.40E-08	7.21E-08	-1.00E-06
AP	mol H ⁺ -eq.	6.13E+00	3.48E-03	5.66E-02	9.53E-03	1.88E-03	-2.39E+00
EP-freshwater	kg P-eq.	9.51E-02	3.04E-06	4.22E-07	1.52E-04	1.75E-04	-2.18E-01
EP-marine	kg N-eq.	1.90E+00	1.64E-03	1.78E-02	3.49E-03	3.35E-04	-3.54E-01
EP-terrestrial	mol N-eq.	2.33E+01	1.79E-02	1.94E-01	3.83E-02	3.64E-03	-6.49E+00
POCP	kg NMVOC-eq.	7.00E+00	5.33E-03	4.74E-02	1.15E-02	9.84E-04	-1.90E+00
ADP-minerals&metals*	kg Sb-eq.	7.07E-03	1.56E-08	7.42E-09	2.31E-05	7.75E-10	-1.02E-02
ADP-fossil*	MJ	3.42E+04	4.90E+00	8.67E+01	2.45E+01	6.75E+00	-5.78E+03
WDP*	m ³ world equiv.	2.45E+01	6.37E-03	5.64E-01	1.62E-01	5.67E-02	2.30E+02

* Disclaimer: 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 18 Life cycle inventory indicators on use of resources

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.01E+03	1.10E-02	2.46E-01	3.29E+00	1.85E-01	-8.30E+02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.01E+03	1.10E-02	2.46E-01	3.29E+00	1.85E-01	-8.30E+02
PENRE	MJ	3.42E+04	4.90E+00	8.67E+01	2.45E+01	6.75E+00	-5.78E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.42E+04	4.90E+00	8.67E+01	2.45E+01	6.75E+00	-5.78E+03
SM	kg	6.13E+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	7.00E+00	1.54E-04	1.30E-02	3.51E-03	1.20E-03	4.38E+00

¹ The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3)

Table 19 Life cycle inventory indicators on waste categories and output flows

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	1.15E+02	5.29E-04	0.00E+00	1.58E-02	8.39E-06	-4.36E+02
NHWD	kg	1.21E+03	1.78E-02	0.00E+00	7.11E-01	1.00E+02	-2.07E+03
RWD	kg	2.36E-03	2.50E-07	0.00E+00	2.13E-06	3.97E-09	2.40E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	9.00E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	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

Table 20 EN15804+A2 additional environmental impact indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG (IPCC AR5)	kg CO ₂ -eq.	3.31E+03	3.73E-01	6.39E+00	1.63E+00	5.56E-01	-7.19E+02
PM	Disease incidence	2.98E-04	9.98E-08	3.19E-07	2.22E-07	1.36E-08	-4.89E-05
IRP	kBq U-235-eq	1.00E+01	1.04E-03	1.28E-04	8.49E-03	2.86E-05	1.03E+01
ETP-fw	CTUe	5.08E+03	1.69E-01	1.94E+01	2.92E+00	1.50E+00	4.86E+03
HTP-c	CTUh	8.05E-06	2.61E-11	2.47E-11	1.10E-09	1.91E-11	3.83E-07
HTP-nc	CTUh	6.66E-06	3.72E-10	5.42E-10	1.91E-08	1.32E-09	5.80E-05
SQP	Dimensionless	3.06E+03	1.04E-02	3.97E-01	6.48E+00	2.11E+01	-1.85E+03

Table 21 Additional mandatory and voluntary impact category indicator

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ -eq.	3.31E+03	3.72E-01	6.39E+00	1.63E+00	5.56E-01	-7.17E+02

¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Additional impact category indicators according to EN 15804+A1

Table 22 EN15804+A1 environmental impact indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP (EN15804+A1)	kg CO ₂ -eq.	3.30E+03	3.72E-01	6.39E+00	1.62E+00	5.55E-01	-7.17E+02
ODP (EN15804+A1)	kg CFC 11-eq.	2.25E-06	4.62E-09	7.97E-07	1.14E-08	5.69E-08	-1.16E-06
AP (EN15804+A1)	kg SO ₂ -eq.	4.29E+00	2.43E-03	3.12E-02	6.71E-03	1.04E-03	-1.90E+00
EP (EN15804+A1)	kg PO ₄ ³⁻ -eq.	1.02E+00	5.60E-04	6.57E-03	1.66E-03	6.93E-04	-7.74E-01
POCP (EN15804+A1)	kg C ₂ H ₄ -eq.	2.33E+00	6.22E-05	2.01E-03	2.61E-04	4.57E-05	-4.23E-01
ADPE (EN15804+A1)	kg Sb-eq.	7.07E-03	1.56E-08	7.42E-09	2.31E-05	7.75E-10	-1.02E-02
ADPF (EN15804+A1)	MJ	3.42E+04	4.90E+00	8.67E+01	2.45E+01	6.75E+00	-5.78E+03

Additional impact category indicators according to Green Star 2.0

Table 23 Green Star 2.0 impact category indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Human Toxicity cancer	CTUh	8.76E-08	2.59E-12	2.51E-11	8.18E-11	6.58E-12	-3.00E-08
Human Toxicity non-cancer	CTUh	1.62E-09	1.37E-13	9.43E-12	2.68E-12	2.36E-12	-3.15E-09
Land use	kg C deficit eq.	2.71E+02	4.46E-03	3.63E-03	6.32E-01	2.88E+00	-4.83E+02
Ionising radiation	kBq U-235-eq	1.00E+01	1.04E-03	1.28E-04	8.49E-03	2.86E-05	1.03E+01
Particulate Matter	kg PM2.5-eq.	1.52E+01	9.57E-04	7.09E-03	2.30E-03	1.87E-04	-1.57E+00
Resource depletion - water	m ³	1.80E-01	2.14E-04	1.86E-02	6.45E-03	2.15E-03	6.08E+00

Results for additional scenarios

This section provides results for alternate end-of-life (EOL) scenarios.

Table 24 EN15804+A2 Core environmental impact indicators

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
GWP-total	kg CO ₂ -eq.	1.81E+00	0.00E+00	-8.02E+02	0.00E+00	5.10E+00	5.51E+01
GWP-fossil	kg CO ₂ -eq.	1.80E+00	0.00E+00	-8.03E+02	0.00E+00	5.09E+00	5.52E+01
GWP-biogenic	kg CO ₂ -eq.	7.34E-04	0.00E+00	9.16E-01	0.00E+00	3.62E-03	-6.30E-02
GWP-luluc	kg CO ₂ -eq.	1.89E-04	0.00E+00	-1.58E-02	0.00E+00	3.88E-06	1.09E-03
ODP	kg CFC11-eq.	1.55E-08	0.00E+00	-1.12E-06	0.00E+00	6.61E-07	7.73E-08
AP	Mole of H ⁺ eq.	1.06E-02	0.00E+00	-2.68E+00	0.00E+00	1.73E-02	1.84E-01
EP-freshwater	kg P eq.	1.69E-04	0.00E+00	-2.44E-01	0.00E+00	1.60E-03	1.68E-02
EP-marine	kg N eq.	3.88E-03	0.00E+00	-3.96E-01	0.00E+00	3.07E-03	2.72E-02
EP-terrestrial	Mole of N eq.	4.26E-02	0.00E+00	-7.27E+00	0.00E+00	3.34E-02	4.99E-01
POCP	kg NMVOC eq.	1.27E-02	0.00E+00	-2.13E+00	0.00E+00	9.02E-03	1.46E-01
ADP-minerals&metals*	kg Sb-eq.	2.56E-05	0.00E+00	-1.14E-02	0.00E+00	7.11E-09	7.86E-04
ADP-fossil*	MJ	2.72E+01	0.00E+00	-6.47E+03	0.00E+00	6.19E+01	4.45E+02
WDP*	m ³ world equiv.	1.80E-01	0.00E+00	2.57E+02	0.00E+00	5.20E-01	-1.77E+01

* Disclaimer: 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 experienced with the indicator.

Table 25 Use of resources

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
PERE	MJ	3.65E+00	0.00E+00	-9.29E+02	0.00E+00	1.70E+00	6.39E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.65E+00	0.00E+00	-9.29E+02	0.00E+00	1.70E+00	6.39E+01
PENRE	MJ	2.72E+01	0.00E+00	-6.47E+03	0.00E+00	6.19E+01	4.45E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.72E+01	0.00E+00	-6.47E+03	0.00E+00	6.19E+01	4.45E+02
SM	kg	0.00E+00	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	3.90E-03	0.00E+00	4.90E+00	0.00E+00	1.10E-02	-3.37E-01

Table 26 Waste generated and output flows

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
HWD	kg	1.75E-02	0.00E+00	-4.87E+02	0.00E+00	7.70E-05	3.35E+01
NHWD	kg	7.90E-01	0.00E+00	-2.31E+03	0.00E+00	1.00E+03	1.59E+02
RWD	kg	2.36E-06	0.00E+00	2.68E-03	0.00E+00	3.64E-08	-1.84E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.00E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	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

Table 27 EN15804+A2 additional environmental impact indicators

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
GWP-GHG	kg CO ₂ -eq.	1.81E+00	0.00E+00	-8.02E+02	0.00E+00	5.10E+00	5.51E+01
GWP-GHG (IPCC AR5)	kg CO ₂ -eq.	1.81E+00	0.00E+00	-8.05E+02	0.00E+00	5.10E+00	5.53E+01
PM	Disease incidence	2.47E-07	0.00E+00	-5.48E-05	0.00E+00	1.24E-07	3.77E-06
IRP	kBq U-235-eq	9.43E-03	0.00E+00	1.16E+01	0.00E+00	2.62E-04	-7.95E-01
ETP-fw	CTUe	3.24E+00	0.00E+00	5.44E+03	0.00E+00	1.38E+01	-3.74E+02
HTP-c	CTUh	1.22E-09	0.00E+00	4.28E-07	0.00E+00	1.76E-10	-2.94E-08
HTP-nc	CTUh	2.12E-08	0.00E+00	6.49E-05	0.00E+00	1.21E-08	-4.46E-06
SQP	Dimensionless	7.20E+00	0.00E+00	-2.08E+03	0.00E+00	1.93E+02	1.43E+02

Table 28 EN15804+A1 Environmental impact indicators

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
GWP (EN15804+A1)	kg CO ₂ -eq.	1.80E+00	0.00E+00	-8.03E+02	0.00E+00	5.09E+00	5.52E+01
ODP (EN15804+A1)	kg CFC11-eq.	1.27E-08	0.00E+00	-1.30E-06	0.00E+00	5.22E-07	8.94E-08
AP (EN15804+A1)	kg SO ₂ -eq.	7.45E-03	0.00E+00	-2.12E+00	0.00E+00	9.52E-03	1.46E-01
EP (EN15804+A1)	kg PO ₄ ³⁻ -eq.	1.84E-03	0.00E+00	-8.67E-01	0.00E+00	6.36E-03	5.96E-02
POCP (EN15804+A1)	kg Ethene-eq.	2.90E-04	0.00E+00	-4.73E-01	0.00E+00	4.19E-04	3.25E-02
ADPE (EN15804+A1)	kg Sb-eq.	2.56E-05	0.00E+00	-1.14E-02	0.00E+00	7.11E-09	7.86E-04
ADPF (EN15804+A1)	MJ	2.72E+01	0.00E+00	-6.47E+03	0.00E+00	6.19E+01	4.45E+02

Table 29 Green Star 2.0 impact indicators

Indicator	Unit	100% Recycling			100% Landfilling		
		C3	C4	D	C3	C4	D
Human Toxicity cancer	CTUh	9.09E-11	0.00E+00	-3.35E-08	0.00E+00	6.04E-11	2.30E-09
Human Toxicity non-cancer	CTUh	2.98E-12	0.00E+00	-3.53E-09	0.00E+00	2.16E-11	2.43E-10
Land use	kg C deficit eq.	7.02E-01	0.00E+00	-5.41E+02	0.00E+00	2.64E+01	3.72E+01
Ionising radiation	kBq U-235-eq	9.43E-03	0.00E+00	1.16E+01	0.00E+00	2.62E-04	-7.95E-01
Particulate Matter	kg PM2.5-eq.	2.55E-03	0.00E+00	-1.76E+00	0.00E+00	1.71E-03	1.21E-01
Resource depletion - water	m ³	7.17E-03	0.00E+00	6.81E+00	0.00E+00	1.97E-02	-4.68E-01

ADDITIONAL ENVIRONMENTAL INFORMATION

The Material Circularity Indicator

The Material Circularity Indicator (MCI), developed by the Ellen MacArthur Foundation, provides a quantitative measure of how well a product performs within a circular economy framework. It reflects the extent to which material flows for a product are restorative, regenerative, and efficient over their full life cycle. The MCI is expressed as a value between 0 and 1, where a score of 1 represents a fully circular product, and a value of 0 represents a fully linear product with lower-than-average utility. Scores below 0.1 indicate products that are both linear and have reduced utilisation compared with standard market benchmarks.

The MCI assesses circularity by considering:

- Material inputs (virgin and recycled content),
- Material outputs (waste and recyclability at end of life),
- Product utility, including intensity of use and expected lifespan.

The indicator can be applied to individual products, product portfolios, or aggregated to company level, supporting product designers, procurement teams and organisations seeking to monitor and improve circular performance. Its focus aligns closely with the objectives of this EPD, highlighting opportunities to improve resource efficiency across the whole life cycle.

As part of developing this EPD, Edge Impact were commissioned to assess the circularity of the OneSteel's products covered by this declaration.

The MCI for the products in this EPD was calculated using the Material Circularity Indicator Calculator hosted by thinkstep-anz, in accordance with the methodology defined by the Ellen MacArthur Foundation. The assessment incorporated product-specific data provided by OneSteel, including:

- proportions of virgin and recycled material inputs,
- manufacturing yields and material losses,
- assumptions regarding end-of-life recovery and recycling rates,
- estimates of product lifespan and typical intensity of use.

These inputs were entered into the MCI calculator, which applies the standardised formulae to determine the restorative flow of materials, adjust for utility, and derive a final MCI value on the 0–1 scale.

The OneSteel products included in this EPD achieved an MCI score of 0.46. The result is driven primarily by the inherent recyclability of steel and the established collection, recovery, and recycling infrastructure supporting steel products at end of life, rather than by recycled content within the manufacturing process itself. While the products contain approximately 6.3% recycled content, the MCI outcome is strongly influenced by the high recovery potential of structural steel and rail products, which can be collected, reprocessed, and returned to steel production systems following use. Accordingly, the reported MCI score should be interpreted as reflecting the broader circular performance of steel within existing recycling systems and infrastructure, rather than a direct measure of circularity associated solely with OneSteel's manufacturing operations.

Benefits of using OneSteel products

Why steel? – Steel is fundamental to the way we live, work and play.

As one of the most utilised materials in the world, steel supports the buildings we use, strengthens the roads and bridges that connect us and contributes to a more sustainable built environment.

From design and construction, through to building and infrastructure use, and then at the end of the asset lifespan, steel offers construction proponents unique sustainability benefits.

Steel can be readily adapted for various uses. It allows asset owners to modify existing structures to cater for future uses and tenants, as well as extending the structure's lifespan beyond its initial intent.

Steel is a 100% recyclable material, with no loss in material strength or quality.

Modern design techniques and the use of higher strength grades can also reduce the mass of steel used in structures.

To understand the environmental performance of steel, the full life cycle of steel must be taken into consideration. The key steps in the life cycle of steel are shown in next page.

VERSION HISTORY

Original version of the EPD, 8 November 2016 – Original EPD released under OneSteel brand (S-P-00824 Version 1).

Revision 1, 21 September 2020 – Updated in line with 5-year validity, including updated hotspot data covering over 95% of all impacts. Hot rolled structural steel and merchant bar sections manufactured by Infrabuild Steel are now covered in the Infrabuild EPD (S-P-00854 Version 1.1).

Revision 1.2, 29 June 2022 – Updated logo and Sales & Service contact details (S-P-01547 Version 1.2).

Revision 2, This revision updates the EPD model to use FY23 data. The modelling approach has also been refined to exclude InfraBuild downstream products from the assessment boundary. As a result, allocation is now applied only within the defined system boundaries for the products covered by this EPD, and the modelling has been decoupled from downstream product processes that could otherwise influence the reported results. The underlying unit processes used in the model remain largely unchanged from previous revisions, with the main updates relating to the revised data year and the clearer separation of downstream product modelling from the declared product system.

ABBREVIATIONS

AusLCI	Australian Life Cycle Inventory Database
BF	Blast Furnace
BOS	Basic Oxygen Steelmaking
CEN	European Committee for Standardization
CML	Centre of Environmental Science at Leiden
CPC	Central product classification
EF	Environmental Footprint
EN	European Norm (Standard)
EPD	Environmental Product Declaration
GPI	General Programme Instructions
GRI	Global Reporting Initiative
INA	Indicator Not Assessed (unable to be assessed using the worldsteel dataset for scrap)
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory
MCI	Material Circularity Indicator
MER	Materials for Energy Recovery
MFR	Materials for Recycling
ND	Not Declared
NGER	National Greenhouse and Energy Reporting Scheme
NPI	National Pollutant Inventory
UN CPC	United Nations Central Product Classification

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