Environmental Product Declaration

of multiple products, based on the average result of the product group. (Products listed on Page 7)

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

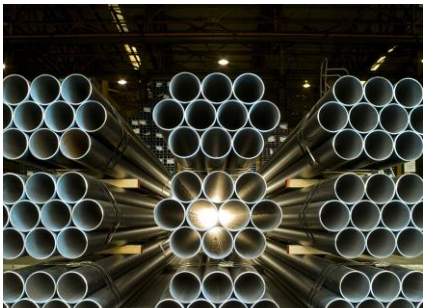
Orrcon Steel Pipe and Tube

from

Orrcon Steel Manufacturing

Program:	International EPD System, www.environdec.com
Program operator:	EPD International AB
Regional program operator:	EPD Australasia Ltd, www.epd-australasia.com
EPD registration number:	EPD-IES-0022478:001
Publication date:	2025-06-17
Valid until:	2030-06-16
Geography	Australia

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



General information

Program information	
Program:	International EPD System
Program Operator: EPD INTERNATIONAL EPD SYSTEM	**EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden W: www.environdec.com E: info@environdec.com
Regional Programme Operator: AUSTRALASIA EPD® INTERNATIONAL EPD SYSTEM	**EPD Australasia Ltd** 315a Hardy Street, Nelson 7010, New Zealand W: epd-australasia.com E: info@epd-australasia.com

Accountabilities for PCR, LCA and Independent, Third-Party Verification	
Owner of the EPD	
Declaration Owner Orrcon Steel Manufacturing	**Orrcon Steel Manufacturing** 121 Evans Rd, Salisbury QLD 4107, Australia W: https://orrconmanufacturing.com.au/ E: info@orrcon.com.au
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)	
Product Category Rules (PCR):	PCR 2019:14 Construction products, version 1.3.4
UN CPC Code:	412 (Products of iron or steel)
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members
Review Chair:	Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact
Life Cycle Assessment (LCA)	
EPD Prepared by: edge impact™	Sazal Kundu, Weiqi Xing, Ray Mohan Edge Environment Pty Ltd Greenhouse, Level 3, 180 George Street, Sydney NSW 2000 W: www.edgeimpact.global E: info@edgeimpact.global
Third-party verification	
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:	☒ EPD verification by individual verifier
Third-party verifier:	Claudia A. Peña, PINDA LCT SpA Email: claudia@epd-americalatina.com
Approved by:	EPD Australasia
Procedure for follow-up of data during EPD validity involves third party verifier:	☐ Yes ☒ No

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.

Company information

Owner of the EPD: Orrcon Steel Manufacturing

Contact: Brett McCormack
Quality Systems Manager
E: NationalQuality@Orrcon.com.au

Description of the Organisation: Orrcon Steel Manufacturing is a leading Australian manufacturer of steel tube, and pipe products, offering an extensive range. With manufacturing sites at Unanderra in New South Wales, Salisbury in Queensland, and O'Sullivan Beach in South Australia.

Product-related or Management System-related Certifications:

All Orrcon Steel Manufacturing products comply with applicable laws, regulations and standards including ISO:9001 standard with onsite NATA accredited testing laboratory. Orrcon Steel's range of structural pipe and tube manufactured are certified by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS).

- ISO9001:2015, SAI Global – Certificate number: QEC13342
- ISO/IEC 17025, NATA – Accreditation number 16978, site: 18499
- ACRS Certifications Salisbury – Certificate number: 160507
- ACRS Certifications Unanderra – Certificate number: 240903

Name and Location of Production Sites:

- Sailsbury, Queensland, Australia
- O'Sullivan Beach, South Australia, Australia
- Unanderra, New South Wales, Australia

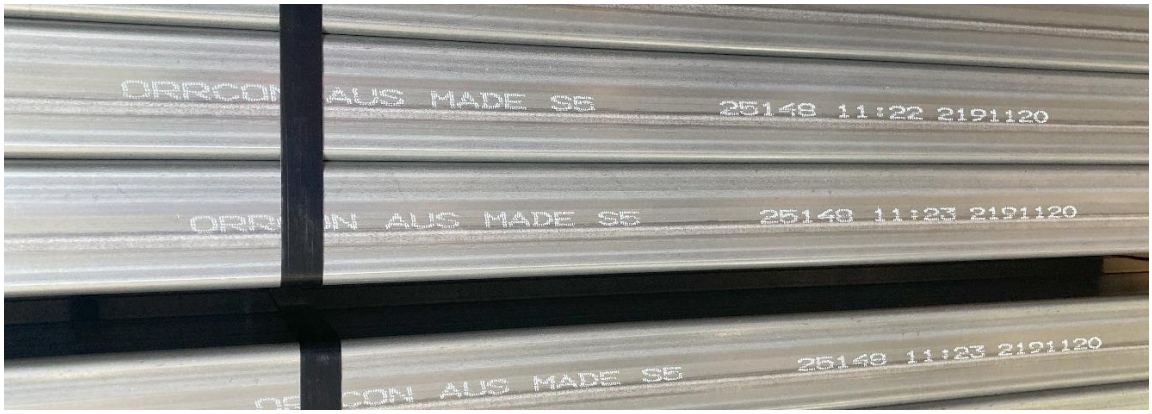
Product information

Product Name: Orrcon Steel Manufacturing –Steel pipe and tube.

Product Identification:

Each bundle has pack tags with product details and traceable order information.

Individual length tube marking is available for additional order traceability.



Product Description:

At Orrcon Steel Manufacturing, we are proud to provide products that are created, owned, and operated in Australia. Orrcon Steel Manufacturing's range of steel pipe and tube products are suitable for a broad range of structural, mechanical, gas or fluid reticulation, general and end-use applications as outlined in the below table.

Product Application:

Orrcon Steel Manufacturing extensive range of steel pipe and tube products are inspected and tested to comply with one or more of the following standards, including:

- Structural – AS/NZS 1163 Cold-formed structural steel hollow sections
- Low pressure water or gas pipe – AS1074 Steel tubes and tubulars for ordinary service
- Precision – AS1450 Steel tubes for mechanical purposes
- ALLGAL® standard – AS4750 Electro-galvanised (zinc) coating on ferrous hollows and open sections.

ALLGAL® STRUCTUBE® and BLU350® ULTRASPEC-GAL®	ORRFIRE®	PRECISION MECSPEC-GAL® FENCESPEC-GAL®	
Building Construction – residential & commercial Fencing and Shade products **Engineering** Heat exchangers Heavy structural fabrication Conveyor manufacturing Mineral processing & refineries Mining, piling & solar farms **Fluids** Bore drilling Contractors and Electrical OEM's Fire fabricators	**Manufacturing** Automotive aftermarket & OEM Box, marine & special trailers, bus manufacturing, caravan & camping equipment Furniture **Rural & Livestock** Yards, crushes and panels Ramps, gates, feeders, silos Floats, sheds, shelters Harvesters and combines	**Home Improvements** Gazebos, carports, garden sheds **Industrial** Clothes lines, gardening products **Agriculture** Equipment such as seeders & sprayers **Furniture** Industrial, school & office	**Hospital Equipment** Hospital beds **Fencing** Domestic, security & pool fencing **Automotive & HVAC** Exhaust systems, extractors & heat exchangers **Leisure** Trampolines, playground, fitness & camping equipment

Product Covered by this EPD: Orrcon Steel Tube and Pipe

Range	Section	Standard and Grade*	BMT (mm)	Sizes*	Length (mm)	Product Type	Coating / Finish Specifications*
Structural	Square Hollow Section (SHS)	AS/NZS 1163 C250L0, C350L0, C450L0^	1.6 – 9.0	20x20 - 200x200	6,500 – 12,480	ALLGAL®	AS4750 ZE50/50
	Rectangular Hollow Section (RHS)	AS/NZS 1163 - C250L0, C350L0, C450L0^		38x25 - 250x150		STRUCTUBE® BLU350®	SMARTCOTE® (QAL-OSP-CRP-001)
	Circular Hollow Section (CHS)	AS 1074 - AS/NZS 1163 C250L0, C350L0		20NB - 250NB		ULTRASPEC-GAL®	AS4792 ZB135/135
	Yard Rail/Oval Sections	AS/NZS 1163 C350L0		52x25 - 124x42	6,100		Oiled No Oil or Paint (NOPC) Powder Coat Quality (PCQ)
	Silo & Special Sections	AS/NZS 1163 C350L0#		75x64	12,000		
Sprinkler & Hydrant Pipe	ORRFIRE®	AS 1074 - AS/NZS 1163 C250L0, C350L0 ActivFire®	XL – H	20NB - 200NB ϕ26.9 – 219.1mm	6,500 – 12,000	ALLGAL®	AS4750 ZE50/50
						SMARTCOTE®	QAL-OSP-CRP-001
						Hot Dip Galvanised	AS4792 HDG300
Precision	Square Hollow Section (SHS)	AS 1450 C200, C250 #	1.2 – 3.2	12.7x12.7 - 65x65	6,100 & 7,320 (standard lengths)	SEMB & MSBR – Cold Roll MSBL – Mild Steel Black (Hot Roll) MSGB – Mild Steel GALVABOND® MECSPEC-GAL® - Strength grade Precision FENCESPEC-GAL® - Precision fencing range	
	Rectangular Hollow Section (RHS)			12x9 - 90x40			
	Circular Hollow Section (CHS)		0.9 – 3.2	12.7OD - 101.6OD			

Notes: * Not all Grades, Sizes and Finishes are available across the full range shown
^ C450L0 grade available subject to enquiry
# Non-standard lengths available subject to enquiry

LCA information

Declared Unit: 1 tonne of Orrcon Steel tube and pipe product manufactured at Sailsbury, O'Sullivan Beach, and Unanderra sites in Australia.

Technical Service Life: 50 years

Time Representativeness: The LCA study was conducted based on the financial year 2023-07-01 to 2022-07-30 production data

Database(s) and LCA Software Used: The inventory data for the process are entered into the SimaPro (v10.1) LCA software program and linked to the pre-existing data for the upstream feedstocks and services selected in order of preference from:

- For Australia, the Australian Life Cycle Inventory (AusLCI) v2.45 compiled by the Australian Life Cycle Assessment Society ((ALCAS), 2025). The AusLCI database at the time of this report was less than 1 year old.
- Other authoritative sources (e.g., ecoinvent v3.10, (Wernet, et al., 2023)), where necessary adapted for relevance to Australian conditions (energy sources, transport distances and modes and so on, and documented to show how the data is adapted for national relevance). At the time of reporting, the ecoinvent v3.10 database was less than 2 years old.
- Other sources with sensitivity analysis reported to show the significance of this data for the results and conclusions drawn.

Scope of Declaration: The scope of this EPD is cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).

Orrcon Steel products are manufactured in three sites across Salisbury, Queensland; O'Sullivan Beach, South Australia; and Unanderra, New South Wales. Mass and energy data, including production volume related data was collected through Orrcon Steel's data management system for individual products for the assessment period. Energy and utilities used, as well as waste generated during production were allocated to individual products using the mass allocation method, based on production volumes of each product variant. This average was weighted according to the production volumes of the included product groups.

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

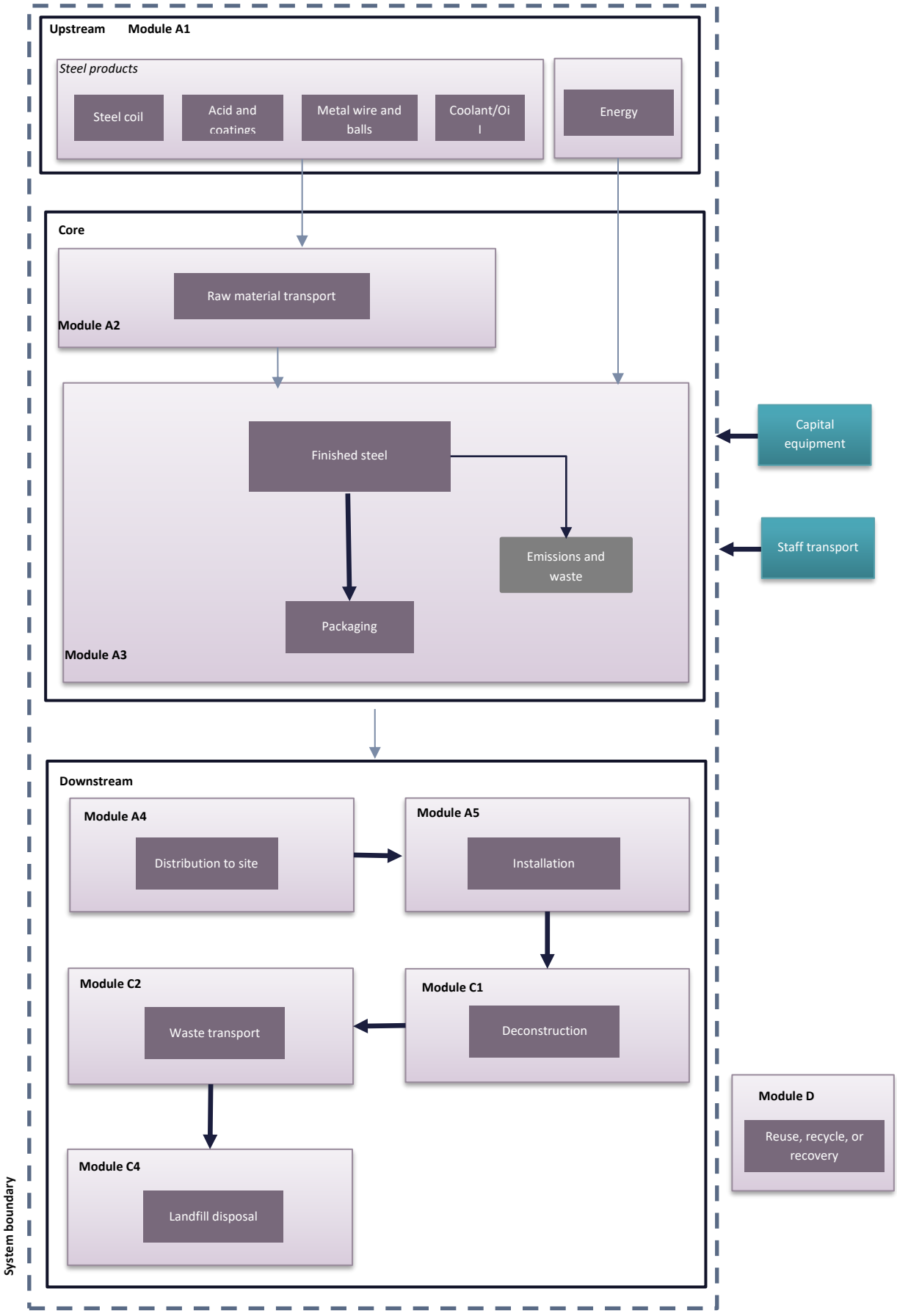
ND = not declared (such a declaration shall not be regarded as an indicator of zero result).

The following life cycle stages have not been declared, as they are deemed not applicable or predictable for Orrcon Steel Manufacturing products: Transport (A4); Construction installation (A5); Material emissions from usage (B1); Maintenance (B2); Repair (B3); Replacement (B4); Refurbishment (B5), Operational energy use (B6) and Operational water use (B7).

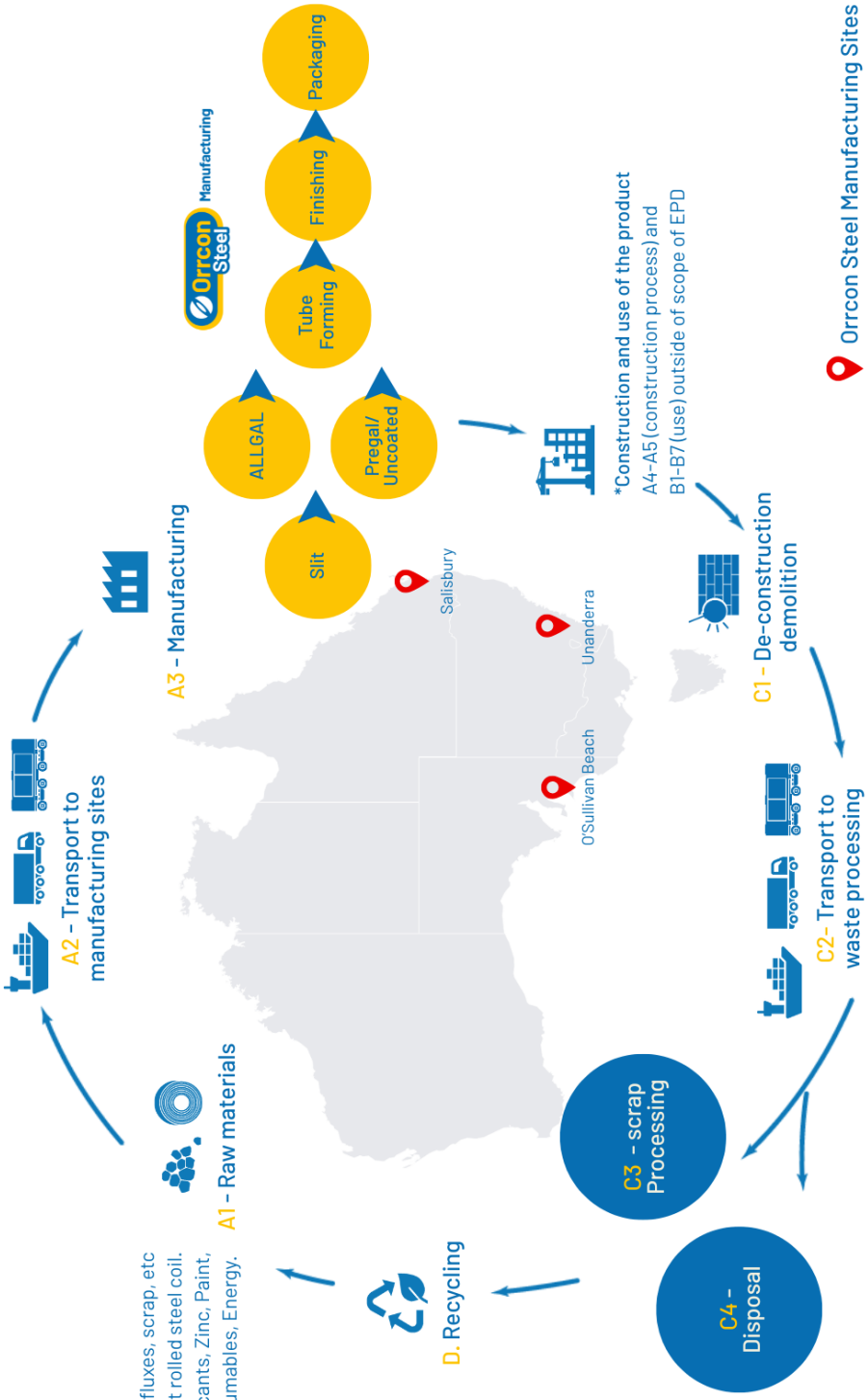
Module A4 has been excluded due to the large variability in distribution from year to year. Module A5 has been excluded as it is not within the control of Orrcon Steel, with any inputs/outputs considered attributable to the building/site's environmental impact. Use related modules B1-B7 are excluded as no material inputs/outputs occur during use.

This EPD has been produced in conformance with the requirements of PCR2019:14, General Program Instructions (GPI) and EN 15804. It is discouraged to use the results of modules A1-A3 without considering the results of module C.

System Diagram:



Manufacturing diagram



Upstream Processes

The upstream processes include those involved in Module A1 – Raw material supply. This module includes:

- Extraction, transport and manufacturing of raw materials.
- Generation of electricity from primary and secondary energy resources, also including their extraction, refining and transport for Modules A1.
- Processing up to the end-of-waste state or disposal of final residues including any packaging not leaving the factory gate with the product.

Orrcon Steel Manufacturing tubular products are made from BlueScope coil and sources all the input materials within the scope of this EPD in Australia. The iron ore is sourced from the Pilbara in Western Australia and coal and other key materials, including zinc are all locally sourced.

Core Processes

Orrcon Steel manufactures its products using steel coils supplied by BlueScope. All Orrcon products are manufactured using a consistent, linear tube-forming process, with specific capabilities determined by each rolling mill. Production begins with slit steel coil, prepared to a specific width to match the final product. The coil is driven through a series of breakdown and forming rollers, gradually shaping the flat strip into a round tube.

Variations in feedstock include differences in thickness, coating, and grade to suit the required product specification. After shaping, the tube undergoes finishing processes where surface coatings are applied before the end product is packed and shipped out to customers.

The other core processes include those involved in Module A2 and Module A3, including:

- External transportation of materials to the core processes and internal transport.
- Packaging materials.
- Processing of waste to landfill and recycling.

Downstream Processes

The downstream processes include those covered in Modules C1 to C4. Module C1 accounts for impacts from deconstruction, assumed to be carried out using an excavator with diesel consumption of 0.172 kg per tonne of steel, consistent with BlueScope EPDs. Module C2 includes transport to end-of-life treatment, modelled as 25 km by truck due to limited specific data. Modules C3 and C4 represent waste processing and final disposal, with 87% of steel assumed to be recycled and 13% landfilled, based on the National Waste Report 2022 (DCCEEW).

Module D reports environmental benefits from post-consumer recycling, excluding 17.4% secondary material (pre- and post-consumer) already accounted for in production, as reported in BlueScope EPDs, to avoid double counting and maintain mass balance. Further details on the parameters used are provided in the Content Information section of this EPD. Consequently, this portion of steel is excluded from the benefits beyond the system boundary as the worst case to maintain mass balance.

<u>Database(s) and LCA software used:</u>

The inventory data for the processes are entered into the SimaPro (v9.6) LCA software program and linked to the pre-existing data for the upstream feedstocks and services selected in order of preference from:

- For Australia, the Australian Life Cycle Inventory (AusLCI) v1.42 compiled by the Australian Life Cycle Assessment Society ((ALCAS), Australian Life Cycle Inventory (AusLCI) – v1.42, 2023). The AusLCI database at the time of this report was 1 year old.

- Other authoritative sources (e.g., ecoinvent v3.10, (Wernet, et al., The ecoinvent database version 3.10, 2024), where necessary adapted for relevance to Australian conditions (energy sources, transport distances and modes and so on, and documented to show how the data is adapted for national relevance). At the time of reporting, the ecoinvent v3.10 database was less than 1 year old.

Cut-off rules and Exclusion of Small Amounts:

It is common practice in LCA/LCI protocols to propose exclusion limits for inputs and outputs that fall below a certain threshold % of the total, but with the exception that where the input/output has a "significant" impact it should be included. According to the PCR 2019:14 v1.3.4, Life cycle inventory data shall according to EN 15804 A2 include a minimum of 95% of total inflows (mass and energy) per module. Inflows not included in the LCA shall be documented in the EPD. Data gaps in included stages in the downstream modules shall be reported in the EPD, including an evaluation of their significance. In accordance with the PCR 2019:14 v1.3.4, the following system boundaries are applied to manufacturing equipment and employees:

- Environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the LCI. Capital equipment and buildings typically account for less than a few percent of nearly all LCIs and this is usually smaller than the error in the inventory data itself. For this project, it is assumed that capital equipment makes a negligible contribution to the impacts as per Frischknecht et al. (Frischknecht, 2007) with no further investigation.
- Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI. The impacts of employees are also excluded from inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very hard to decide what proportion of the impacts from their whole lives should count towards their employment. For this project, the impacts of employees are excluded.

Allocation:

In a process step where more than one type of product is generated, it is necessary to allocate the environmental stressors (inputs and outputs) from the process to the different products (functional outputs) in order to get product-based inventory data instead of process-based data. An allocation problem also occurs for multi-input processes. In an allocation procedure, the sum of the allocated inputs and outputs to the products shall be equal to the unallocated inputs and outputs of the unit process.

The following stepwise allocation principles shall be applied for multi-input/output allocations:

- The initial allocation step includes dividing up the system sub-processes and collecting the input and output data related to these sub-processes.
- The first (preferably) allocation procedure step for each sub-process is to partition the inputs and outputs of the system into their different products in a way that reflects the underlying physical relationships between them.
- The second (worst case) allocation procedure step is needed when physical relationship alone cannot be established or used as the basis for allocation. In this case, the remaining environmental inputs and outputs from a sub-process must be allocated between the products in a way that reflects other relationships between them, such as the economic value of the products.
- Orrcon Steel products are manufactured in three sites across Salisbury, Queensland; O'Sullivan Beach, South Australia; and Unanderra, New South Wales. Mass and energy data

have been sourced for the manufacturing plants Orrcon. Manufacturing volume related data was collected for individual products for the assessment period. Energy and utilities used as well as waste generated during production are allocated to individual products using the mass allocation method, based on production volumes of each product variant.

- Impacts of manufacturing waste that is being landfilled is 100% allocated to the product system at A1-A3. For wastes that are being recycled, all disposal impacts up to the point the waste reaches its end-of-waste stage has been allocated to the product system at A1-A3. No credits for recycling of manufacturing waste have been assigned.

Data Quality and Validation:

The specific data used for the study (core module) is based on direct utility bills or feedstock quantities from the Orrcon Steel's procurement records, and raw material suppliers' EPD. Specific data was carefully reviewed in order to ensure completeness, accuracy and representativeness of the data supplied. The generic data were obtained from AusLCI, ecoinvent, and any other relevant databases. Edge used contribution analysis to focus on the key pieces of data contributing to the environmental impact categories. The data was benchmarked against relevant benchmark data in ecoinvent. Edge considers the data to be of high quality for the core module.

As per the background data, the quality was considered very good when processes chosen were geographically, temporal and technologically relevant. For data that was based on assumptions, quality was considered good or fair, unless based on official reports.

Assumptions, Choices, and Limitations:

Assumption or limitation	Impact on LCA results	Discussion
Raw material data for steel product manufacturing is based on generic information.	Moderate	The main material steel coil is modelled based on EPDs. In addition, the EN 15804 standard permits generic data for upstream processes, however, this is where the main impacts are for Orrcon products across the life cycle.
The Orrcon product compositions are grouped and averaged based on the production volume.	Moderate	The LCA model of Orrcon Steel products is based on the production weighted average inventory. The generalisation is justified by all Orrcon Steel products are made with the same process and same amount of steel coil, where the differences are in finishes associated with oiling, coating, welding, and/or painting.
Conversion from volume to mass for some wastes.	Minor	Some solid wastes are dumped to bins for collection that only volume is measured. Therefore, they are converted to mass basis according to the guidelines from Commercial and Industrial (C&I) waste records in Australia.
Exclusion of employees, capital good and infrastructure.	Minor	For this project, the impacts of employees, capital goods and infrastructure are excluded.
End of life recycling rate of Orrcon Steel products	Minor	An 87% recycling rate is assumed at end of life according to National Waste Report 2022 (DCCEEW). This is a conservative estimate for flat steel construction products but was used in the absence of verified higher recycling rates.

Compliance with Standards:

The methodology and report format has been modified to comply with:

- ISO 14040:2006+A1:2020 and ISO14044:2006+A2:2020 which describe the principles, framework, requirements and provides guidelines for life cycle assessment (LCA).
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations -- Principles and procedures, which establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations.

- EN 15804:2012+A1:2013; Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN 15804:2012+A2:2019; Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- Product Category Rules (PCR) 2019:14, v1.3.4 – Construction products – Hereafter referred to as PCR 2019:14.
- General Programme Instructions (GPI) for the International EPD System v4.0 – containing instructions regarding methodology and the content that must be included in EPDs registered under the International EPD System.
- Instructions of EPD Australasia V4.2 – a regional annex to the general programme instructions of the International EPD System.

Environmental Performance Related Information:

The potential environmental impacts, use of resources and waste categories included in this EPD were calculated using the SimaPro v10.1 tool. The characterisation factors are based on version 3.1 of the EN 15804+A2 package for the Product Environmental Footprint (PEF) framework (EF 3.1). The impact results of the biogenic carbon and energy resource use are coherent with the guidance and requirement in Annex 2 and Annex 3 - Option A of PCR 2019:14.

All tables from this point will contain the abbreviation only. 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.

Life Cycle Impact, Resource and Waste Assessment Categories, Measurements and Methods

Impact Category	Abbreviation	Measurement Unit	Assessment Method and Implementation
Potential Environmental Impacts			
Total global warming potential	GWP - Total	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Global warming potential (fossil)	GWP - Fossil	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Global warming potential (biogenic)	GWP - Biogenic	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Land use/ land transformation	GWP - Luluc	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Ozone depletion potential	ODP	kg CFC 11 equivalents	Steady-state ODPs, WMO 2014
Acidification potential	AP	mol H^+ eq.	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008
Eutrophication – aquatic freshwater	EP - freshwater	kg P equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication – aquatic marine	EP - marine	kg N equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication – terrestrial	EP – terrestrial	mol N equivalent	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.
Photochemical ozone creation potential	POCP	kg NMVOC equivalents	LOTOS-EUROS, Van Zelm et al., 2008, as applied in ReCiPe
Abiotic depletion potential (elements)*	ADPE	kg Sb equivalents	CML 2002 (v4.8)

Abiotic depletion potential (fossil fuels)*	ADPF	MJ net calorific value	CML 2002 (v4.8)
Water Depletion Potential*	WDP	m^3 equivalent deprived	Available Water Remaining (AWARE) Boulay et al., 2016 (includes Australia flows calculated using 36 Australian catchments)
**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.*			
Resource use			
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value	Manual for direct inputs [1]
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value	Manual for direct inputs[2]
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value	ecoinvent version 3.8 and expanded by PRé Consultants[3]
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ, net calorific value	Manual for direct inputs[4]
Use of non- renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value	Manual for direct inputs[5]
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ, net calorific value	ecoinvent version 3.108 and expanded by PRé Consultants[6]
Use of secondary material	SM	kg	Manual for direct inputs
Use of renewable secondary fuels	RSF	MJ, net calorific value	Manual for direct inputs
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value	Manual for direct inputs
Use of net fresh water	FW	m^3	ReCiPe 2016
Waste categories			
Hazardous waste disposed	HWD	kg	EDIP 2003 (v1.05)
Non-hazardous waste disposed	NHWD	kg	EDIP 2003 (v1.05) [7]
Radioactive waste disposed/stored	RWD	kg	EDIP 2003 (v1.05)
Output flow categories			
Components for re-use	CRU	kg	Manual for direct inputs
Material for recycling	MFR	kg	Manual for direct inputs

1 PERE = PERT - PERM
2 Calculated based on the lower heating value of renewable raw materials. LHV is taken from https://phyllis.nl/, as recommended by SimaPro in compliance with EN15804+A2: https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro
3 Calculated as sum of renewables, biomass; renewable, wind, solar and geothermal, and renewable, water.
4 PENRE = PENRT - PENRM
5 Calculated based on the lower heating value (LHV) of non-renewable raw materials. LHV is taken from https://phyllis.nl/, as recommended by SimaPro in compliance with EN15804+A2: https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro
6 Calculated as sum of non-renewables, fossil and non-renewable, nuclear.
7 Calculated as sum of Bulk waste and Slags/ash.

Materials for energy recovery	MERE	kg	Manual for direct inputs
Exported energy - electricity	EE - e	MJ per energy carrier	Manual for direct inputs
Exported energy – thermal	EE – t	MJ per energy carrier	Manual for direct inputs
Additional environmental impact indicators			
Global warming potential, excluding biogenic uptake, emissions and storage	GWP-GHG	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021[8]
Particulate matter	Potential incidence of disease due to PM emissions (PM)	Disease incidence	SETAC-UNEP, Fantke et al. 2016
Ionising radiation - human health**	Potential Human exposure efficiency relative to U235 (IRP)	kBq U-235 eq	Human Health Effect model
Eco-toxicity (freshwater)*	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	USEtox
Human toxicity potential - cancer effects*	Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	USEtox
Human toxicity potential - non cancer effects*	Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	USEtox
Soil quality*	Potential soil quality index (SQP)	dimensionless	Soil quality index (LANCA®)
**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.*			
Potential Environmental Impacts – Indicators According to EN 15804+A1			
Global warming (GWP100a)	GWP	kg CO_2 equivalents	CML (v4.02) based on IPCC AR4
Ozone layer depletion	ODP	kg CFC-11 equivalents	CML (v4.02) based on WMO 1999
Acidification	AP	kg SO_2 equivalents	CML (v4.02)
Eutrophication	EP	kg PO_4^{3-} equivalents	CML (v4.02)
Photochemical oxidation	POCP	kg C_2H_4 equivalents	CML (v4.02)
Abiotic depletion	ADPE	kg Sb equivalents	CML (v4.02)
Abiotic depletion (fossil fuels)	ADPF	MJ, net calorific value	CML (v4.02)

Content Information

8 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 CO_2 is set to zero.

Cradle to Gate (Modules A1-A3)

Modules A1 – A3 covers the extraction and transport of raw materials, and the production stage of Orrcon Steel products.

Orrcon Steel products primarily use cold-rolled, hot-rolled, and galvanized steel from BlueScope, supplemented welding and coating materials including aluminium wire, zinc wire, zinc balls, and passivation. Additional materials such as coolant & corrosion preventative, and paints are sometimes applied to meet product quality requirements. Finished products are packaged and marked with steel strapping, strap seals, product tag, thermal ink ribbon, and R-clip.

Orrcon Steel products are manufactured in Unanderra (UNA) at New South Wales, Salisbury (SAL) at Queensland, and O'Sullivan Beach (OSB) at South Australia. Electricity was modelled using the state-based residual electricity mixes developed by AusLCI for New South Wales, Queensland and South Australia.

- New South Wales: black coal (69%), photovoltaic (12%), and other sources (19%) with emission of 8.55E-01 kg CO2 eq./kWh (GWP-GHG).
- Queensland: black coal (71%), photovoltaic (13%), natural gas (10%), and other sources (6%) with emission of 9.29E-01 kg CO2 eq./kWh (GWP-GHG).
- South Australia: wind power (34%), natural gas (31%), photovoltaic (24%), and other sources (11%) with emission of 1.60E-01 kg CO2 eq./kWh (GWP-GHG).

Mass and energy data, including production volume related data was collected through Orrcon Steel's data management system for individual products for the assessment period. Energy and utilities used, as well as waste generated during production were allocated to individual products using the mass allocation method, based on production volumes of each product variant. This average was weighted according to the production volumes of the included product groups.

Content Declaration: For 1 tonne Orrcon Steel Manufacturing Steel Tube and Pipe.

Product components	**Weight (kg)**	**Post-consumer material, weight-%**	**Biogenic material, weight-%**	**Biogenic material, kg C/kg**
Steel	994.6	0%*	0%	0
Welding Wire (Zinc & Aluminium)	0.2	0%	0%	0
Others	5.3	0%	0%	0
Total	1 000	0%	0%	0
Packaging materials	**Weight-% (versus the product)**	**Post-consumer material, weight-%**	**Weight biogenic carbon, kg C/kg**	
Steel strapping	0.12% - 0.31%	0%	0	
Strap Seals	0.01% - 0.03%	0%	0	
Others	< 0.01%	0%	0	
Total	0.13% - 0.34%	0%	0	

* Orrcon Steel Manufacturing sources BlueScope steel as its raw material. The average recycled content across the range of steel products manufactured by BlueScope in Australia is 17.4%, accounting for both pre- and post-consumer materials. However, in line with EPD rules, only post-consumer recycled content should be reported. Therefore, a conservative value of 0% is reported for Orrcon Steel Manufacturing, as it is dependent on the supplier BlueScope.

Additional information on the release of dangerous substances to indoor air, soil and water:

The products are highly inert and are used predominantly in outdoor applications. They do not release any dangerous substances to indoor air, soil, or water.

None of the products contain one or more substances that are listed in the “Candidate List of Substances of Very High Concern for authorisation”. Based on available information and safety data sheet, Orrcon Steel Manufacturing are not classified as hazardous according to safe work Australia criteria and no signal of hazard or precautionary statements have been allocated according to the GHS classification.

Deconstruction and End of Life (Modules C1 – C4)

At end-of-life, products are removed, transported to waste processing, and recycled and/or landfilled. Due to limited data availability around the end-of-life fate for Orrcon Steel’s products, the cradle to grave environmental profile was based on the most common scenario that 87% of steel product is recycled, aligning to National Waste Report 2022 (DCCEEW), while the rest is diverted to landfill. The following assumptions have been used in this study to model deconstruction and end of life scenarios of the Orrcon Steel products:

- Deconstruction is by an excavator is used to deconstruct steel products. This is standard industry practice and is in line with assumptions made in other steel coil EPDs.

- 25km transport distance to end-of-life treatment facilities. Due to the lack of published data related to average distances to landfill in across Australia, 25km has been considered a conservative approach.

Benefits and loads beyond the system boundary (Module D)

The information in module D may contain technical information as well as LCA results from post-consumer recycling, i.e., environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g., as secondary materials or fuels. Avoided impacts from co-products from module A to C shall not be included in Module D.

Orrcon Steel production relies on EPDs published by BlueScope, which report a 17.4% use of secondary materials (SM), including both pre- and post-consumer recycled content. Consequently, this portion of steel is excluded from the benefits beyond the system boundary as the worst case to maintain mass balance.

Results of the environmental performance indicators

The interpretation of results is presented in the following sections. Note that the use of results of modules A1-A3 without considering the results of module C may mislead the communication and decision-making. 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.

Mandatory impact category indicators according to EN 15804

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2.19E+03	6.85E-01	3.86E+00	1.83E+02	5.44E-01	-6.47E+02
GWP-biogenic	kg CO_2 eq.	8.99E-01	2.92E-05	1.73E-04	2.71E-01	1.60E-04	-7.82E-01
GWP-luluc	kg CO_2 eq.	1.09E+00	2.41E-05	1.13E-04	6.12E-01	3.36E-04	-1.28E-02
GWP-total	kg CO_2 eq.	2.19E+03	6.85E-01	3.86E+00	1.84E+02	5.44E-01	-6.48E+02
ODP	kg CFC 11 eq.	5.60E-07	1.02E-08	5.17E-08	7.56E-07	7.41E-09	-9.06E-07
AP	mol H^+ eq.	7.72E+00	6.45E-03	1.05E-02	1.09E+00	4.93E-03	-2.16E+00
EP-freshwater	kg P eq.	2.06E-03	6.21E-07	9.55E-06	7.76E-04	4.61E-07	6.93E-02
EP-marine	kg N eq.	1.70E+00	3.03E-03	3.80E-03	1.71E-01	2.15E-03	-2.90E-01
EP-terrestrial	mol N eq.	1.91E+01	3.32E-02	4.18E-02	1.84E+00	2.36E-02	-5.86E+00
POCP	kg NMVOC eq.	5.78E+00	9.83E-03	1.56E-02	5.41E-01	6.98E-03	-1.72E+00
ADP-minerals&metals*	kg Sb eq.	1.30E-02	2.82E-08	2.29E-07	8.09E-06	1.99E-08	-9.22E-03
ADP-fossil*	MJ	2.07E+04	9.04E+00	5.15E+01	1.36E+03	6.56E+00	-5.21E+03
WDP*	m^3 eq. deprived	1.30E+02	1.21E-02	7.25E-02	4.31E+01	2.70E-02	2.07E+02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

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

Additional mandatory and voluntary impact category indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[9]	kg CO_2 eq.	2.19E+03	6.85E-01	3.86E+00	1.84E+02	5.44E-01	-6.46E+02
Particulate matter	disease incidence	1.02E-04	1.85E-07	2.57E-07	9.49E-06	1.31E-07	-4.42E-05
Ionising radiation - human health**	kBq U-235 eq	4.77E+00	6.90E-04	3.57E-03	5.57E-01	5.56E-04	3.80E+00
Ecotoxicity - freshwater*	CTUe	3.45E+03	3.28E-01	3.38E+00	1.48E+02	2.35E-01	-2.86E+04
Human toxicity potential - cancer effects*	CTUh	3.04E-07	3.69E-11	2.70E-10	8.64E-08	3.63E-11	-1.04E-04
Human toxicity potential - non cancer effects*	CTUh	4.26E-05	6.75E-10	2.55E-08	5.73E-07	7.04E-10	4.73E-05
Soil quality*	Pt	1.45E+03	1.74E-02	2.11E-01	4.12E+02	2.25E-01	-1.67E+03

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Resource use indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5.28E+02	1.70E-02	8.39E-02	2.51E+02	1.40E-01	-7.49E+02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.28E+02	1.70E-02	8.39E-02	2.51E+02	1.40E-01	-7.49E+02
PENRE	MJ	2.07E+04	9.04E+00	5.15E+01	1.36E+03	6.56E+00	-5.21E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.07E+04	9.04E+00	5.15E+01	1.36E+03	6.56E+00	-5.21E+03
SM	kg	1.55E+02	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

[9] 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 CO_2 is set to zero.

NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.65E+00	2.92E-04	1.73E-03	8.78E-01	5.62E-04	3.95E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	5.25E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	9.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed	kg	3.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.83E+02	0.00E+00	0.00E+00	8.70E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EN 15804+A1

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP (A1)	kg CO2 eq	2.13E+03	6.85E-01	3.86E+00	1.84E+02	5.44E-01	-6.47E+02
ODP (A1)	kg CFC-11 eq	4.54E-07	8.09E-09	4.08E-08	6.12E-07	5.86E-09	-1.05E-06
AP (A1)	kg SO2 eq	6.04E+00	4.52E-03	7.84E-03	2.79E-01	3.19E-03	-1.71E+00
EP (A1)	kg PO4--- eq	6.16E-01	1.02E-03	1.36E-03	6.29E-02	7.28E-04	1.21E-01
POCP (A1)	kg C2H4 eq	9.59E-01	1.15E-04	4.63E-04	7.75E-03	8.05E-05	-3.81E-01
ADPE (A1)	kg Sb eq	1.30E-02	2.82E-08	2.29E-07	8.09E-06	1.99E-08	-9.22E-03
ADPF (A1)	MJ	2.02E+04	0.00E+00	0.00E+00	1.51E+03	8.11E-01	0.00E+00

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