



# Delithiated beta-spodumene (DBS) Independently Verified Product Carbon Footprint (PCF) Full Report

22 May 2026

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# Document overview

This Product Carbon Footprint (PCF) report provides a transparent and verified account of the greenhouse gas (GHG) emissions associated with Delithiated beta-spodumene (DBS).

This report has been prepared by the declaration owner using primary and secondary data. The report conforms to international standard ISO 14067 and it is compiled using a range of high quality data sources. The results of this report has been reviewed by a suitably qualified Rebuilt LCA professional and verified in accordance to ISO 14064-3. This report demonstrates the declaration owner's commitment to transparency, sustainability excellence and continuous improvement.

Users of this PCF are responsible for evaluating the applicability of the data for their intended purposes.

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## Benefits of using this Product Carbon Footprint

This document can be used to:

- Inform your customers about the embodied emissions in your products
- Meet procurement and tender requirements
- Identify hot spots and opportunities for making improvements in carbon intensity over time
- Input into mandatory corporate carbon disclosure reporting.

## PCFs and EPDs: making comparisons

Product Carbon Footprints (PCFs) and Environmental Product Declarations (EPDs) are both based on ISO 14044 Life Cycle Assessment methodology.

The key distinction is scope:

- An EPD reports multiple environmental impact categories.
- A PCF reports greenhouse gas emissions only.

Because both apply the same methodological backbone, carbon results are technically interoperable when:

- The same lifecycle modules are included
- The same Product Category Rules are applied
- Functional performance are similar

Users should refer to the declared system boundary in this report before undertaking comparisons.

# Results at a glance

## Delithiated beta-spodumene (DBS)

Cement Australia

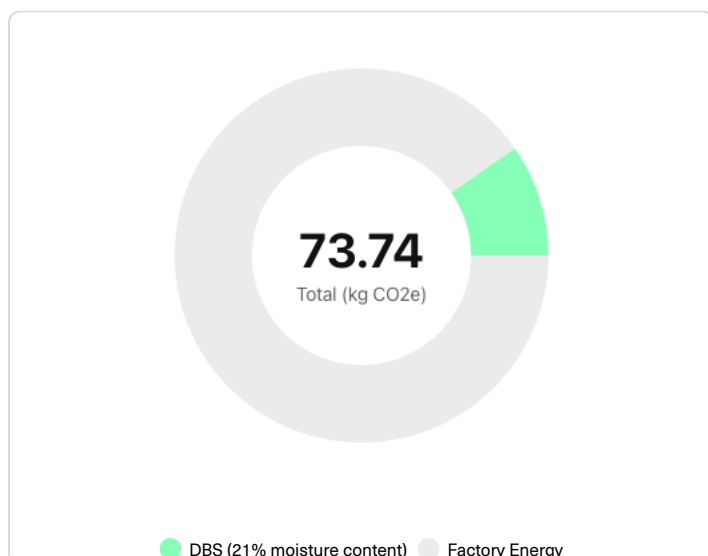
Total upfront carbon (Fossil)  
(A1-A3)

**73.74**

Carbon Footprint  
kg CO<sub>2</sub>e /tonne

## Carbon impact (Fossil)

Relative carbon impact of the components of the product



Component name	Weight (kg)	kg CO <sub>2</sub> e	% of total kg CO <sub>2</sub> e
DBS (21% moisture content)	1,000.00	7.14	9.69
Factory Energy	0.00	66.59	90.31
	Total (kg)	Total (kg CO <sub>2</sub> e)	
	1,000.00	73.74	

## Carbon intensity by life cycle stage

Carbon impact from raw materials (A1), transport to factory (A2), and production activities (A3)

Type	A1 (kgCO <sub>2</sub> e)	A2 (kgCO <sub>2</sub> e)	A3 (kgCO <sub>2</sub> e)
Fossil	7.00	0.14	66.59
Biogenic	0.00	0.00	0.00
Luluc	0.00	0.00	0.00
	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)
	7.00	0.14	66.59

# Report information

Current version	Version 1
Publication date	May 22, 2026
Valid until	May 22, 2031
Independently verified	Declaration owner generated report Reviewed and verified by Rebuilt
Verifier contact	www.rebuilt.eco verified@rebuilt.eco
Geographic scope	This claim covers production in Australia
Goal of study	Identification of Hotspots
Intended users	Architect / Engineer / Specifier
Data collection period	1 May 2026 - 30 April 2027
Standards compliance	ISO 14040, ISO 14044, ISO 14064-3, ISO 14067, ISO 14071
Product Category Rules (PCR)	EN 15804+A2:2019

## Verification and Assurance

This Product Carbon Footprint has undergone:

- Automated validation checks for completeness and reasonableness
- Data Quality Healthcheck assessment
- Independent review by a qualified Life Cycle Assessment practitioner
- Risk-based assessment where material risks or outlier results were identified
- Verification aligned with ISO 14064-3

Verification constitutes limited assurance appropriate to carbon-only disclosure.

All documentary evidence provided by the declaration owner has been assessed and evaluated against EN 15804+A2 and PACT Framework v3 data quality requirements. Supporting documentation is retained and available upon request for audit or regulatory review.

This PCF report has been created and verified in accordance with:



## Declaration owner

Declaration owner	Cement Australia
Company description	Rebuilt Demo Account
Company location	Naval Base, Australia
Manufacturing facility	DBS Dryer (21% moisture content)
Manufacturing location	Naval Base, Australia

This document confirms that the Product Carbon Footprint presented in this report has been prepared and verified in accordance with recognised international standards for Life Cycle Assessment and carbon footprinting methodologies.

### The assessment:

- Applies the principles and framework of ISO 14040 and ISO 14044
- Quantifies greenhouse gas emissions in accordance with ISO 14067
- Follows Product Category Rules EN 15804+A2:2019 where applicable
- Has been reviewed and verified in accordance with ISO 14064-3

The results represent the global warming potential (GWP) of the product for the lifecycle stages specified within this report. It does not constitute a multi-impact Environmental Product Declaration under ISO 14025.

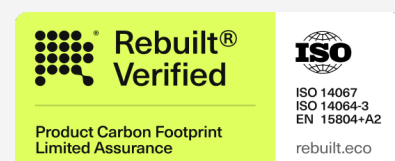
Where lifecycle modules, Product Category Rules and system boundaries are equivalent, the GWP results disclosed in this report are methodologically aligned with those presented in Environmental Product Declarations.

Verification has been conducted by a qualified Life Cycle Assessment practitioner. The verification process includes review of documentary evidence, assessment of data quality and consistency, and evaluation of methodological conformance.

The level of assurance provided is limited assurance appropriate to carbon-only disclosure.

Supporting documentation and evidence are retained and may be made available for audit or regulatory review upon request.

Based on the provided evidence and data input by the declaration owner, the PCF has been reviewed to meet the requirements of ISO 14067:2018 and we conclude that no evidence of non-conformance was observed during the review process, hence the PCF meets a limited level of assurance.



# Product information



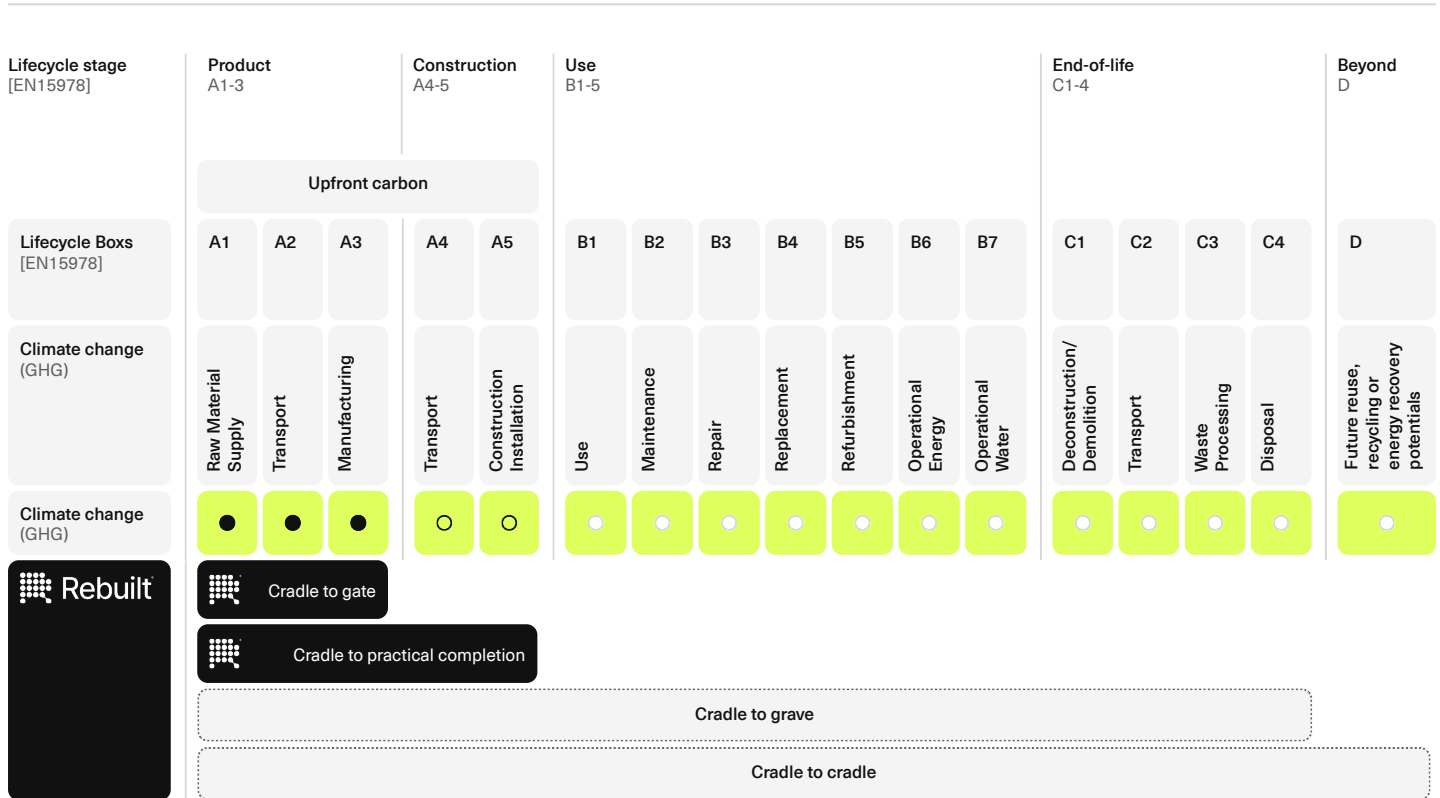
Product name	Delithiated beta-spodumene (DBS)
SKU	-
Description	<p>This is a prospective PCF for Cement Australia's new product - Delithiated beta-spodumene (DBS). The calculation is based on energy estimation required to dry the by-product from lithium hydroxide production in a rotary dryer.</p> <p>The PCF will be updated once production is in full force and 12-month continuous production data is available. As this is a prospective PCF, it is valid for 1 year from the publish date.</p> <p>DBS is the leach residue byproduct produced after lithium refining. The material is predominately aluminosilicates and is featured in AS3582.4:2022 Supplementary cementitious material: Manufactured Pozzolans.</p> <p>Cement Australia's Naval Base production facility receives wet DBS from the Kwinana Lithium Refinery which is then dried, stored and dispatched as a supplementary cementitious material to partially replace General Purpose (GP) Cement in a broad range of concrete and mortar applications.</p>
Net weight (kg) per declared unit	1,000.00
Declared unit	1 tonne
	For the purposes of this report, declared unit is taken to be an individual unit as sold.
Recycled content	100%
ANZSIC	2031
UNICLASS code	Pr_20_31_12_13

# Technical information

## Report boundary

This declaration shows the global warming potential (GWP) of the greenhouse gases embodied in this product, expressed in kilograms of carbon dioxide and equivalent gasses with global warming potential (kgCO<sub>2</sub>-e) and is based on the results of a pre-verified LCA performed in accordance with ISO14067 process and procedure as well as ISO14025 and nominated PCR EN15804.

NOTE: This declaration is limited to the life cycle stages shown in the table below.



### A1 - Raw Material Extraction

The raw materials stage also called background or upstream covers the extraction and production of the raw materials needed to manufacture the product. It includes the processing of the extracted raw material to the point where it can be made into a recognisable part.

### A2 - Transport Raw Material to Factory

This stage outlines the calculation of CO<sub>2</sub> emissions (Stage A2) for transporting raw materials to the factory. It considers transport modes, distances travelled, and material weights to calculate emissions.

### A3 - Manufacturing

Converting raw materials into parts and made into the final product. It considers energy usage, packaging, process emissions and production waste.

### A4 - Transport to Site

Not reported as part of this scope

### A5 - Construction & Installation

Not reported as part of this scope

### B - Use Phase

Not reported as part of this scope

### C - End of Life

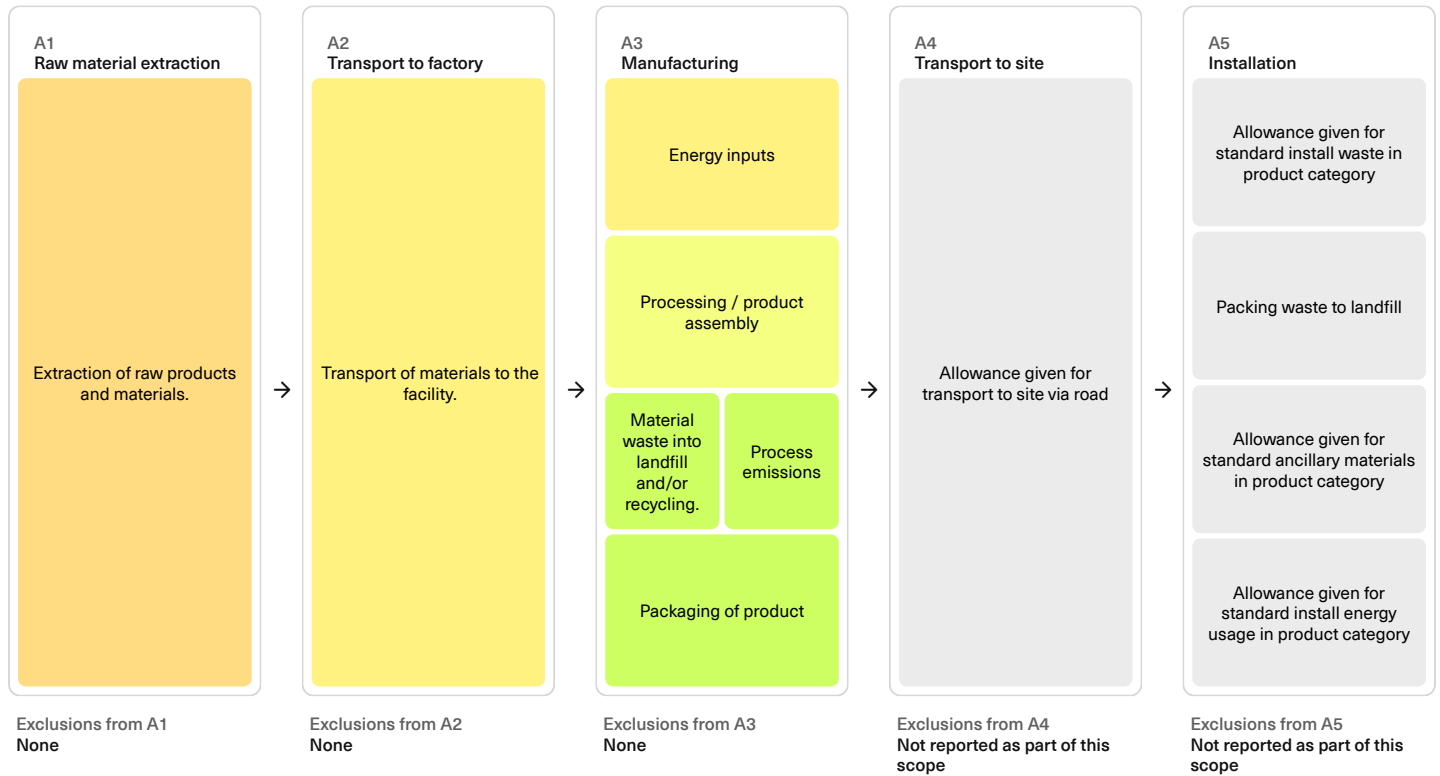
Not reported as part of this scope

### D - Beyond

Not reported as part of this scope

# Technical information (continued)

## Process flow diagram



## Cut-off criteria

Individual processes may be excluded if their contributions to the total system's environmental impact are less than 1%. The aggregate cut-off criteria of this PCF follows PCR 2019:14 guideline where a minimum of 95% of total input (mass and energy) for each life cycle stage are included. Exclusions from the PCF is outlined in "Data Assumptions, Choices and Limitations".

The use stage is excluded from the study due to the uncertainty related to the multiple possible applications of the products assessed.

The following processes were left out of the system boundaries, in conformity to usual practices in carbon footprinting: labor, commuting of workers and administrative work.

## Allocation procedures

The allocation method for this PCF is based on a physical (mass) basis. The energy used by the product is allocated by normalising the total energy used in the factory to the total mass of the product to the total production mass output from the same factory.

## Intended use of this PCF

This declaration is suitable for use in:

- NABERS Embodied Carbon Rating
- Green Star Responsible Products and Upfront Carbon credits
- Scope 3 reporting
- Australian Sustainability Reporting Standards (ASRS) contexts
- Government procurement sustainability requirements

Where a contract explicitly requires a Type III Environmental Product Declaration under ISO 14025, a full EPD may be required.

# Results

Total upfront carbon (Fossil)  
(A1-A3)

**73.74**

Carbon Footprint  
kg CO<sub>2</sub>e /tonne

## Carbon intensity by life cycle stage

Type	A1 (kgCO <sub>2</sub> e)	A2 (kgCO <sub>2</sub> e)	A3 (kgCO <sub>2</sub> e)
Fossil	7.00	0.14	66.59
Biogenic	0.00	0.00	0.00
Luluc	0.00	0.00	0.00
	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)
	7.00	0.14	66.59

## Carbon intensity by raw material

Material	GWP Fossil (kgCO <sub>2</sub> e)	GWP Biogenic (kgCO <sub>2</sub> e)	GWP Luluc (kgCO <sub>2</sub> e)	GWP Total (kgCO <sub>2</sub> e)
DBS (21% moisture content)	7.00	0.00	0.00	7.00
	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)
	7.00	0.00	0.00	7.00

## Carbon intensity by transport type

Material	Transport mode	GWP Fossil (kgCO <sub>2</sub> e)	GWP Biogenic (kgCO <sub>2</sub> e)	GWP Luluc (kgCO <sub>2</sub> e)	GWP Total (kgCO <sub>2</sub> e)
DBS (21% moisture content)	By road, diesel truck, 28t, Fleet Average	0.14	0.00	0.00	0.14
		Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)
		0.14	0.00	0.00	0.14

## Carbon intensity by energy source

Energy type	GWP Fossil (kgCO <sub>2</sub> e)	GWP Biogenic (kgCO <sub>2</sub> e)	GWP Luluc (kgCO <sub>2</sub> e)	GWP Total (kgCO <sub>2</sub> e)
Natural gas from grid	60.47	0.00	0.00	60.47
Purchased from grid (low voltage)	6.13	0.00	0.00	6.13
	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)	Total (kgCO <sub>2</sub> e)
	66.59	0.00	0.00	66.59

## Results (Continue)

### Carbon intensity by packaging material

Material	GWP Fossil (kgCO2e)	GWP Biogenic (kgCO2e)	GWP Luluc (kgCO2e)	GWP Total (kgCO2e)
	Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)
	0.00	0.00	0.00	0.00

### Carbon intensity by process emissions

Material	GWP Fossil (kgCO2e)	GWP Biogenic (kgCO2e)	GWP Luluc (kgCO2e)	GWP Total (kgCO2e)
	Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)
	0.00	0.00	0.00	0.00

### Carbon intensity by waste treatment

Material	Waste treatment type	GWP Fossil (kgCO2e)	GWP Biogenic (kgCO2e)	GWP Luluc (kgCO2e)	GWP Total (kgCO2e)
DBS (21% moisture content)	N/A	0.00	0.00	0.00	0.00
		Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)	Total (kgCO2e)
		0.00	0.00	0.00	0.00

# References

- ISO 14040:2006+A1:2020 - Environmental management - Life cycle assessment - Principles and framework
- ISO 14044:2006+A2:2020 - Environmental management - Life cycle assessment - Requirements and guidelines
- ISO 14067:2018 (First Edition) - Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification
- EN 15804:2012+A2:2019 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- Australian National Life Cycle Inventory Database (AusLCI) version 1.42 (May 2023)
- ecoinvent database v3.11 (November 2024)
- Australian National Greenhouse Accounts Factors 2024