



# ViroDecs™ Aggregates

## Holcim Australia Aggregates

### Environmental Product Declaration

In accordance with ISO 14025 and EN 15804+A1

Programme: The International EPD® System | [www.environdec.com](http://www.environdec.com)

Programme operator: EPD Australasia Limited | [www.epd-australasia.com](http://www.epd-australasia.com)

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Version	Revision Date	Description of Changes
2.0	11 May 2023	Environmental impact results have been updated following a correction to the calculation formulas, resulting in an increase to the overall environmental impact of the products. Recycled aggregate products have been removed from this EPD.



# Introduction

All around the world, the expectation for Governments and organisations to provide enhanced transparency and disclosure of environmental impacts, such as greenhouse gas (GHG) emissions, has been growing. This follows the landmark COP 21 Paris Agreement in 2015 in which all nations agreed to ambitiously pursue efforts to combat climate change and its effects.

At the same time, the global demand for construction materials is also growing due to worldwide population growth and an increase in urbanisation.

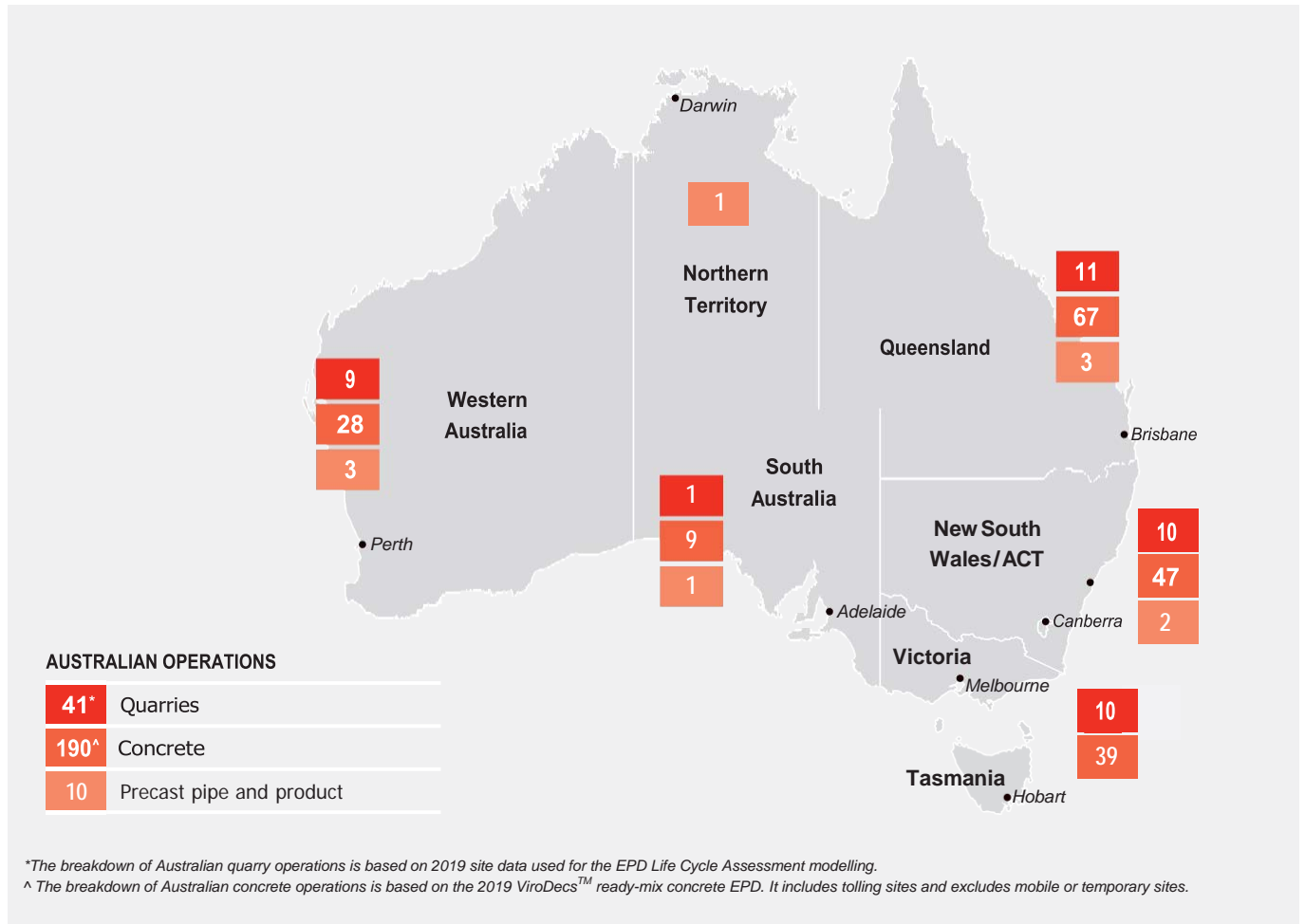
This clearly demonstrates both the essential need for construction materials now and in the future, as well as the necessity for the construction materials industry to be a leading part of the solution addressing climate change.

At Holcim, we recognise our responsibility to contribute to global emissions reduction targets and we have developed a roadmap with a number of actions to direct our efforts.

Our ViroDecs™ range of aggregates represented by an Environmental Product Declaration (EPD) is one such initiative for Holcim in Australia.



# About Holcim



## About Holcim

Holcim Australia is a leading supplier of construction materials in Australia, dating back to 1901. Today Holcim continues to supply essential construction materials including aggregates, sand, ready-mix concrete, engineered precast concrete and prestressed concrete solutions to a range of customers and projects throughout Australia.

Holcim operates right across the Australian continent supplying concrete from a network of concrete plants, quarries, precast and concrete pipe places, and mobile and on-site project facilities.

Sustainability is at the core of our global strategy, with our industry's first 2050 net-zero targets, endorsed by the Science Based Targets initiative (SBTi).

Globally, Holcim is 60,000 people around the world who are passionate about building progress for people and the planet through four business segments: Cement, Ready-Mix Concrete, Aggregates and Solutions & Products.

Holcim builds progress for people and the planet. As a global leader in innovative and sustainable building solutions, Holcim is enabling greener cities, smarter infrastructure and improving living standards around the world. With sustainability at the core of its strategy Holcim is becoming a net zero company, with its people and communities at the heart of its success. The company is driving circular construction as a world leader in recycling to build more with less.



# Holcim ViroDecs™ Aggregates – a first for raw aggregates in Australia

## ViroDecs™ Aggregates at a glance

The Holcim ViroDecs™ Aggregates initiative for Environmental Product Declarations (EPDs) constitutes a major investment in comprehensively analysing and communicating to customers the embodied environmental impacts of Holcim's products.

Data collected from across Holcim's Australian operations, including 41 quarries, was fed into an ISO14044-compliant Life Cycle Assessment (LCA) model by specialist practitioners to generate an Environmental Product Declaration (EPD) to ISO 14025 and EN 15804, which have been independently reviewed by an approved, third-party verifier.

The development of a raw aggregates EPD is a "missing" piece to having all key infrastructure and building materials represented by an EPD in Australia. Its publication will support our customers to drive improved sustainable procurement and materials selection. Holcim's ViroDecs™ also have the potential to challenge common beliefs of environmental sustainability, by supporting the standardisation and transparency of environmental claims.

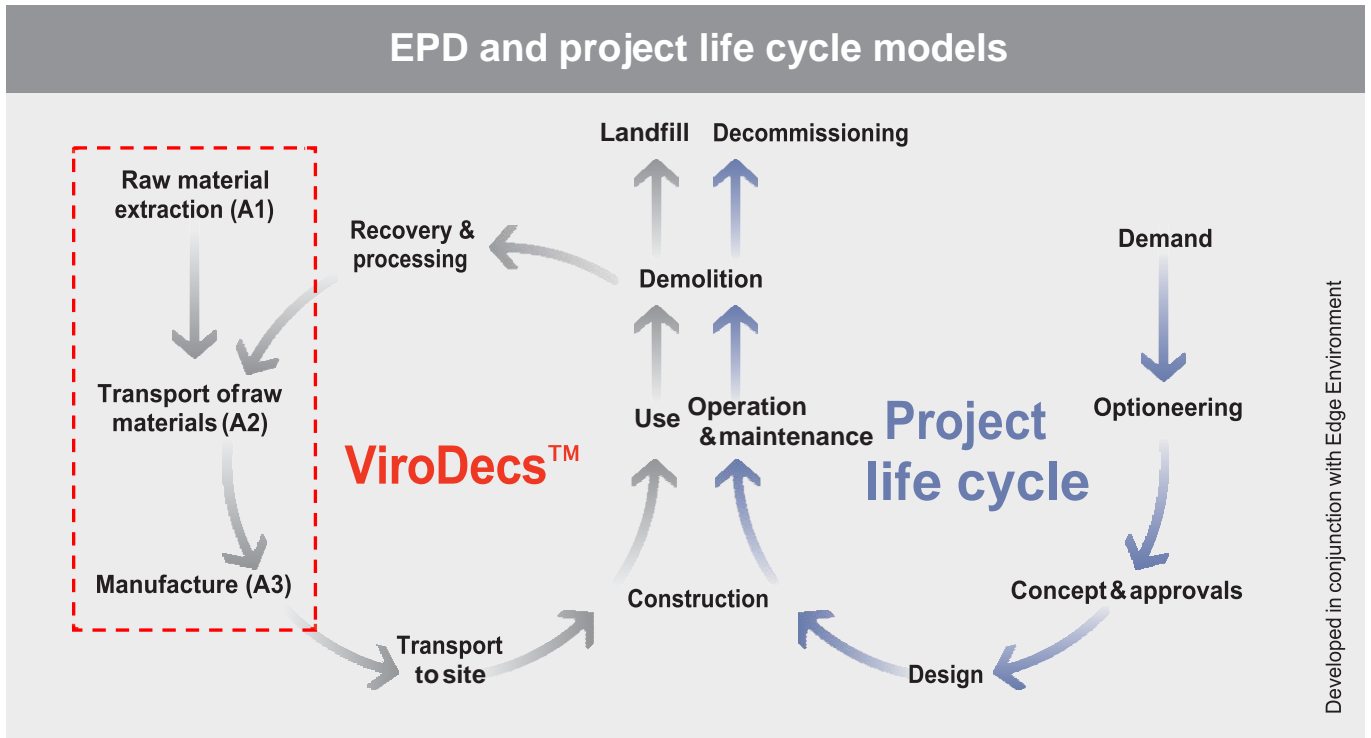
Holcim's ViroDecs™ will help shape the way the construction industry analyses the environmental impact of buildings and infrastructure now and in the future. Advancing from generic environmental information to product, company and geographically-specific information will allow for deeper, broader and more customised analysis with greater confidence in the results.

Beyond providing greater transparency, Holcim's ViroDecs™ also provide a rigorous, science-based framework for driving environmental improvement throughout Holcim's sites and supply chains.

As a result, Holcim's ViroDecs™ will offer an advantage to customers wanting to be leaders in the sustainable infrastructure and building industry. Holcim hopes it will lead the way for other providers to follow suit, fostering a whole-of-life approach in the Australian construction materials industry.



# Why have we developed this EPD?



Note: ViroDecs™ Aggregates EPD only covers EPD lifecycle stages A1 to A3

One significant means of providing transparency at the product level is the publication of Environmental Product Declarations.

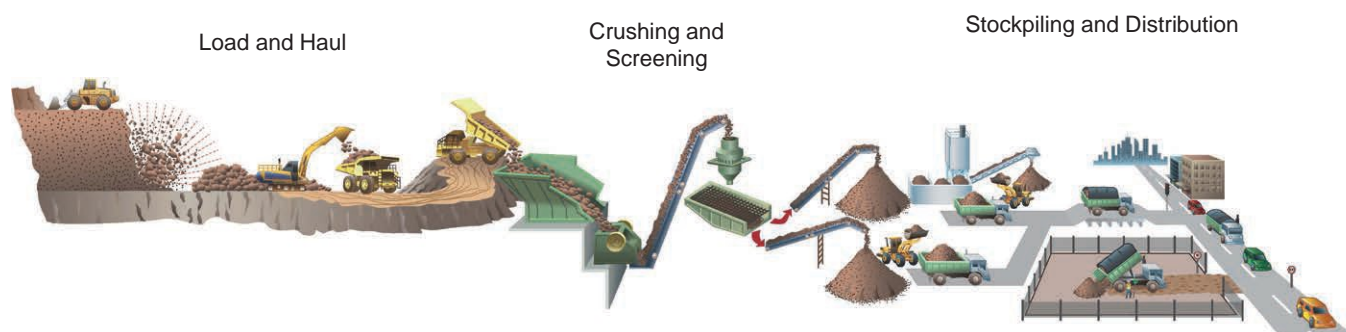
In simple terms, an EPD is a comprehensive disclosure of a product's environmental impacts. An EPD can cover the different stages of a product's life cycle, from its creation and use to disposal, as well as other relevant information in accordance with recognised international standards.

The ViroDecs™ Aggregates EPD covers EPD lifecycle stages from raw material extraction (Stage A1), through to manufacturing of the aggregates (Stage A3).

EPDs provide credible transparency because they rely on an objective, scientifically accepted approach, defined in international and European standards, and are third party verified and publicly available.



# Aggregate products



## Summary of aggregate products

In simple terms, Aggregates, generally consisting of crushed stone, gravel, and sand, are mainly used in the construction of roads, rail track beds, the manufacturing of concrete, concrete products, and asphalt. Aggregates are rock fragments extracted from earth deposits as in the case of natural sand and gravel or quarried from hard rock formations. The extracted materials are then processed by crushing, shaping, and screening, including washing where required, into final products. The processed aggregates can be combined with cementitious materials in the manufacturing of concrete or bitumen as a binder in the production of asphalt.

## Concrete aggregates

Concrete aggregates are an integral component of producing quality concrete. These aggregates and subsequent concrete supply support our community in meeting its requirements of roads, housing, commercial and infrastructure needs.

## Asphalt aggregates

The production of high quality asphalt aggregates is a critical component in the production of quality asphalt. Holcim quarrying operations supports its customers in producing quality aggregates throughout each region.

## Roadbase materials

Are an integral part of the construction of road projects including, major infrastructure, road duplications, residential sub-divisions, commercial developments and local councils/shires.

## Armour rock

Weatherproofing and natural barriers need to be created to prevent coastal and river erosion. Armour rock is produced with specific objectives outlined in each specification. The product typically ranges in size from 200mm-1.0m dependent on each specification.

## Rail ballast

Holcim is a leading supplier of rail ballasts in Australia, working closely with customers, consultants and specifies to best suit their needs. Rail ballast is a specifically engineered product designed to support railway sleepers underneath a rail line. The product is produced to a high performance specification.

# Strategy 2025 – “Accelerating Green Growth”



## To Become the Global Leader in Innovative & Sustainable Building Solutions

Sustainability is not new to Holcim. For decades, Holcim has embedded the triple bottom line approach to sustainability with a focus on responsible utilisation of our planet’s natural resources, safety and environmental performance, and social.

Globally Holcim, is reinventing how the world builds for people and the planet. On our way to becoming a net zero company, we are accelerating green construction by joining the net zero pledge with science-based targets.

With “Strategy 2025 – Accelerating Green Growth,” Holcim will become the global leader in innovative and sustainable building solutions.

With “Accelerating Green Growth,” Holcim will achieve growth across all our businesses, fueled by sustainability and innovation. We will accelerate the expansion of our Solutions & Products business to reach 30% of Group sales.

Sustainability is at the core of our global strategy, with our industry’s first 2050 net-zero targets, endorsed by the Science Based Targets initiative (SBTi). Holcim will remain at the forefront of green building solutions, with at least 25% of ready-mix net sales coming from ECOPact, ranging from 30% to 100% lower CO<sub>2</sub> footprint.

Holcim is part of a global response to these challenges through sustainable products and solutions, supported by four fields of action – climate, circular economy, water, and nature – in order to improve quality of life for communities and employees.



# Supporting sustainable construction



## Supporting sustainable construction

The Holcim Foundation for Sustainable Construction was created in 2003 to raise awareness of the important role that architecture, engineering, urban planning and the building industry have in achieving a more sustainable future. It is the mission of the Foundation to select and support initiatives that combine sustainable construction solutions with architectural excellence and enhanced quality of life beyond technical solutions.

Through the non-commercial promotion and development of sustainable construction at national, regional, and global levels, the Holcim Foundation encourages sustainable responses to the technological, environmental, socioeconomic, and cultural issues affecting building and construction. The Foundation is an independent legal entity that is supported by Holcim.

## Holcim Forum

The Holcim Forum is a tri-annual series of conferences on the topic of sustainable construction conducted by the Foundation. The multi-day Forum, including workshops and site visits, is an academic platform for architects, engineers, construction professionals and specialists of all generations to exchange information on creating a sustainable built environment and thus advancing sustainable development.

The Forum supports sustainable construction in the scientific field, among experts in the construction sector, business and society, and promotes interdisciplinary dialogue, brings forward new ideas, and examines potential solutions.



## Holcim Awards for Sustainable Construction

The Flagship of the Foundation is the Holcim Awards for Sustainable Construction. It is a significant worldwide competition for sustainable design. It rewards projects and visionary concepts that go beyond balancing environmental performance, social responsibility, and economic growth, thereby exemplifying architectural excellence and a high degree of transferability.

A total of USD 1 million in prize money is awarded and projects and visionary concepts in the fields of architecture, engineering, urban planning, material and construction technology and related fields are eligible for entry.

# How the EPD can be used in the IS and Green Star rating schemes

The Infrastructure Sustainability (IS) and Green Star rating schemes are the most commonly applied sustainability rating schemes for infrastructure and property assets in Australia, respectively. Both schemes are run by industry bodies the Infrastructure Sustainability Council and the Green Building Council of Australia with strong support from the built environment sector, government and academia.

## The IS rating scheme

The IS rating scheme scores infrastructure assets on a broad range of sustainability areas, from greenhouse gas (GHG) emissions to community health and well-being, for each major project stage. Holcim's ViroDecs™ may help IS registered projects gain points in four key credits:

Credit topic	IS rating – v1.1 and 1.2	IS rating – v2.0	Purpose
Material environmental impacts	Mat-1	Rso-6	To reward the reduction of embodied environmental impacts associated with materials
Environmental labels	Mat-2	Rso-7	To reward the use of materials with environmental labels
Innovation – improving on credit benchmarks	Inn-1	Inn-1	To reward pioneering initiatives in sustainable design, process or advocacy
Innovation – market transformation	Inn-1	Inn-1	To reward pioneering initiatives in sustainable design, process or advocacy

## Green Star

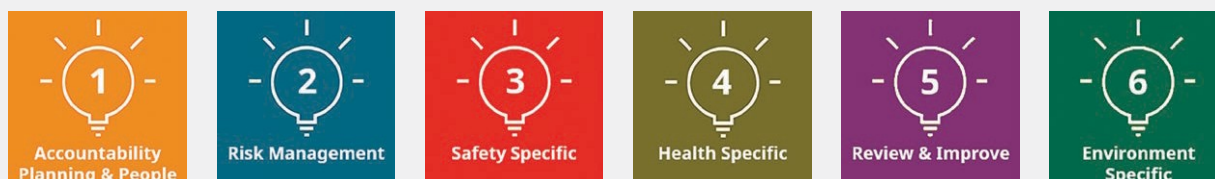
The Green Star rating scheme provides a framework for understanding and communicating the sustainability performance of a property, master plan or building re-fit. Holcim's ViroDecs™ may help Green Star registered projects gain points in three key credits:

Credit topic	Green Star – Design & As Built	Green Star – Buildings	Purpose
Life Cycle Assessment	19A	26	To reward the reduction of life cycle environmental impact
Environmental labels	21C	21	To reward the use of products with environmental labels
Innovation challenge: sustainable sourcing of concrete aggregates	19B.1	-	To reward the sustainable sourcing of concrete aggregates

# Holcim's management systems

## Safety, Health & Environment Management System

### Introduction to the SHEMS



Holcim Australia is committed to providing positive contributions to the community, the environment, and our business by continuously improving environmental performance and focusing on sustainable development.

Holcim's Safety, Health and Environment Management System (SHEM) has been developed in alignment with the fundamental management principles as set out in the following International Standards:

- **AS/NZS 4801:** Occupational Health and Safety Management Systems - Specification with guidance for use
- **AS/NZS 4804:** Occupational Health and Safety Management Systems - General Guidelines on principles, systems and supporting techniques
- **AS/NZS ISO 14001:** Environmental Management Systems - Requirements with guidance for use\*
- **AS/NZS ISO 14004:** Environmental Management Systems - General Guidelines on principles, systems and support techniques.
- **AS/NZS ISO 31000:** Risk management – Principles and guidelines\*

Holcim's SHEM is used to support sites and areas across Holcim Australia and New Zealand to implement, maintain and continually improve an effective Safety, Health and Environment program. The SHEM is an interrelated collection of policies, processes, programs, procedures, accountabilities and activities designed to provide the foundation for successful safety, health and environment management. Holcim sets corporate objectives and targets and undertake regular audits of environmental performance to monitor progress.

\*Note: Holcim's Safety, Health and Environment Management System (SHEM) is not certified to ISO 14001 or ISO 31000 etc.



# LCA information

## Declared unit

1 tonne of aggregate.

## Reference service life (RSL)

The RSL is not specified as the scope is from cradle to gate, and there is a variety of applications of aggregates with different anticipated RSLs.

## Time representativeness

The primary data for the LCA is based on 2019 calendar year production data.

## Databases and LCA software used

SimaPro (v9.1.1.1) was used for the LCA modelling, using background data from:

1. The Australian National Life Cycle Inventory Database (AusLCI) (2019); and
2. ecoinvent 3.6 (2019).

The following impact categories were calculated manually for the foreground data:

- Use of renewable primary energy resources used as raw materials.
- Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials.
- Use of secondary material.
- Use of renewable secondary fuels.
- Use of non-renewable secondary fuels.

## Allocation

Allocation was necessary to proportion inputs and outputs to intermediate flows at the quarry level. As much as possible, intermediate flows were allocated physically based on weight. At the quarry level, whenever physical allocation was not possible, economic allocation was carried out based on Holcim's internal cost system.

Regarding inputs, it was assumed that fly ash is a waste product and therefore burden-free. Please refer to the "Recycled Material" section for further detail.

## Product grouping

A total of 762 products were modelled and grouped according to Holcim's product classification system. A representative product was selected from each product group to represent the group in the LCA results section.

The representative product was selected through the following process:

1. Calculate the median global warming potential (GWP) value for each product group.
2. Identify the product/s with the median GWP value.
3. If the median GWP value corresponds to only one product, that product is selected as the representative product and the process ends.
4. If the median GWP value corresponds to multiple products, the product with the highest value in one or more of the other impact categories was selected and the process ends.
5. If the median does not correlate to a specific product (due to an even dataset) then the product with the next GWP value higher than the median was selected.

## Cut-off criteria

No flows were excluded on the basis of cut-off criteria.

## Data quality

Data quality for the foreground data was assessed in terms of geographic and temporal representativeness. All data sources were scored at medium or higher. Background data sources were also assessed with respect to their timeliness, with all data sources being last updated within the 10 years required under the PCR 2012:01.

Module	Input/outputs	Sub-processes	Data source	Temporal scope	Geographic scope	Quality
A1	Gravel	Electricity	Electricity provider invoices	2019	All states	High
		Diesel Petrol	Supplier invoices	2019	All states	High
		Pollutants	National Pollution Inventory (NPI) data	2019	All states	High
		Explosives (gravel only)	Invoices	2019	All states (excluding the Kalgoorlie Quarry in WA which purchases raw feed from an external source)	High
	Fine aggregate Coarse Aggregate	Modelled data used – selected representative product for results of this LCA study	Holcim Breakdown of Materials (BOM) inventory used for QTY of material blended with aggregates.	2019	All states	High
Cement Cement Flyash Blend Precoat oil	Background data used to model	Holcim Breakdown of Materials (BOM) inventory used for QTY of material blended with aggregates	2019	All states	High	
A2	Internal transport	Diesel	Diesel burned by site vehicles for internal transport within the aggregate site is included in the site resource use data based on supplier invoices	2019	All states	High
	Transport of precoat oil	Background data used to model	Background data includes 'transport to customer'	2019	All states	Medium
	Transport of cementitious materials Transport of explosives	Background data used to model	Conservative assumptions on distance and transport mode as provided by Holcim technical team	2019	All states	Medium
A3	Aggregate production plant	Electricity	Electricity provider invoices	2019	All states	High
		Diesel Petrol	Supplier invoices	2019	All states	High
		Mains water	Water utility invoices	2019	All states	High
		Water – other sources (lakes, groundwater, rainwater)	Estimate based on water balance	2019	All states	Medium
		Water discharge from site	Estimate based on Holcim site performance metrics	2019	All states	Medium
		Solid waste	Waste data reports based on waste service provider invoices	2019	All states	High

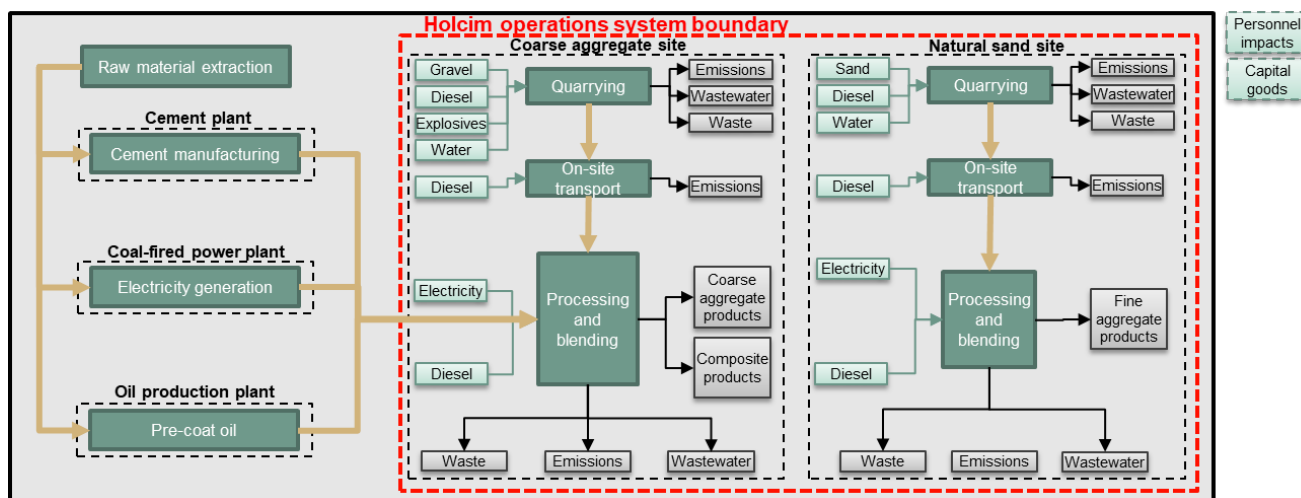
## Assumptions and Limitations

The key assumptions and limitations of the study are summarised in the table below.

Assumption or limitation	Impact on LCA results	Discussion
Use of internal cost of production data to allocate energy inputs	Medium	Cost of production data was assessed to be the most accurate proxy for the physical relationships underlying the processes. Cost of production data is linked to Holcim's cost of production data and is therefore unlikely to have significant errors. Outliers in the results were investigated and determined to be justified based on real differences between sites, such as the different degrees of rock blasting and quarrying activity at each site.
Transport distances assumed or generic for all raw materials barring quarry materials	Low	Conservative assumptions regarding transport distance were made based on country of origin and transport mode information.

## System diagram

The processes included in the LCA are presented in a process diagram in the figure below.





## Description of system boundaries and excluded lifecycle stages

The scope of the LCA and EPD is from cradle to gate. Life cycle stages beyond Holcim’s gate are excluded from the LCA (see figure below).

Environmental impacts relating to personnel, infrastructure and production equipment not directly consumed in the process are excluded from the system boundary as per the Product Category Rules (2012:01 Construction products and construction services).

Product Stage			Construction Stage		Use Stage							End of Life Stage				Benefits & loads for the next product system
Raw Material Supply	Transport	Manufacturing	Transport	Construction/installation process	Use	Maintenance incl. transport	Repair incl. transport	Replacement incl. transport	Refurbishment incl. transport	Operational Energy Use	Operational Water Use	De-construction & demolition	Transport	Re-use recycling	Final Disposal	Reuse, Recovery Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

\* Not declared (ND)

# EPD product description

This EPD covers Holcim's range of aggregates sold in Australia. The following table outlines the product groups covered in this EPD.

Aggregate type	Product Group	Component Products
Fine	Natural Sand	<ul style="list-style-type: none"> <li>Fine sand</li> <li>Mortar sand</li> <li>Coarse sand</li> <li>Fill sand</li> </ul>
	Manufactured Sand	<ul style="list-style-type: none"> <li>Manufactured sand</li> </ul>
	Drainage Filter	<ul style="list-style-type: none"> <li>Drainage filter</li> </ul>
	Dust	<ul style="list-style-type: none"> <li>Dust</li> <li>Asphalt dust</li> </ul>
Coarse	Customer Spec. Roadbase	<ul style="list-style-type: none"> <li>NSW Roads and Maritime Services (RMS) Densely Graded Base (DGB)</li> <li>QLD Transport and Main Roads (TMR) Unbound Pavement (UBP)</li> <li>VicRoads specified aggregate product</li> <li>WA Main Roads Department (MRD) specified aggregate product</li> <li>SA Department for Infrastructure and Transport specified aggregate product</li> </ul>
	Other Roadbase	<ul style="list-style-type: none"> <li>Base material</li> <li>Crusher run</li> <li>Scalps</li> <li>Processed fill</li> <li>Subbase material</li> </ul>
	Recycled Products	<ul style="list-style-type: none"> <li>Recycled fill</li> <li>Recycled concrete</li> </ul>
	Ballast	<ul style="list-style-type: none"> <li>Ballast</li> </ul>
	Concrete Aggregates	<ul style="list-style-type: none"> <li>Concrete aggregate 5mm</li> <li>Concrete aggregate 7 mm</li> <li>Concrete aggregate 10 mm</li> <li>Concrete aggregate 14mm</li> <li>Concrete aggregate 20mm</li> <li>Concrete aggregate other</li> </ul>
	Asphalt Aggregates	<ul style="list-style-type: none"> <li>Asphalt aggregate 5mm</li> <li>Asphalt aggregate 7 mm</li> <li>Asphalt aggregate 10 mm</li> <li>Asphalt aggregate 14mm</li> <li>Asphalt aggregate other</li> </ul>
	Sealing Aggregates	<ul style="list-style-type: none"> <li>Sealing aggregate 7 mm</li> <li>Sealing aggregate 10 mm</li> <li>Sealing aggregate 14mm</li> <li>Sealing aggregate other</li> </ul>
	Other Aggregates	<ul style="list-style-type: none"> <li>Armour rock</li> <li>Decorative rock</li> <li>Round pebbles</li> <li>Overburden</li> <li>Shot rock</li> <li>Size graded rock</li> <li>Spalls</li> </ul>
	Precoat Aggregates	<ul style="list-style-type: none"> <li>Precoat aggregate 5mm</li> <li>Precoat aggregate 7 mm</li> <li>Precoat aggregate 10 mm</li> <li>Precoat aggregate 14mm</li> <li>Precoat aggregate other</li> </ul>
Cement treated	Cement-treated Products	<ul style="list-style-type: none"> <li>Cement-treated roadbase</li> <li>Cement-treated dust</li> </ul>

## Content declaration

The following table provides a summary of the materials included in Holcim's aggregate products groups and their relative composition by weight.

Materials	% by (weight)
Aggregate	94%-100%
Cementitious material	0-6%
Pre-coat oil	0-2%

## Packaging

Holcim aggregate is delivered in bulk with no packaging.

## Recycled material

BS EN 16757:2017 specifically lists the following materials relevant to the study as co-products:

- Fly ash;

As such, the above materials are considered as co-products of their production process and the impacts for their production process are allocated according to PCR 2012:01 Construction Products and Construction Services (co-produced goods, multi-output allocation).

Default background data from LCA databases was used to model fly ash. The AusLCI process for fly ash treats it as a waste material and only includes transport impacts.

The allocation approach of the AusLCI LCA database was adopted as a default for secondary data and processes (e.g. secondary fuel in cement production). The AusLCI dataset conforms to EN 15804 when applying allocation to its various processes and sub-processes.



# Environmental performance

The environmental impacts considered in this EPD are listed in the table below. All further tables from this point will contain the abbreviation only.

Impact Category	Abbreviation	Measurement Unit
<b>Potential Environmental Impacts</b>		
Global warming potential	GWP	kg CO <sub>2</sub> equivalents (GWP100)
Ozone depletion potential	ODP	kg CFC 11 equivalents
Acidification potential	AP	kg SO <sub>2</sub> equivalents
Eutrophication Potential	EP	kg PO <sub>4</sub> <sup>3-</sup> equivalents
Photochemical ozone creation potential	POCP	kg C <sub>2</sub> H <sub>2</sub> equivalents
Abiotic depletion potential (elements)	ADPE	kg Sb equivalents
Abiotic depletion potential (fossil fuels)	ADPF	MJ net calorific value
<b>Resource use</b>		
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ, net calorific value
Use of non- renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ, net calorific value
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ, net calorific value
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value
Use of net fresh water	FW	m <sup>3</sup>
<b>Output categories</b>		
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed/stored	RWD	kg
Components for reuse	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy	EE	MJ per energy carrier

A representative product was selected from each product group to represent the group in the environmental impact results. The criteria for selection are outlined in the LCA information section. Variability for results within the product groups was greater than ± 10%.

## Australia Wide

### Holcim ViroDecs™ Aggregates – Fine (1 tonne)

Impact Category	Unit	Drainage filter	Natural sand	Manufactured sand	Dust
<b>Potential Environmental Impacts</b>					
GWP	kg CO <sub>2</sub> eq.	6.52	3.10	6.01	5.98
ODP	kg CFC 11 eq.	6.51E-08	3.59E-10	2.29E-08	4.15E-08
AP	kg SO <sub>2</sub> eq.	4.46E-02	1.86E-02	3.22E-02	2.87E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq.	1.23E-02	4.83E-03	8.67E-03	7.60E-03
POCP	kg C <sub>2</sub> H <sub>2</sub> eq.	1.38E-03	3.64E-04	7.74E-04	7.62E-04
ADPE	kg Sb eq.	6.19E-06	8.31E-08	2.46E-06	3.12E-06
ADPF	MJ	7.77E+01	4.58E+01	7.56E+01	6.48E+01
<b>Resource Use</b>					
PERE	MJNCV	2.47E+00	2.65E-02	1.92E+00	1.42E+00
PERM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJNCV	2.47E+00	2.65E-02	1.92E+00	1.42E+00
PENRE	MJNCV	7.78E+01	4.58E+01	7.56E+01	6.48E+01
PENRM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJNCV	7.78E+01	4.58E+01	7.56E+01	6.48E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	7.47E-01
RSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m <sup>3</sup>	3.46E-02	4.38E-04	8.61E-03	1.01E-02
<b>Output categories</b>					
HWD	kg	4.68E-04	3.09E-07	1.36E-04	1.69E-04
NHWD	kg	3.55E-01	4.26E-03	2.82E-01	2.17E-01
RWD	kg	3.83E-07	3.45E-09	1.28E-07	1.62E-07
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	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
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

## Holcim ViroDecs™ Aggregates - Course (1 tonne)

Impact Category	Unit	Ballast	Other Aggregates	Asphalt Aggregates	Sealing Aggregates	Concrete Aggregates	Precoat Aggregates	Other Roadbase	Customer Spec. Roadbase
<b>Potential Environmental Impacts</b>									
GWP	kg CO <sub>2</sub> eq.	7.81	6.12	9.24	8.16	7.98	31.71	6.17	3.26
ODP	kg CFC 11 eq.	3.97E-08	2.62E-08	3.94E-08	1.67E-08	2.51E-08	4.15E-08	2.38E-08	6.26E-09
AP	kg SO <sub>2</sub> eq.	2.22E-02	2.82E-02	3.85E-02	4.86E-02	4.21E-02	1.52E-01	2.66E-02	2.65E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq.	6.29E-03	7.59E-03	1.05E-02	1.28E-02	1.13E-02	1.74E-02	7.25E-03	6.97E-03
POCP	kg C <sub>2</sub> H <sub>2</sub> eq.	7.16E-04	7.11E-04	9.78E-04	1.08E-03	9.16E-04	6.64E-03	6.58E-04	5.48E-04
ADPE	kg Sb eq.	4.11E-06	2.44E-06	4.17E-06	1.89E-06	2.76E-06	6.51E-06	2.63E-06	7.10E-07
ADPF	MJ	9.78E+01	8.51E+01	1.13E+02	1.17E+02	1.05E+02	2.78E+03	7.75E+01	4.46E+01
<b>Resource use</b>									
PERE	MJNCV	2.47E+00	6.97E-01	2.23E+00	9.23E-01	1.45E+00	1.04E+00	1.96E+00	5.14E-01
PERM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E+00	0.00E+00	0.00E+00
PERT	MJNCV	2.47E+00	6.97E-01	2.23E+00	9.23E-01	1.45E+00	2.81E+00	1.96E+00	5.14E-01
PENRE	MJNCV	9.78E+01	8.51E+01	1.13E+02	1.17E+02	1.05E+02	5.46E+01	7.75E+01	4.46E+01
PENRM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.73E+03	0.00E+00	0.00E+00
PENRT	MJNCV	9.78E+01	8.51E+01	1.13E+02	1.17E+02	1.05E+02	2.78E+03	7.75E+01	4.46E+01
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.51E-05	0.00E+00	0.00E+00
RSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m <sup>3</sup>	1.27E-02	6.12E-03	2.02E-02	8.27E-03	3.43E-02	1.02E-01	9.00E-03	2.57E-03
<b>Output categories</b>									
HWD	kg	2.67E-04	1.91E-04	2.10E-04	1.15E-04	1.52E-04	1.36E-04	1.51E-04	3.79E-05
NHWD	kg	3.60E-01	9.90E-02	4.55E-01	7.45E-02	2.57E-01	4.62E-01	2.87E-01	7.62E-02
RWD	kg	2.33E-07	1.56E-07	8.10E-07	1.06E-07	1.41E-07	3.41E-07	1.39E-07	3.69E-08
CRU	kg	0.00E+00	0.00E+00	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	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	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

# Holcim ViroDecs™ Aggregates - Cement Treated (1 tonne)

Impact Category	Unit	0.5% Cement-treated Roadbase	Cement-treated Other Roadbase	1% Cement-treated Roadbase	1.5% Cement-treated Roadbase	2% Cement-treated Roadbase	2.5% Cement-treated Roadbase	Cement-treated Customer Spec. Roadbase	3% Cement-treated Roadbase	3.5% Cement-treated Roadbase	4% Cement-treated Roadbase	Cement-treated Dust	5% Cement-treated Roadbase	6% Cement-treated Roadbase
<b>Potential Environmental Impacts</b>														
GWP	kg CO <sub>2</sub> eq.	7.77	8.12	10.11	12.51	13.67	14.74	14.74	17.52	19.21	22.21	21.16	24.34	33.88
ODP	kg CFC 11 eq.	6.01E-08	3.88E-08	8.60E-08	1.13E-07	1.21E-07	1.31E-07	1.31E-07	1.30E-07	1.81E-07	1.68E-07	1.69E-07	2.25E-07	2.71E-07
AP	kg SO <sub>2</sub> eq.	2.52E-02	4.89E-02	3.06E-02	3.55E-02	3.78E-02	4.00E-02	4.00E-02	4.58E-02	4.90E-02	5.53E-02	4.98E-02	5.93E-02	7.84E-02
EP	kg PO <sub>4</sub> <sup>3-</sup> eq.	6.40E-03	1.23E-02	7.64E-03	8.69E-03	9.19E-03	9.66E-03	9.66E-03	1.08E-02	1.16E-02	1.28E-02	1.15E-02	1.38E-02	1.80E-02
POCP	kg C <sub>2</sub> H <sub>2</sub> eq.	6.98E-04	1.01E-03	8.53E-04	9.90E-04	1.05E-03	1.11E-03	1.11E-03	1.24E-03	1.37E-03	1.49E-03	1.36E-03	1.64E-03	2.10E-03
ADPE	kg Sb eq.	3.61E-06	1.86E-06	4.69E-06	5.75E-06	6.15E-06	6.59E-06	6.59E-06	7.61E-06	8.57E-06	9.35E-06	8.59E-06	1.05E-05	1.33E-05
ADPF	MJ	7.06E+01	7.80E+01	8.69E+01	1.02E+02	1.08E+02	1.15E+02	1.15E+02	1.28E+02	1.43E+02	1.56E+02	1.40E+02	1.73E+02	2.26E+02
<b>Resource Use</b>														
PERE	MJNCV	1.49E+00	5.20E-01	1.77E+00	2.01E+00	2.12E+00	2.23E+00	2.23E+00	4.78E+00	2.67E+00	5.22E+00	2.67E+00	3.17E+00	4.10E+00
PERM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJNCV	1.49E+00	5.20E-01	1.77E+00	2.01E+00	2.12E+00	2.23E+00	2.23E+00	4.78E+00	2.67E+00	5.22E+00	2.67E+00	3.17E+00	4.10E+00
PENRE	MJNCV	7.06E+01	7.80E+01	8.69E+01	1.02E+02	1.08E+02	1.15E+02	1.15E+02	1.28E+02	1.43E+02	1.56E+02	1.40E+02	1.73E+02	2.26E+02
PENRM	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJNCV	7.06E+01	7.80E+01	8.69E+01	1.02E+02	1.08E+02	1.15E+02	1.15E+02	1.28E+02	1.43E+02	1.56E+02	1.40E+02	1.73E+02	2.26E+02
SM	kg	0.00E+00	0.00E+00	1.50E+00	3.00E+00	2.75E+00	3.13E+00	3.13E+00	0.00E+00	6.00E+00	0.00E+00	0.00E+00	6.50E+00	0.00E+00
RSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJNCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m <sup>3</sup>	3.70E-02	7.48E-03	4.24E-02	4.59E-02	4.75E-02	4.90E-02	4.90E-02	3.15E-02	5.57E-02	3.83E-02	3.26E-02	6.27E-02	7.51E-02
<b>Output categories</b>														
HWD	kg	1.43E-04	9.85E-06	1.57E-04	1.62E-04	1.64E-04	1.66E-04	1.66E-04	1.19E-04	1.75E-04	1.27E-04	1.46E-04	1.83E-04	1.97E-04
NHWD	kg	1.84E-01	9.84E-02	2.39E-01	2.92E-01	3.12E-01	3.34E-01	3.34E-01	3.52E-01	4.33E-01	4.41E-01	4.76E-01	5.33E-01	6.80E-01
RWD	kg	1.68E-07	5.81E-08	2.05E-07	2.36E-07	2.48E-07	2.61E-07	2.61E-07	5.15E-07	3.19E-07	5.65E-07	3.53E-07	3.78E-07	4.67E-07
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

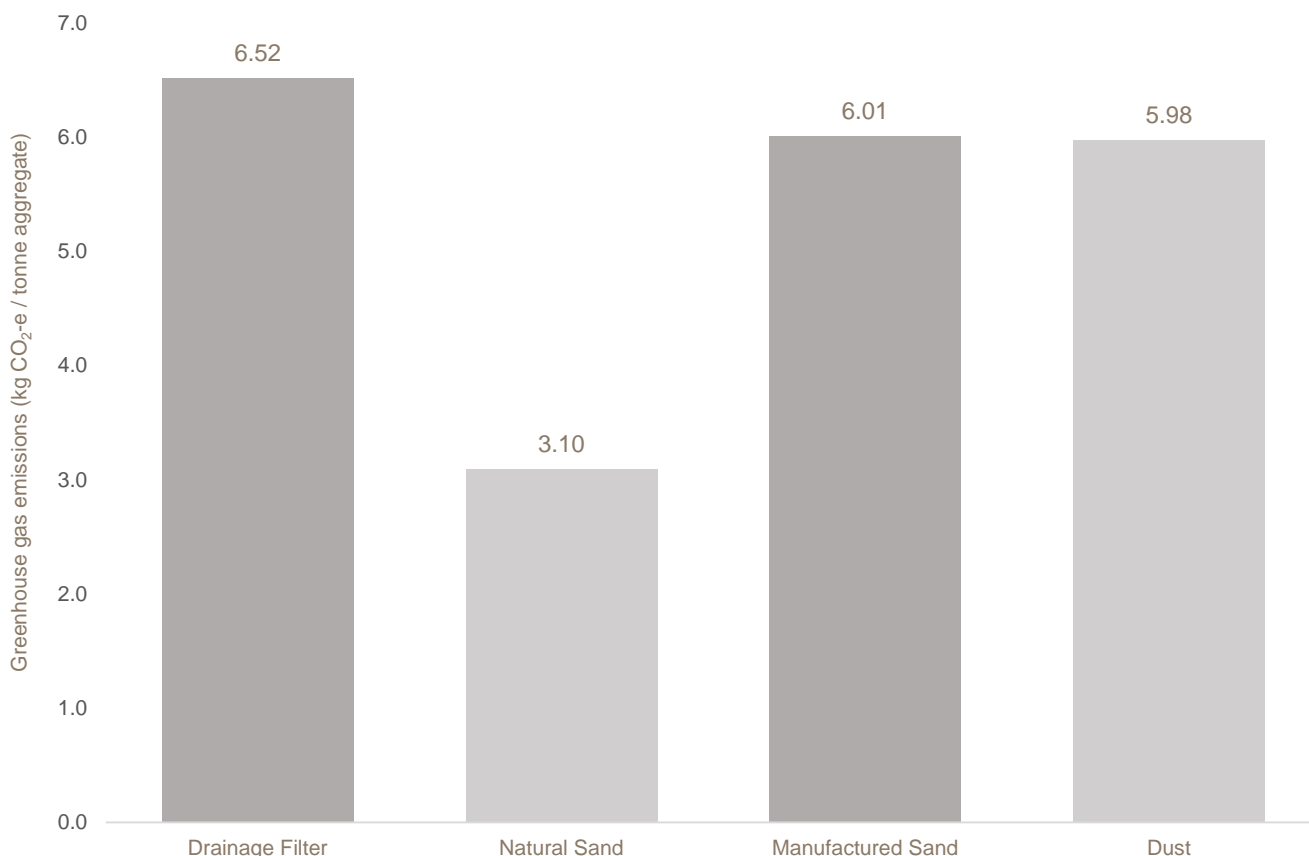
# Interpretation

## Holcim ViroDecs™ Aggregates

Care should be taken when comparing EPDs. The EPD of construction products may not be comparable if they do not comply with the requirements of comparability set in EN 15804. EPDs within the same product category but from different programmes may not be comparable.

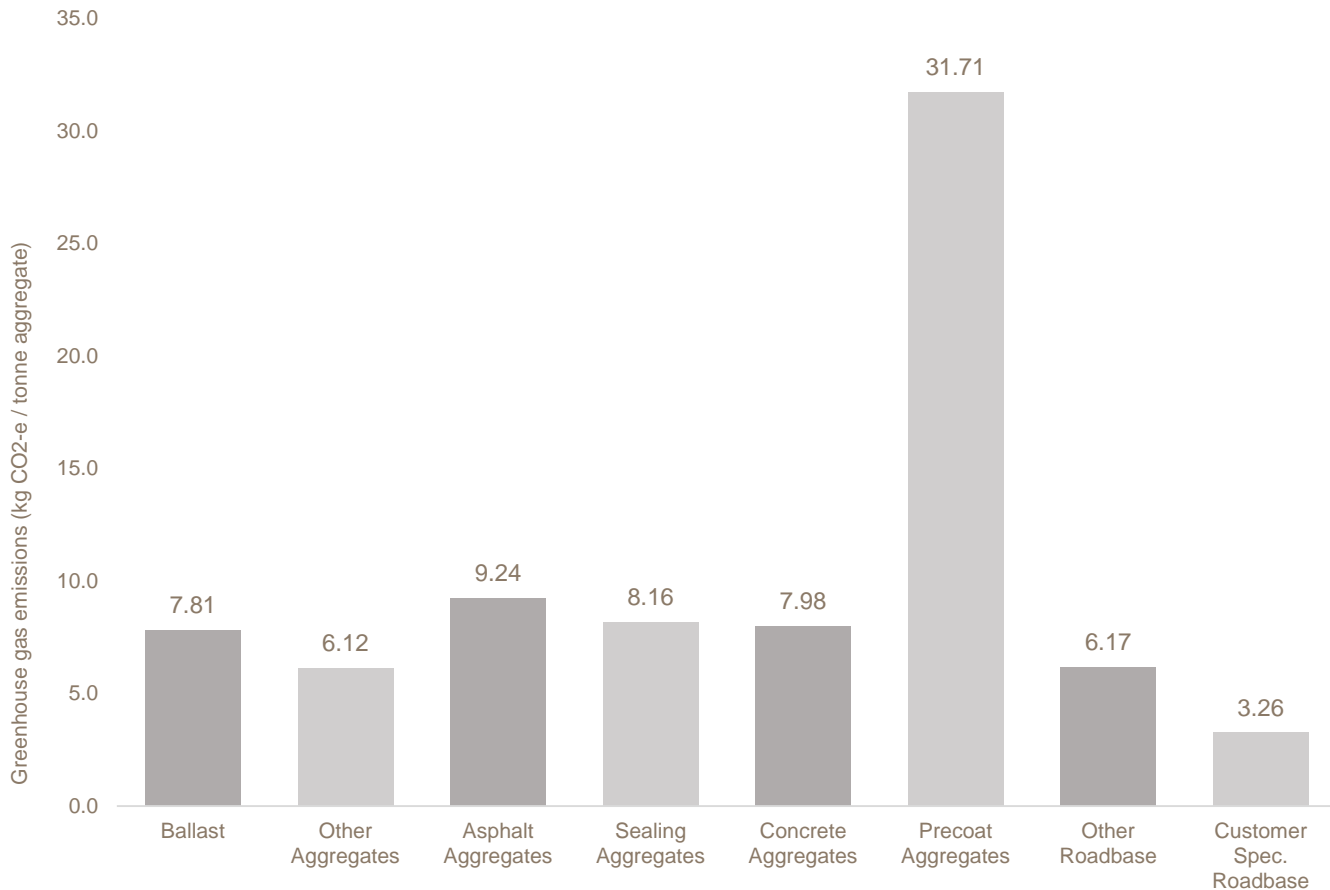
Holcim’s aggregates have a range of greenhouse gas (GHG) emissions, across the different product groups covered by the EPD. The following section presents the GHG emissions associated with 1 tonne of Holcim aggregates in Australia. To evaluate the performance of Holcim’s ViroDecs™ Aggregates range, the EPD results can be benchmarked against the IS materials calculator default base case aggregates and the Australian National Life Cycle Inventory Database (AusLCI). Benchmarking in Green Star can be done as per the guidance for credit 19B.1 (Life Cycle Impacts).

The global warming potential data produced by the study indicate varying degrees of impact across the 24 product groups modelled in this LCA study. Medium sized coarse aggregates such as ballast, other aggregates and asphalt aggregates had the lowest median global warming potential impacts per tonne of aggregate (as determined by the ‘representative product’ selected for each product group per the process outlined earlier in this EPD). This is likely due to the reduced processing requirements for these products. The cementitious products had a significantly higher impact (even at 0.5% cement content). Graphs of the cradle to gate global warming potential results for the representative product of each product group are presented in figures below.

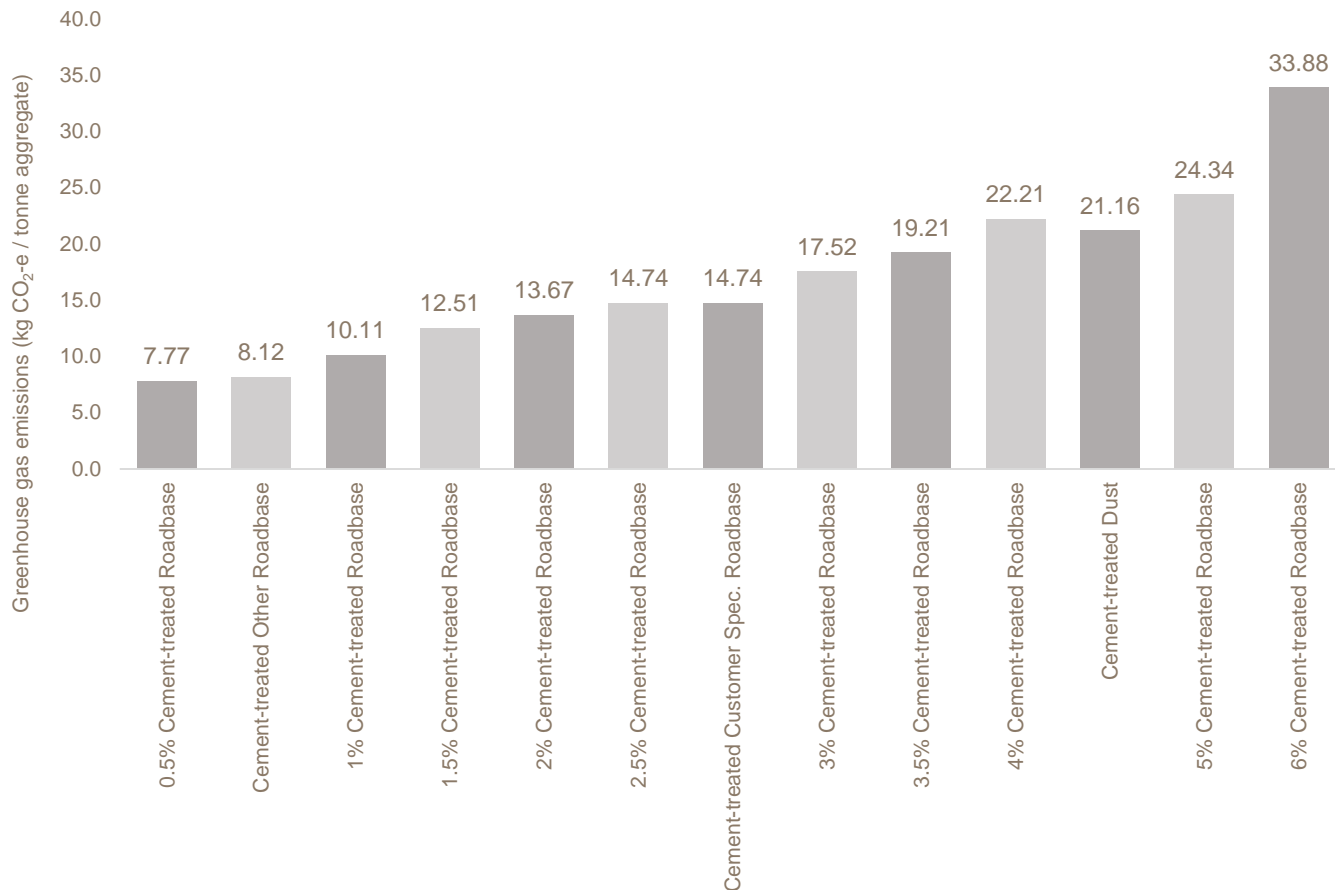


Holcim ViroDecs™ Aggregates - Fine - Cradle to gate global warming potential (kg CO<sub>2</sub>-e / per tonne)





Holcim ViroDecs™ Aggregates – Coarse - Cradle to gate global warming potential (kg CO<sub>2</sub>-e / per tonne)






Holcim ViroDecs™ Aggregates – Cement Treated - Cradle to gate global warming potential (kg CO<sub>2</sub>-e / per tonne)


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# Programme-related information and verification

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<b>EPD Produced by</b>	Edge Environment Pty Ltd Web: <a href="http://www.edgeenvironment.com">www.edgeenvironment.com</a> Phone: +612 9438 0100 Email: info@edgeenvironment.com	
<b>EPD Registration Number</b>	SP-02332	
<b>Valid From</b>	2021-05-18	
<b>Version</b>	2.0 Version   Revision date 2023-05-11	
<b>Valid Until 2026</b>	2026-05-17	
<b>Product category rules</b>	PCR 2012:01 Construction Products and Construction Services, Version 2.3, 2018-11-15	
<b>Product group classification</b>	UN CPC 54	
<b>Geographical Scope</b>	Australia	
<b>Reference Year for Data</b>	2019	

## CEN standard EN 15804:2012+A1:2013 served as the core PCR

<b>Product category rules</b>	PCR 2012:01 Construction Products and Construction Services, Version 2.3, 2018-11-15	
<b>PCR review was conducted by</b>	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com	
<b>Independent third-party verification of the declaration and data, according to ISO 14025:2006:</b>	<input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification	
<b>Third Party Verifier</b>	Jane Anderson ConstructionLCA Limited Approved by: EPD Australasia	
<b>Procedure for follow-up of data during EPD validity involves third party verifier:</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

## Programme-related information and verification:

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



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