

Life Cycle Assessment
& Environmental Product Declaration

Adbri Masonry Products EPD

Programme: The International EPD® System, www.environdec.com

Programme operator: EPD Australasia Ltd

EPD registration number: S-P-05517

Valid from: 31-03-2023 | Valid until: 31-03-2028

Geographical scope: Australia

Version 01, 03/22

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.

In accordance with ISO 14025:2016, EN15804+A2:2019



adbri MASONRY

1.	About Adbri	page 3
2.	General Guidance	page 8
3.	General Information.....	page 9
4.	Life Cycle Assessment Information	page 14
5.	Content Declaration	page 23
6.	Environmental Performance Results	page 25
7.	Interpretation of Results	page 56
8.	References	page 59

Adbri is Building a Better Australia with its locally manufactured cement, lime, concrete, aggregates, industrial minerals and concrete products.

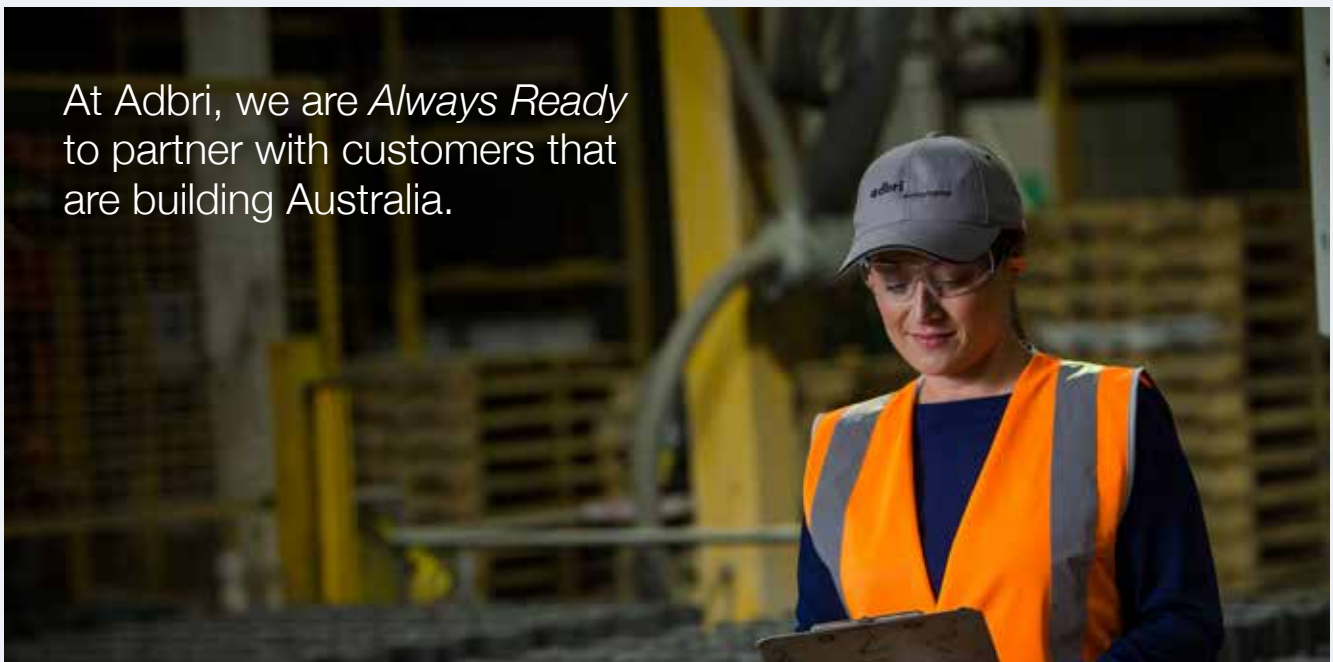
About Adbri

We believe in doing business responsibly; keeping our people and communities safe; meeting the needs of our customers; and creating long-term value for our shareholders.

We contribute to a sustainable future

Since our origins in 1882, we have focused on building long-term partnerships that add value. We are a proud Australian company with an extensive local manufacturing presence which allows us to be agile in meeting customer needs.

At Adbri, we are *Always Ready* to partner with customers that are building Australia.



A proud Australian manufacturer and supplier

As one of Australia's most experienced construction materials companies, we have helped build the foundations of our communities.

Today our 1500+ strong team located across 200 locations, continue to work closely with our customers, partners and communities to develop solutions that enhance the quality of lives of Australians, underpinned by our national footprint, secure supply chain and technical expertise.

Unrivalled technical expertise you can rely on.

We are committed to supplying innovative and quality products, supported by our leading technical advice. Our in-house technical experts are highly experienced in developing and managing quality control and assurance systems for our industry.

Adbri operates a centralised laboratory complex in Birkenhead, South Australia that provides industry leading capability in the Australian heavy construction materials industry. We are the first Australasian laboratory to commission a robotic quality control cement testing facility which improves testing accuracy and efficiencies.

Our customers are also supported by an experienced in-house engineering team who can provide product technical information. All of our masonry manufacturing sites have achieved ISO 9001 endorsement for Quality Management Systems, and our Stapylton Masonry site is NATA accredited to ISO/IEC 17025 for a range of masonry test methods.



Contributing to a safe, healthy and sustainable future for Australians, our communities and the environment is a fundamental part of Adbri's culture.

Contributing to a safe, healthy and sustainable future for Australians, our communities and the environment is a fundamental part of Adbri's culture.

Our sustainability approach is built on strong relationships with our people, customers, suppliers, partners, shareholders and the communities in which we operate, coupled with continuous improvement across our value chains.

Cement, lime, concrete, aggregates, and masonry are essential materials to the global economy. Our products will play a critical role in the transition to a lower carbon environment, supplying key industries including construction, infrastructure, energy, mining, and agriculture.

Our goal at Adbri is to be net zero emissions by 2050.

We operate two emissions-intensive and hard-to-abate processes – the integrated manufacture of clinker and lime production. Our key decarbonisation challenge is associated with unavoidable process emissions that are chemically liberated from the high-temperature processing of limestone, which accounts for approximately 60% of Adbri's Scope 1 and Scope 2 greenhouse gas emissions.

In 2022 we released our Net Zero Emissions Roadmap which sets out the steps we will take to achieve our goal of net zero emissions by 2050, based on the three key actions of reducing emissions, creating new lower carbon products, and collaborating with key partners.

CASE STUDY

Refuse Derived Fuel

At our Birkenhead cement plant for clinker manufacture, Adbri pioneered in the use of refuse derived fuel (RDF) in Australia since 2003. Since then, we've used over 1.3 million tonnes of RDF which has significantly reduced the Group's GHG emissions.

RDF is produced by a third party who processes industrial waste products to produce an alternative fuel source. As well as reducing demand for fossil fuels, it diverts waste from landfill.





Our Environmental Product Declarations

Adbri is committed to a sustainable future and this includes providing transparency about our products' environmental credentials via an Environmental Product Declaration (EPD).

Underpinning our EPDs is a Life Cycle Assessment (LCA) which identifies the environmental footprint throughout the life cycle of a product and is compliant with the ISO standards 14040 and 14044.

Having an EPD allows Adbri to understand the roles and contributions of different materials to

the total environmental impacts, thus, meeting market demand for science-based, transparent, and verified environmental product information. Adbri has engaged Edge Environment for the production of this EPD.

This report presents the methodology, data, results, and interpretation of the LCA. The LCA has been through several iterations of internal review to refine the life cycle data and assumptions.

General guidance

EPDs are independently verified documents that include information about the environmental impact of products throughout their life cycle.

EPDs require the completion of a Life Cycle Inventory (LCI), LCA and verification to best practice international and Australian standards.

- LCI is the collection of data on the inputs, processes and outputs within a defined system boundary.
- LCA is the modelling of LCI in accordance with ISO 14040, 14044 and 14025 standards.
- EN 15804+A2:2019: Sustainability of construction works – Environmental Product Declarations – core rules for the product category of construction products.
- General Programme Instructions (GPI) for the International EPD System V3.01 – containing instructions regarding methodology and the content that must be included in EPDs registered under the International EPD System.
- Third party verification of the output of the LCA in the format of an EPD.
- Product Category Rules (PCR) 2019:14, v1.11 – construction products.

EPDs are not always comparable

When comparing EPDs it is important to recognise:

- EPDs within the same product category from different programmes may not be comparable.
- EPDs of construction products may not be comparable if they do not comply with ISO 14025:2006 or if they are produced using different PCRs.
- Understanding the detail is important in comparisons. Expert analysis is required to ensure data is truly comparable to avoid unintended distortions.

Benefits of using this EPD

Results derived from this EPD can be used as a component for customers, for the purpose of compiling their own LCA calculation and modelling for EPDs. The 37 environmental impact indicators align with EN15804 +A2 and are used to support lower carbon concrete initiatives, and to establish the global warming potential of materials used for material selection or decision making.

General information

Programme Information

Programme Operator	EPD Australasia
Address	EPD Australasia Limited 315a Hardy Street Nelson 7010 New Zealand
Website	www.epd-australasia.com
E-mail	info@epd-australasia.com
CEN standard	EN 15804 +A2:2019 serves as the core PCR
Product category rules (PCR) 2019	Complementary Product Category Rules (C-PCR) to PCR 2019:14 Concrete and concrete elements (EN 16757), Version 2019-12-20 Product Group Classification: UN CPC 375
PCR review was conducted by	<i>The Technical Committee of the International EPD® System.</i> <i>Chair: Claudia A. Peña. Contact via info@environdec.com</i>
Independent third-party verification	Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third-party verifier	<i>Epsten Group</i> <i>101 Marietta St. NW, Suite 2600, Atlanta, Georgia 30303, USA</i> www.epstengroup.com
	
	Accredited by: A2LA, Certificate #3142.03
Procedure for follow-up	Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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. For further information about comparability, see EN 15804 and ISO 14025.



Company Information

Owner of the EPD	Adbri Limited Level 1 157 Grenfell Street Adelaide SA 5001 +61 8 8223 8000
Description of the organisation	Adbri is a leading Australian construction and building materials company that manufactures and distributes cement, lime, concrete, aggregates, masonry products and industrial minerals. With its origins dating back to 1882, Adbri is a vertically integrated business with operations spanning Australia. The Group employs more than 1,500 people and serves customers in the residential and non-residential construction, engineering construction, infrastructure, alumina production and mining markets through its portfolio of respected brands, including the Adbri Masonry brand which is covered in this EPD.
Name and location of production sites	Manufacturing and distribution of Adbri Masonry products is undertaken in the states of Queensland (QLD), New South Wales, South Australia (SA), Victoria (VIC) and Tasmania (TAS). In particular, the following plants were included, Maroochydore and Stapylton (QLD), Ottoway (SA), Bendigo and Campbellfield (VIC), and Ulverstone (TAS).

Product Information

Adbri Masonry produces concrete bricks, Besser® blocks, pavers, permeable pavers, retaining walls, concrete sleepers and erosion control products. Adbri Masonry has a certified Quality Management System conforming to AS/NZS ISO 9001:2015 for production, development and sales of masonry products. The products covered by this EPD are:

Besser® Blocks	Traditional grey masonry Besser® blocks. In this EPD, these products are represented in the “Blocks” Product Grouping, and include 200mm series masonry blocks.
Bricks	Adbri concrete bricks are covered in this EPD. The Concrete Brick products assessed include plain grey render bricks, coloured bricks, as well as coloured and textured (Honed) bricks, promoted as ‘Architectural Bricks’.
Ecotrihex®	Is a permeable paver that can be used as part of a permeable pavement system to capture and recycle water. Ecotrihex® pavers feature a specialty void which allows water to infiltrate through the pavement surface, through the graded aggregate base material and into storage or the natural water table. Permeable pavers deliver a range of benefits including water harvesting and recycling, limiting impacts of rain events by limiting downstream flooding and reducing pollution of estuary’s and waterways.
Versaloc®	Is a dry-stack walling system developed by Adbri. The Versaloc® system is an attractive alternative to traditional Besser® block construction, offering time saving and installation benefits. Innovative design enables the blocks to be “dry-stacked” during construction, negating the need for grout between units.

Product Identification

Adbri Masonry’s products comply with the manufacturing specifications outlined in AS4455.1, and are suitable for use with design codes AS3700 and AS4773.1.

Product Description

Adbri is seeking to develop a Life Cycle Assessments (LCA) and Environmental Product Declaration (EPD) for their Block, Brick, Ecotrihex® and Versaloc® products manufactured over four states of Australia.

ABOUT OUR MASONRY PRODUCTS

Adbri Masonry is Australia's leading masonry manufacturer, and one of the most experienced with origins dating back to the 1950's when we produced our first Besser® blocks.

Today, Adbri Masonry produces concrete bricks, Besser® blocks, pavers, including environmental permeable pavers, retaining walls, concrete sleepers and erosion control products. Our products help build Australia, from schools and hospitals to our homes, commercial constructions, land developments and landscapes.

This EPD covers four key brick, block and paving product groups, with examples of these product ranges shown below.

Concrete Bricks



Besser® Blocks



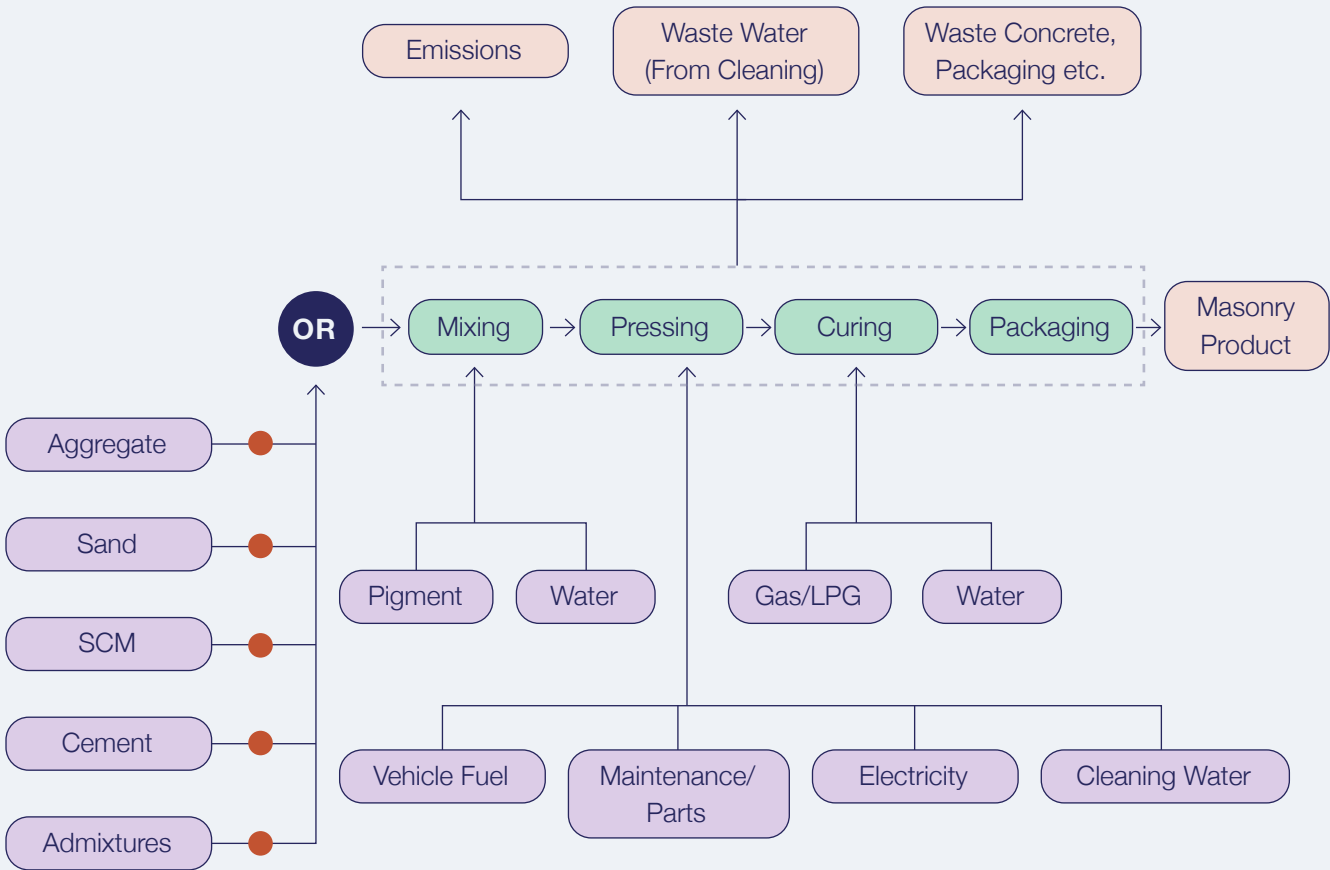
Versaloc®



Ecotrihrex® Permeable Paver



Figure 1 | Typical process flow for an Adbri Masonry plant



● DENOTES TRANSPORT OF A MATERIAL

LCA information

Three main types of masonry have been assessed in the LCA study. These mixes have differences in term of compositions and the amount of components. Table 1 shows the masonry name and relevant manufactured location.

Declared unit

The declared unit adopted is 1 tonne of manufactured masonry product, which fulfills the specified quality criteria.

Databases and LCA software used

The software used was SimaPro® LCA software (v9.3.0.3). The inventory data for the processes are entered in the LCA software and linked to the pre-existing background data for upstream feedstocks and services. Inventory data was selected per the standards, in the following order of preference:

1. For Australia, the Australian Life Cycle Inventory (AusLCI) v1.36 compiled by the Australian Life Cycle Assessment Society ((ALCAS), Australian Life Cycle Inventory (AusLCI) – v1.36, 2021) and the Australasian Unit Process LCI v2014.09. The AusLCI database at the time of this report was 1 year old, while the Australasian Unit Process LCI was 8 years old.
2. Other authoritative sources (e.g., Ecoinvent v3.8, (Moreno, 2021)), 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 v3.8 database was 1 year old.
3. Other sources with sensitivity analysis reported to show the significance of this data for the results and conclusions drawn.

Description of system boundaries and excluded life cycle stages

The scope of LCA for this EPD is Cradle to Gate A1-A3 with options of additional modules A4-A5, C and D (PCR, 2019). Emissions from the Use stage were excluded from the study due to the variety of applications of masonry products.

All modules included in this EPD are marked as X in the table below and those excluded are marked as 'module not declared' (MND). The system boundary for this EPD is depicted in figure 2.

Table 1 | Masonry products Assessed in this Study

State	Plant	Ecotrihex®	Brick	Versaloc®	Block
SA	Ottoway	X		X	
VIC	Bendigo		X	X	
	Campbellfield	X			X
TAS	Ulverstone	X	X	X	X
QLD	Stayplton	X		X	X
	Maroochydore		X		X



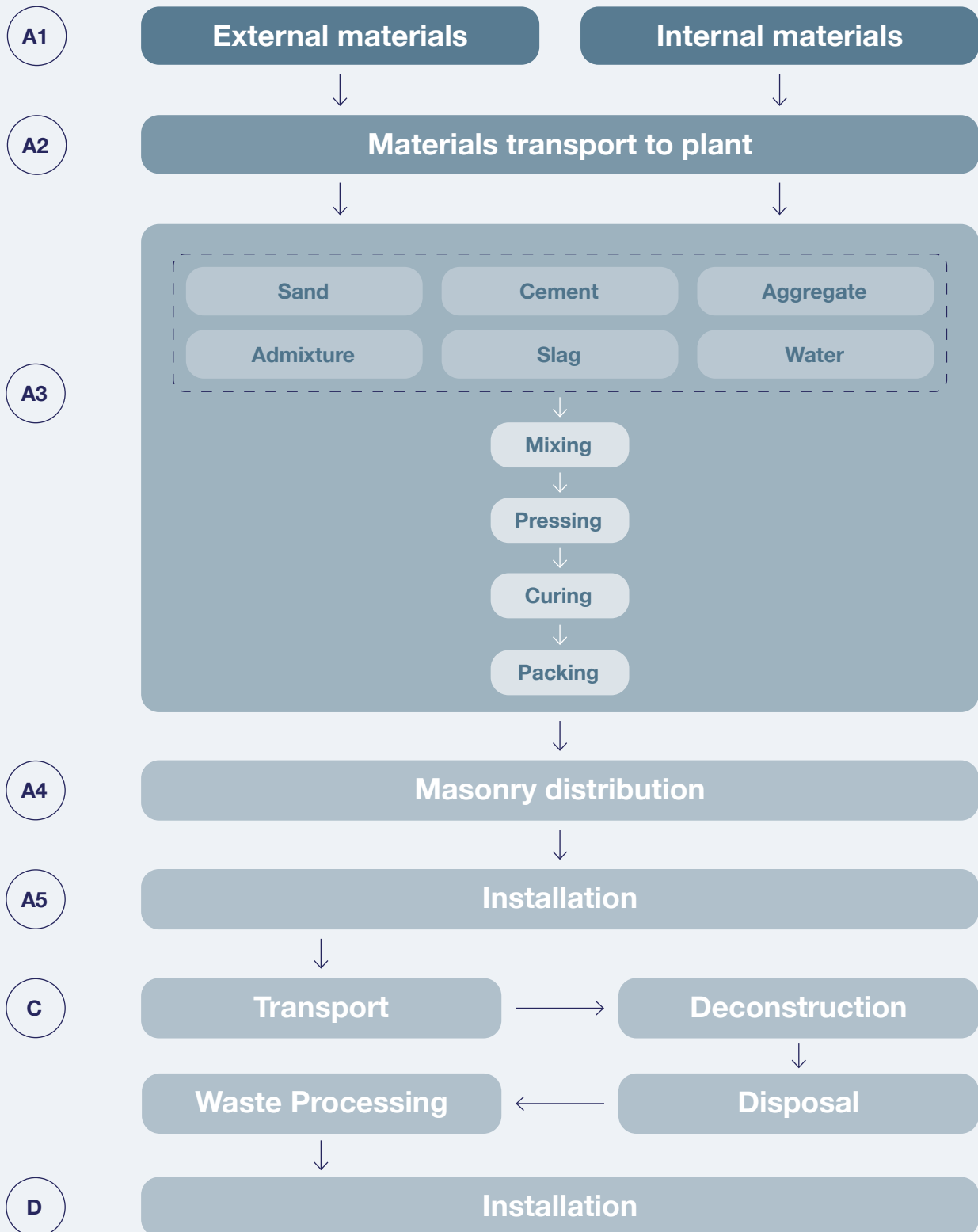
Table 2 | Life Cycle of building products: stages and modules included in this EPD

GPI module	Asset life cycle stage		Information module	Declared modules
Upstream	A1	Raw material supply	A1-3. Manufacturing stage	X
Core	A2	Transport		X
	A3	Manufacturing		X
Downstream	A4	Transport	A4-5. Construction stage	X
	A5	Construction, installation process		X
	C1	Deconstruction and demolition	C. End of life	X
	C2	Transport		X
	C3	Waste Processing		X
C4	Disposal	X		
Other environmental information	D	Reuse, recycle or recovery	D. Recyclability potentials	X

Process diagram

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

Figure 2 | System 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 and A3.

Electricity inputs in foreground processes based in Australia were modelled based on the state-specific grid. The AusLCl database was used to model

electricity in the foreground processes. The AusLCl dataset was updated using state specific grid data sourced from the Department of the Environment and Energy (Department of the Environment and Energy, December, 2020).

Core processes

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

- External transportation of materials to the core processes and internal transport.
- Manufacturing of the Masonry products.

Data quality

The following criteria has been used in selecting data for modelling:

- **Completeness:** include all LCI items that provide a material's contribution to a product's life cycle emissions,
- **Consistency:** enable meaningful comparisons in life cycle impact assessment (LCIA) information,
- **Accuracy:** reduce bias and uncertainty as far as is practical,
- **Transparency:** when communicating, disclose enough information to allow third parties to make decisions,
- **Time coverage:** the data collected represents recent practice for the construction of the project, and
- **Geographical coverage:** the data collected are representative of the sourcing of materials, whether from Australia or overseas, and are in line with the goal of the study.
- **Technology:** the data collected represents the specific technology or technology mix used in the production of the product inputs and outputs.
- **Precision:** minimise variability of the values for each data point.
- **Representativeness:** ensure the data set reflects the actual production of the products included, including an evaluation of the criteria above – in particular, an assessment of geographical, temporal and technological representativeness.
- **Reproducibility:** ensure information pertaining to the data sources and methods are adequately documented for an independent practitioner to reproduce the results as required.

The primary data used for the study (core module) is based on direct utility bills or feedstock quantities from Adbri's procurement records. Contribution analysis is used to focus on the key pieces of data contributing to the environmental impact categories. The data was benchmarked against relevant benchmark data in Ecoinvent. The data for the core module needs to be of high quality.

As per the background data, the quality was considered high when processes chosen were geographically, temporal and technologically relevant as shown in the following table. For data that was based on assumptions, quality was considered medium, unless based on official reports.

The data requirements and quality assessment for the LCA are summarised in Table 3.

Table 3 | Data quality

Module	Asset life cycle stage	Primary Data	Generic Data	Primary Data Quality	Generic Data Quality
A1	Raw material supply	Source and quantities of materials of feed mix Inputs: electricity, diesel and gas	Extraction of raw materials	Very good	
A2	Transport from supplier	Transport mode and distance	Fuel consumption embedded in process	Very good	
A3	Manufacturing	Inputs: water use Outputs: manufactured product quantities, waste		Very good	
A4	Transport to customer		Transport mode and average distances to DC from manufacturing sites	Very good	
A5	Construction, installation		Construction energy and waste (e.g. cut offs) - assumptions		Good
C1	Deconstruction and demolition		Deconstruction energy and waste, and lifespan – assumptions		Good
C2	Transport to waste processing		Transportation to landfill-reprocessing – assumption		Good
C3	Waste processing		Waste processing scenario and rates from industry data		Good
C4	Disposal		Waste to landfill scenario and rates from industry data		Good
D	Reuse, recycling, or recovery				Good

The EPD will be updated if changes in its lifecycle inventory lead to a variation of 10% or more in any of the included environmental indicators during its validity period.

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 threshold percent 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 v1.11, 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 the 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 v1.11, 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.
- Transport for raw materials accounting for less than 1% of the feedmix was excluded. This is because the impact contribution is considerably small.

Based on this guidance no energy or mass flows. All materials required for manufacturing were delivered via trucks and ships without packaging.

Allocation

According to PCR 2019:14 and EN 15804 A2:2019, 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.

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 (preferable) 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.

In the case of co-production, where the processes cannot be subdivided the coherence of the process must be followed. The allocation procedure criteria is as follows:

Table 4 | Allocation procedure criteria

Revenue Classification	Revenue Contribution	Allocation Type
Very Low	Processes generating overall revenue of the order of 1% or less	The process may be neglected
High	A difference in revenue of more than 25%	Allocation shall be based on economic values
Low	A difference in revenue of less than 25%	Allocation shall be based on physical properties, e.g. mass, volume.

Material flow carrying specific inherent properties, e.g. energy content, elementary composition, shall always be allocated reflecting the physical flows, irrespective of the allocation chosen for the process.

In the case of combined heat and power production, a distribution based on the best efficiency for the (potential) separate generation of electricity or heat shall be considered.

Data provided by Adbri for this assessment includes both product (recycled content in mixes) and production site (energy use) specific data.

Allocation of recycled content

Adbri's masonry products incorporate varying levels of supplementary cementitious materials, i.e. granulated blast furnace slag and fly ash. BS EN 16757:2017 specifically lists these materials relevant to the study as co-products. 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 2014:19 Construction Products (co-produced goods, multi-output allocation).

Ground granulated blast furnace slag: The AusLCI process for slag is allocated based on economic value as the product has significant economic value at the point of collection.

Fly ash: Fly ash in the AusLCI process is treated as a waste material and only includes transport impacts. If the fly ash was not utilised as a supplementary cementitious material, this material would otherwise have been landfilled and hence, classified as waste.

Allocation in background data

Adbri produces a range of masonry mixes at each of our plants, with the range dependent on customer demand. Due to the random nature of which mixes are produced and the large number of mixes, allocation was required to determine the amount of site resource use, discharges and emissions associated with each mix. Allocation was simply carried out based on physical relationships (i.e., production amount, by volume). It was assumed that all mixes require or result in an equal amount of site resources, discharges, and emissions (per tonne). Therefore, each site's total production volume could be used to perform the calculation of inputs and outputs per tonne – i.e., physical allocation.

Allocation in background data

The allocation approach for the generic databases utilised in this LCA is also compliant with the PCR. More specifically, the burden of primary production of materials is always allocated to the primary user of a material, while secondary (recycled) materials bear only the impacts of the recycling processes.

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.

Compliance with standards

The LCA and EPD have been developed to comply with:

1. BS EN 15804:2012+A2:2019. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products. British Standards Institution, 2019.³
2. BS EN 16757:2017. Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements. British Standards Institution, 2017.⁴
3. ISO 14040:2006 and ISO14044:2006+A1:2018 which describe the principles, framework, requirements and provides guidelines for life cycle assessment (LCA) (ISO, 2006; ISO, 2018).⁷⁻⁸
4. 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 (ISO, 2006).⁹
5. General Programme Instructions (GPI) for the International EPD System V3.01 – containing instructions regarding methodology and the content that must be included in EPDs registered under the International EPD System.¹⁰
6. PCR 2019:14 Construction Products (Version 1.11), 2021-02-05.¹¹
7. Complementary Product Category Rules (C-PCR) to PCR 2019:14 Concrete and concrete elements (EN 16757), Version 2019-12-20 Product Group Classification: UN CPC 375

Key assumptions: All foreground data used for the manufacturing processes (up to factory gate), transportation to the plant, distribution in Australia, via a 'Request for Information' spreadsheet. This data was collected for the period September 2020 to September 2021 referred as financial year 2020 -2021 (FY20-21).

Grouping of products

Adbri produces a significant number of product variations (>131) based on a set of eleven groups of mix designs. To provide a meaningful manner and avoid the variation when calculating the environmental profile, products have been grouped by “Product Group”.

The difficulty in this case is that there is no clear delineation between product group and cement content. In other words, within each group a variety of mix design is used to produce masonry product with desired characteristics.

The group of mix design for masonry products assessed in this study are provided in Table 5. After careful consideration, it was decided to group products by “Product Group” based plant, blend and GWP results. The variation in the GWP impacts within each group does not exceed 10%.

Table 5 | Understanding Our Product Groupings

Main Group	Sub Group: Plant of Manufacture	Sub Group: Colour tone (Light or Dark)	Description
Block	YES: Cambellfield, Maroochydore, Stapylton, Ulverstone	NO	Refers to concrete Besser® blocks manufactured in the natural grey, with no colour oxide. Sub-grouped into plant of manufacture.
Brick	YES: Bendigo, Maroochydore, Ulverstone	YES; Light or Dark	Concrete bricks produced in both a cored, and solid brick variant. Sub-grouped into; plant of manufacture, plain or textured finish, and colour tone, represented as Light or Dark colours.
Ecotrihex®	YES: Campbellfield, Ottoway, Stapylton, Ulverstone	YES; Light or Dark	Ecotrihex® is an Adbri Masonry permeable paver. This product is sub-grouped into plant of manufacture, and where required, colour tone, represented as Light or Dark colours.
Versaloc®	YES: Bendigo, Campbellfield, Ottoway, Stapylton, Ulverstone	NO	This is Adbri’s dry-stack walling system. In this EPD, the Versaloc® products are sub-grouped into plant of manufacture.



EPD product description

Four masonry products with varying mix designs have been included in this EPD. These mixes have differences in term of compositions and amount of components (see Table 6). All materials used for masonry mixes and manufacturing are delivered in bulk via trucks.

Table 6 | Material Composition of Products included in this EPD.

	Sand	Coarse Aggregate	Cement	SCM	Admixture	Water
Block	35% - 65%	11% - 26%	11% - 16%	0% - 22%	<0.2%	4%
Brick	40% - 77%	10% - 40%	9% - 17%	0% - 20%	<0.2%	4%
Ecotrihex®	42% - 71%	0% - 37%	10% - 17%	0% - 1%	<0.6%	11%
Versaloc®	50% - 62%	16% - 29%	9% - 11%	0% - 1%	<0.2%	12%

Manufacturing of masonry is undertaken at six plants as. As per Figure 1, the transported raw materials are mixed, before being pressed and cured into the required product. The products are packaged onto trucks in bulk to be distributed to Adbri's clients.

Some brick products manufactured at the Bendigo plant have a further production step whereby they are transported to the Campbellfield plant to be honed. The Bendigo Honed inputs account for the additional transport required for these products. The manufacturing inventory for Campbellfield plant was proportioned between Campbellfield products and the Bendigo Honed products based on total production tonnage.

The electricity used for masonry production was collected from FY20 National Pollution Inventory (NPI) report and was modelled based on the state specific grid. The AusLCI database was used to model electricity in the foreground processes.

Consumption of diesel, unleaded petrol, LPG, and natural gas was based on NPI and National Greenhouse and Energy Reporting (NGER).

The data of waste materials was provided by Adbri, including:

- Transport of waste materials, off spec and spills generated at manufacturing plants to landfill and recycling facility
- Treatment of materials, off spec and spills generated at manufacturing plants for landfilling and recycling

The data of emissions generated at manufacturing plants was based on NGER report.

Data regarding distribution of manufactured masonry was calculated based on annual figures provided by Adbri, including transport modes and distance.

Environmental performance results

The potential environmental impacts, use of resources and waste categories included in this EPD were calculated using the SimaPro (v9.3.0.3) tool and are listed in Table 7. All tables from this point will contain the abbreviation only.

The LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds and safety margins or risks. The impact assessment results are presented in the next sections.

Table 7 | Life Cycle Impact, Resource and waste Assessment Categories, Measurements and Methods

Impact category	Abbreviation	Measurement unit	Assessment method and implementation	Disclaimer
POTENTIAL ENVIRONMENTAL IMPACTS				
Global warming potential (fossil)	GWPF	kg CO ₂ equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2013	None
Global warming potential (biogenic)	GWPB	kg CO ₂ equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2013	None
Global warming potential (land use/ land transformation)	GWPL	kg CO ₂ equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2013	None
Total global warming potential	GWPT	kg CO ₂ equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2013	None
Acidification potential	AP	mol H ⁺ eq.	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008	None
Eutrophication – aquatic freshwater	EP - freshwater	kg PO ₄ ³⁻ equivalents	CML (v4.1)	None
Eutrophication – aquatic freshwater	EP - freshwater	kg P equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe ¹	None
Eutrophication – aquatic marine	EP - marine	kg N equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe	None
Eutrophication – terrestrial	EP – terrestrial	mol N equivalent	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.	None
Photochemical ozone creation potential	POCP	kg NMVOC equivalents	LOTOS-EUROS ,Van Zelm et al., 2008, as applied in ReCiPe	None
Abiotic depletion potential (elements)	ADPE	kg Sb equivalents	CML (v4.1)	2
Abiotic depletion potential (fossil fuels)	ADPF	MJ net calorific value	CML (v4.1)	2
Ozone depletion potential	ODP	kg CFC 11 equivalents	Steady-state ODPs, WMO 2014	None
Water Depletion Potential	WDP	m ³ equivalent deprived	Available WATER REMaining (AWARE) Boulay et al., 2016	2

Table 7 (Cont.) | Life Cycle Impact, Resource and waste Assessment Categories, Measurements and Methods

Impact category	Abbreviation	Measurement unit	Assessment method and implementation	Disclaimer
ADDITIONAL ENVIRONMENTAL IMPACTS				
Global warming potential, excluding biogenic uptake, emissions and storage	GWP-GHG	kg CO ₂ equivalents (GWP100)	CML (v4.1)	None
Particulate matter	PM	Disease incidence	SETAC-UNEP, Fantke et al. 2016 ²	None
Ionising radiation - human health	IRP	kBq U-235 eq	Human health effect model as developed by Dreicer et al. ³ 1995 update by Frischknecht et al., 2000 ⁴	1 (Refer to the bottom of the table)
Eco-toxicity (freshwater)	ETP-fw	CTUe	Usetox version 2 until the modified USEtox model is available from EC-JRC	2 (Refer to the bottom of the table)
Human toxicity potential - cancer effects	HTP-c	CTUh	Usetox version 2 until the modified Usetox model is available from EC-JRC	2 (Refer to the bottom of the table)
Human toxicity potential - non cancer effects	HTP-nc	CTUh	Usetox version 2 until the modified Usetox model is available from EC-JRC	2 (Refer to the bottom of the table)
Soil quality	SQP	Dimensionless	Soil quality index based on LANCA	2 (Refer to the bottom of the table)
RESOURCE USE				
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value	Ecoinvent version 3.6 and expanded by PRé Consultants ^{5,6}	None
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value	Manual for direct inputs ⁷	None
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value	Ecoinvent version 3.6 and expanded by PRé Consultants ⁸	None
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 ⁹	None
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value	Ecoinvent version 3.6 and expanded by PRé Consultants	None
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 3.6 and expanded by PRé Consultants ¹⁰	None
Use of secondary material	SM	kg	Manual for direct inputs	None
Use of renewable secondary fuels	RSF	MJ, net calorific value	Manual for direct inputs	None
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value	Manual for direct inputs	None
Use of net fresh water	FW	m ³	ReCiPe 2016	None

Table 7 (Cont.) | Life Cycle Impact, Resource and waste Assessment Categories, Measurements and Methods

Impact category	Abbreviation	Measurement unit	Assessment method and implementation	Disclaimer
ADDITIONAL ENVIRONMENTAL IMPACTS				
Hazardous waste disposed	HWD	kg	EDIP 2003 (v1.05)	None
Non-hazardous waste disposed	NHWD	kg	EDIP 2003 (v1.05) ¹¹	None
Radioactive waste disposed/stored	RWD	kg	EDIP 2003 (v1.05)	None
RESOURCE USE				
Components for reuse	CRU	kg	Manual for direct inputs	None
Materials for recycling	MFR	kg	Manual for direct inputs	None
Materials for energy recovery	MFRE	kg	Manual for direct inputs	None
Exported energy	EE	MJ per energy carrier	Manual for direct inputs	None

Disclaimer 1 – 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 ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.¹²

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

¹ EN 15804:2012+A2:2019 specifies that the unit for the indicator for Eutrophication aquatic freshwater shall be kg PO₄³⁻ eq, although the reference given (“EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe”) uses the unit kg P eq. This is likely a typographical error in EN 15804+A2, which is expected to be corrected in a future revision. Until this has been corrected, results for Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq. in the EPD.

² Fantke et al., Global Guidance for Life Cycle Impact Assessment Indicators: Volume 1. UNEP/SETAC Life Cycle Initiative, Paris, pp. 76-99

³ Dreicer et al., 1995. ExternE, Externalities of Energy, Vol. 5. Nuclear, Science, Research and Development JOULE, Luxembourg.

⁴ Frischknecht et al., R., 2000. Environmental impact assessment Review, 20, pp.159-189.

⁵ Method to calculate Cumulative Energy Demand (CED), based on the method published by Ecoinvent version 2.0 and expanded by PRé Consultants for raw materials available in the SimaPro database.

⁷ Calculated based on the lower heating value of renewable raw materials.

⁸ Calculated as sum of *Renewable, biomass, Renewable, wind, solar, geothermal and Renewable, water*.

⁹ Calculated based on the higher heating value of non-renewable raw materials.

¹⁰ Calculated as sum of *non-renewable, fossil, non-renewable, nuclear and non-renewable, biomass*.

¹¹ Calculated as sum of *bulk waste and slags/ash*.

¹² Aligned with PCR 2019:14.

Environmental performance results

Results of the environmental performance indicators: A1 – A3

Table 8 | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP marine	EP terrestrial	POCP	ADP-minerals & metals*	ADP-fossil†	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC-11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ
BLOCK Campbellfield	VIC	111.67	4.87E-02	1.24E-03	111.72	7.24E-06	1.04E+00	1.26E-02	2.90E-03	3.51E-01	3.92E+00	9.39E-01	2.80E-04	1.18E+03	8.38E+02
BLOCK Maroochydore	QLD	182.86	8.32E-02	1.22E-03	182.95	3.04E-06	7.14E-01	1.64E-02	2.68E-03	2.20E-01	2.48E+00	6.06E-01	1.06E-04	6.17E+02	2.72E+02
BLOCK Stapylton	QLD	140.59	2.87E-01	1.26E-03	140.88	2.49E-06	5.75E-01	1.73E-02	2.18E-03	1.73E-01	1.95E+00	4.79E-01	9.02E-05	5.07E+02	2.66E+02
BLOCK Ulverstone	TAS	145.89	1.15E-01	3.00E-03	146.00	6.26E-06	6.09E-01	2.57E-02	3.41E-03	1.74E-01	1.96E+00	5.21E-01	1.77E-04	8.55E+02	3.93E+03
BRICK Bendigo Smooth Shot Dark	VIC	113.56	4.55E-02	1.43E-03	113.61	7.70E-06	1.01E+00	9.80E-03	4.77E-03	3.26E-01	3.65E+00	8.79E-01	2.78E-04	1.29E+03	1.36E+03
BRICK Bendigo Honed Dark	VIC	160.92	4.75E-02	1.56E-03	160.96	1.04E-05	1.42E+00	1.33E-02	3.93E-03	4.86E-01	5.44E+00	1.30E+00	4.09E-04	1.86E+03	1.11E+03
BRICK Bendigo Smooth Shot Light	VIC	138.43	8.31E-02	1.17E-03	138.52	4.12E-06	6.39E-01	1.26E-02	4.65E-03	1.60E-01	1.80E+00	4.55E-01	1.03E-04	7.05E+02	1.09E+03
BRICK Bendigo Honed Light	VIC	240.39	1.23E-01	1.73E-03	240.52	1.00E-05	1.09E+00	2.22E-02	1.17E-02	2.73E-01	3.04E+00	7.86E-01	2.06E-04	1.42E+03	3.17E+03
BRICK Bendigo Cored Light	VIC	152.26	9.09E-02	1.61E-03	152.35	7.49E-06	7.97E-01	1.26E-02	1.10E-02	1.81E-01	2.02E+00	5.21E-01	1.36E-04	9.47E+02	3.06E+03
BRICK Maroochydore	QLD	205.51	1.00E-01	1.67E-03	205.61	7.19E-06	9.05E-01	2.16E-02	8.33E-03	2.47E-01	2.77E+00	7.01E-01	1.66E-04	9.95E+02	2.02E+03
BRICK Ulverstone	TAS	139.84	1.19E-01	3.06E-03	139.97	5.72E-06	5.89E-01	1.98E-02	4.82E-03	1.61E-01	1.81E+00	4.77E-01	1.61E-04	8.70E+02	4.43E+03

Table 8 (cont.) | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP-marine	EP-terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC-11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
Ecotrihex® Campbellfield	VIC	138.77	5.24E-02	1.37E-03	138.82	9.23E-06	1.23E+00	1.61E-02	3.55E-03	4.16E-01	4.65E+00	1.12E+00	3.45E-04	1.53E+03	9.89E+02
Ecotrihex® Ottoway Dark	SA	109.92	1.65E+01	1.39E-03	126.40	8.25E-06	1.03E+00	1.46E-02	3.07E-03	3.83E-01	4.27E+00	1.03E+00	3.05E-04	1.36E+03	7.21E+02
Ecotrihex® Ottoway Light	SA	145.38	1.65E+01	1.04E-03	161.90	3.31E-06	5.82E-01	1.50E-02	2.45E-03	1.92E-01	2.16E+00	5.39E-01	9.78E-05	7.36E+02	2.50E+02
Ecotrihex® Stapylton	QLD	191.61	3.05E-01	1.93E-03	191.92	4.13E-06	7.72E-01	1.39E-02	8.76E-03	2.19E-01	2.57E+00	6.20E-01	8.60E-05	7.29E+02	2.74E+02
Ecotrihex® Ulverstone Light	TAS	159.41	1.33E-01	2.99E-03	159.54	5.53E-06	6.37E-01	2.17E-02	3.62E-03	1.83E-01	2.06E+00	5.37E-01	1.71E-04	9.09E+02	3.96E+03
Ecotrihex® Ulverstone Dark	TAS	227.88	1.46E-01	3.05E-03	228.02	6.05E-06	8.40E-01	2.19E-02	4.45E-03	2.50E-01	2.83E+00	7.19E-01	1.87E-04	1.20E+03	3.94E+03
Versaloc® Bendigo	VIC	110.43	4.87E-02	1.31E-03	110.48	6.81E-06	9.94E-01	9.92E-03	2.96E-03	3.31E-01	3.70E+00	8.86E-01	2.63E-04	1.10E+03	7.83E+02
Versaloc® Campbellfield	VIC	120.70	5.16E-02	1.31E-03	120.75	8.19E-06	1.11E+00	1.46E-02	3.31E-03	3.75E-01	4.20E+00	1.01E+00	3.06E-04	1.29E+03	9.00E+02
Versaloc® Ottoway	SA	96.65	1.65E+01	1.34E-03	113.13	7.51E-06	9.33E-01	1.44E-02	2.76E-03	3.47E-01	3.87E+00	9.37E-01	2.73E-04	1.18E+03	6.49E+02
Versaloc® Stapylton	QLD	132.71	2.81E-01	1.29E-03	132.99	2.96E-06	5.62E-01	1.93E-02	2.20E-03	1.66E-01	1.87E+00	4.66E-01	9.71E-05	5.28E+02	3.50E+02
Versaloc® Ulverstone	TAS	130.99	1.20E-01	2.95E-03	131.11	5.05E-06	5.45E-01	2.10E-02	3.08E-03	1.55E-01	1.75E+00	4.61E-01	1.54E-04	7.38E+02	3.91E+03

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.

Table 9 | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator									
	State	GWP-GHG kg CO ₂ eq	PM disease incidence	IRP kBq U-235 eq	ETP - fw CTUe	HTP - c CTUh	HTP - nc CTUh	SQP		
BLOCK Campbellfield	VIC	108.46	5.55E-06	5.64E+00	811.57	2.85E-08	1.41E-06	476.16		
BLOCK Maroochydore	QLD	180.35	5.23E-06	1.49E+01	998.98	2.75E-08	1.11E-06	313.29		
BLOCK Stapylton	QLD	138.59	4.24E-06	1.04E+01	767.18	2.17E-08	8.57E-07	279.90		
BLOCK Ulverstone	TAS	143.69	5.51E-06	1.14E+01	900.79	2.61E-08	1.04E-06	332.53		
BRICK Bendigo Smooth Shot Dark	VIC	98.76	5.31E-06	1.15E+01	790.72	2.93E-08	1.39E-06	458.79		
BRICK Bendigo Honed Dark	VIC	144.29	7.14E-06	5.95E+00	1101.44	3.87E-08	1.96E-06	601.96		
BRICK Bendigo Smooth Shot Light	VIC	124.73	4.88E-06	1.21E+01	739.54	2.11E-08	8.98E-07	294.29		
BRICK Bendigo Honed Light	VIC	204.19	8.15E-06	8.09E+00	1286.75	3.42E-08	1.64E-06	399.46		
BRICK Bendigo Cored Light	VIC	124.88	5.63E-06	1.64E+01	862.60	2.61E-08	1.15E-06	316.00		
BRICK Maroochydore	QLD	187.51	6.56E-06	1.85E+01	1162.94	3.46E-08	1.43E-06	393.44		
BRICK Ulverstone	TAS	129.29	4.94E-06	9.42E+00	838.38	2.38E-08	9.80E-07	333.21		

Table 9 (cont.) | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP		Indicator	GWP-GHG	PM	IRP	ETP - fw	HTP - c	HTP - nc	SQP
State		kg CO ₂ eq	disease incidence	kBq U-235 eq	CTUe	CTUh	CTUh	CTUh	Pt
Ecotrihex® Campbellfield	VIC	128.52	6.58E-06	9.95E+00	1010.27	3.52E-08	1.69E-06	1.69E-06	543.61
Ecotrihex® Ottoway Dark	SA	102.91	4.79E-06	1.03E+01	879.18	3.06E-08	1.49E-06	1.49E-06	369.22
Ecotrihex® Ottoway Light	SA	134.20	4.00E-06	1.05E+01	810.50	2.01E-08	8.91E-07	8.91E-07	167.60
Ecotrihex® Stapylton	QLD	175.85	5.26E-06	2.48E+02	991.09	8.82E-08	1.46E-06	1.46E-06	317.08
Ecotrihex® Ulverstone Light	TAS	152.19	5.44E-06	1.27E+01	970.91	2.67E-08	1.07E-06	1.07E-06	360.80
Ecotrihex® Ulverstone Dark	TAS	209.20	6.71E-06	3.42E+01	1244.34	3.74E-08	1.40E-06	1.40E-06	382.97
Versaloc® Bendigo	VIC	107.25	5.31E-06	8.92E+00	842.84	2.84E-08	1.35E-06	1.35E-06	460.25
Versaloc® Campbellfield	VIC	116.91	6.02E-06	1.21E+01	924.55	3.26E-08	1.53E-06	1.53E-06	505.62
Versaloc® Ottoway	SA	93.39	4.39E-064	8.45E+00	810.29	2.77E-08	1.34E-06	1.34E-06	335.56
Versaloc® Stapylton	QLD	130.58	4.36E-06	9.74E+00	792.31	2.16E-08	8.47E-07	8.47E-07	312.36
Versaloc® Ulverstone	TAS	129.20	4.85E-06	7.10E+00	857.26	2.26E-08	9.24E-079	9.24E-079	341.26

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Acronyms: GWP-GHG = Global warming potential, excluding biogenic uptake, emissions and storage; PM = Particulate matter; IRP = Ionising radiation - human health; ETP - fw = Ecotoxicity - freshwater; HTP - c = Human toxicity potential - cancer effects; HTP - nc = Human toxicity potential - non cancer effects; SQP = Soil quality

Table 10 | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator											FW
	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW		
State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	MJ	m ³	
BLOCK Campbellfield	4.24E+01	0.00E+00	4.24E+01	1.21E+03	0.00E+00	1.21E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E-01	
BLOCK Maroochydore	2.47E+01	0.00E+00	2.47E+01	6.23E+02	0.00E+00	6.23E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-01	
BLOCK Stapyilton	2.11E+01	0.00E+00	2.11E+01	5.14E+02	0.00E+00	5.14E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.41E-01	
BLOCK Ulverstone	6.11E+01	0.00E+00	6.11E+01	8.80E+02	0.00E+00	8.80E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-01	
BRICK Bendigo Smooth Shot Dark	4.20E+01	0.00E+00	4.20E+01	1.20E+03	0.00E+00	1.20E+03	1.78E+00	0.00E+00	0.00E+00	0.00E+00	8.72E-01	
BRICK Bendigo Honed Dark	5.60E+01	0.00E+00	5.60E+01	1.66E+03	0.00E+00	1.66E+03	3.55E+00	0.00E+00	0.00E+00	0.00E+00	8.71E-01	
BRICK Bendigo Smooth Shot Light	2.46E+01	0.00E+00	2.46E+01	6.54E+02	0.00E+00	6.54E+02	4.93E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-01	
BRICK Bendigo Honed Light	4.11E+01	0.00E+00	4.11E+01	1.34E+03	0.00E+00	1.34E+03	7.17E+00	0.00E+00	0.00E+00	0.00E+00	8.80E-01	
BRICK Bendigo Cored Light	3.32E+01	0.00E+00	3.32E+01	9.89E+02	0.00E+00	9.89E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.79E-01	
BRICK Maroochydore	3.40E+01	0.00E+00	3.40E+01	1.03E+03	0.00E+00	1.03E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.63E-01	
BRICK Ulverstone	6.22E+01	0.00E+00	6.22E+01	8.33E+02	0.00E+00	8.33E+02	1.75E+00	0.00E+00	0.00E+00	0.00E+00	8.67E-01	

Table 10 (cont.) | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator		PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
	MJ	MJ	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
Ecotrihex® Campbellfield	4.90E+01	0.00E+00	4.90E+01	1.47E+03	0.00E+00	1.47E+03	0.00E+00	5.72E+00	0.00E+00	0.00E+00	0.00E+00	8.78E-01
Ecotrihex® Ottoway Dark	7.20E+01	0.00E+00	7.20E+01	1.33E+03	0.00E+00	1.33E+03	0.00E+00	9.72E-01	0.00E+00	0.00E+00	0.00E+00	1.42E-01
Ecotrihex® Ottoway Light	5.01E+01	0.00E+00	5.01E+01	6.29E+02	0.00E+00	6.29E+02	0.00E+00	8.38E+00	0.00E+00	0.00E+00	0.00E+00	9.86E-02
Ecotrihex® Stapylton	2.41E+01	0.00E+00	2.41E+01	5.47E+02	0.00E+00	5.47E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.09E-01
Ecotrihex® Ulverstone Light	6.31E+01	0.00E+00	6.31E+01	8.43E+02	0.00E+00	8.43E+02	0.00E+00	1.51E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-01
Ecotrihex® Ulverstone Dark	6.68E+01	0.00E+00	6.68E+01	9.74E+02	0.00E+00	9.74E+02	0.00E+00	1.35E+01	0.00E+00	0.00E+00	0.00E+00	8.62E-01
Versaloc® Bendigo	4.06E+01	0.00E+00	4.06E+01	1.13E+03	0.00E+00	1.13E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.60E-01
Versaloc® Campbellfield	4.50E+01	0.00E+00	4.50E+01	1.32E+03	0.00E+00	1.32E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-01
Versaloc® Ottoway	6.85E+01	0.00E+00	6.85E+01	1.21E+03	0.00E+00	1.21E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-01
Versaloc® Stapylton	2.06E+01	0.00E+00	2.06E+01	5.38E+02	0.00E+00	5.38E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.37E-01
Versaloc® Ulverstone	6.05E+01	0.00E+00	6.05E+01	7.63E+02	0.00E+00	7.63E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.96E-01

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; PENT = 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

Table 11 | Waste and Output flow indicators

PRODUCT GROUP	Indicator	State										
		Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal	MJ	kg	MJ
BLOCK Campbellfield	VIC	1.15E-03	2.78E+03	2.92E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Maroochydore	QLD	5.38E-04	6.19E+00	3.64E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Stapylton	QLD	4.48E-04	6.17E+00	3.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Ulverstone	TAS	8.23E-04	7.94E+00	9.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Smooth Shot Dark	VIC	1.22E-03	2.58E+03	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Honed Dark	VIC	1.62E-03	4.00E+03	2.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Smooth Shot Light	VIC	6.72E-04	6.67E+00	2.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Honed Light	VIC	1.50E-03	1.42E+01	4.15E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Cored Light	VIC	1.18E-03	1.13E+01	9.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Maroochydore	QLD	1.13E-03	1.17E+01	5.59E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Ulverstone	TAS	8.08E-04	8.14E+00	1.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 11 (cont.) | Waste and Output flow indicators

PRODUCT GROUP	Indicator	Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal
		MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
PRODUCT GROUP	State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
	Ecotrihex® Campbellfield	1.42E-03	3.30E+03	2.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ecotrihex® Ottoway Dark	1.30E-03	2.97E+03	6.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ecotrihex® Ottoway Light	5.34E-04	6.01E+01	3.71E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ecotrihex® Stapyiton	4.21E-04	5.93E+00	3.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ecotrihex® Ulverstone Light	7.74E-04	7.96E+00	9.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ecotrihex® Ulverstone Dark	8.29E-04	8.05E+00	6.11E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Versaloc® Bendigo	1.10E-03	2.55E+03	3.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Versaloc® Campbellfield	1.27E-03	2.97E+03	2.97E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Versaloc® Ottoway	1.19E-03	2.65E+03	3.35E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Versaloc® Stapyiton	5.14E-04	6.44E+00	3.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Versaloc® Ulverstone	7.03E-04	7.27E+00	9.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results of the environmental performance indicators: A4

Table 12 | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP marine	EP terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC 11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
BLOCK Campbellfield	VIC	5.14	7.35E-04	3.94E-05	5.14	8.27E-07	0.03	3.33E-03	1.70E-04	6.88E-03	0.08	0.03	1.66E-05	71.16	45.66
BLOCK Maroochydore	QLD	5.14	7.35E-04	3.94E-05	5.14	8.27E-07	0.03	3.33E-03	1.70E-04	6.88E-03	0.08	0.03	1.66E-05	71.16	45.66
BLOCK Stapylton	QLD	5.14	7.35E-04	3.94E-05	5.14	8.27E-07	0.03	3.33E-03	1.70E-04	6.88E-03	0.08	0.03	1.66E-05	71.16	45.66
BLOCK Ulverstone	TAS	5.14	7.35E-04	3.94E-05	5.14	8.27E-07	0.03	3.33E-03	1.70E-04	6.88E-03	0.08	0.03	1.66E-05	71.16	45.66
BRICK Bendigo Smooth Shot Dark	VIC	13.12	1.88E-03	1.01E-04	13.12	2.11E-06	0.08	8.50E-03	4.35E-04	1.76E-02	0.20	0.07	4.25E-05	181.76	116.62
BRICK Bendigo Honed Dark	VIC	13.12	1.88E-03	1.01E-04	13.12	2.11E-06	0.08	8.50E-03	4.35E-04	1.76E-02	0.20	0.07	4.25E-05	181.76	116.62
BRICK Bendigo Smooth Shot Light	VIC	13.12	1.88E-03	1.01E-04	13.12	2.11E-06	0.08	8.50E-03	4.35E-04	1.76E-02	0.20	0.07	4.25E-05	181.76	116.62
BRICK Bendigo Honed Light	VIC	13.12	1.88E-03	1.01E-04	13.12	2.11E-06	0.08	8.50E-03	4.35E-04	1.76E-02	0.20	0.07	4.25E-05	181.76	116.62
BRICK Bendigo Cored Light	VIC	13.12	1.88E-03	1.01E-04	13.12	2.11E-06	0.08	8.50E-03	4.35E-04	1.76E-02	0.20	0.07	4.25E-05	181.76	116.62
BRICK Maroochydore	QLD	1.51	2.16E-04	1.16E-05	1.51	2.44E-07	0.01	9.80E-04	5.01E-05	2.03E-03	0.02	0.01	4.90E-06	20.96	13.45
BRICK Ulverstone	TAS	10.81	1.55E-03	8.29E-05	10.81	1.74E-06	0.07	7.00E-03	3.58E-04	1.45E-02	0.16	0.06	3.50E-05	149.68	96.04

Table 12 (cont.) | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP marine	EP terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC-11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
Ecotrihex® Campbellfield	VIC	1.29	1.84E-04	9.88E-06	1.29	2.07E-07	0.01	8.34E-04	4.27E-05	1.73E-03	0.02	0.01	4.17E-06	17.85	11.45
Ecotrihex® Ottoway Dark	SA	1.57	2.24E-04	1.20E-05	1.57	2.52E-07	0.01	1.01E-03	5.19E-05	2.10E-03	0.02	0.01	5.07E-06	21.69	13.92
Ecotrihex® Ottoway Light	SA	1.57	2.24E-04	1.20E-05	1.57	2.52E-07	0.01	1.01E-03	5.19E-05	2.10E-03	0.02	0.01	5.07E-06	21.69	13.92
Ecotrihex® Stapyhton	QLD	0.01	7.35E-07	3.94E-08	0.01	8.27E-10	0.00	3.33E-06	1.70E-07	6.88E-06	0.00	0.00	1.66E-08	0.07	0.05
Ecotrihex® Ulverstone Light	TAS	0.03	4.41E-06	2.36E-07	0.03	4.96E-09	0.00	2.00E-05	1.02E-06	4.13E-05	0.00	0.00	9.98E-08	0.43	0.27
Ecotrihex® Ulverstone Dark	TAS	0.03	4.41E-06	2.36E-07	0.03	4.96E-09	0.00	2.00E-05	1.02E-06	4.13E-05	0.00	0.00	9.98E-08	0.43	0.27
Versaloc® Bendigo	VIC	14.77	2.11E-03	1.13E-04	14.77	2.38E-06	0.09	9.56E-03	4.89E-04	1.98E-02	0.22	0.08	4.78E-05	204.59	131.27
Versaloc® Campbellfield	VIC	8.58	1.23E-03	6.58E-05	8.58	1.38E-06	0.05	5.56E-03	2.84E-04	1.15E-02	0.13	0.04	2.78E-05	118.85	76.25
Versaloc® Ottoway	SA	2.55	3.64E-04	1.95E-05	2.55	4.10E-07	0.02	1.65E-03	8.43E-05	3.41E-03	0.04	0.01	8.24E-06	35.27	22.63
Versaloc® Stapyhton	QLD	13.76	1.97E-03	1.06E-04	13.76	2.21E-06	0.08	8.91E-03	4.56E-04	1.84E-02	0.21	0.07	4.45E-05	190.57	122.28
Versaloc® Ulverstone	TAS	8.40	1.20E-03	6.44E-05	8.40	1.35E-06	0.05	5.44E-03	2.78E-04	1.13E-02	0.13	0.04	2.72E-05	116.33	74.64

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.

Table 13 | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator		GWP-GHG kg CO ² eq	PM disease incidence	IRP kBq U-235 eq	ETP - fw CTUe	HTP - c CTUh	HTP - nc CTUh	SQP Pt
	State								
BLOCK Campbellfield	VIC		5.05	4.09E-07	3.07E-03	40.52	1.52E-09	6.11E-08	16.99
BLOCK Maroochydore	QLD		5.05	4.09E-07	3.07E-03	40.52	1.52E-09	6.11E-08	16.99
BLOCK Stapylton	QLD		5.05	4.09E-07	3.07E-03	40.52	1.52E-09	6.11E-08	16.99
BLOCK Ulverstone	TAS		5.05	4.09E-07	3.07E-03	40.52	1.52E-09	6.11E-08	16.99
BRICK Bendigo Smooth Shot Dark	VIC		12.89	1.04E-06	7.83E-03	103.51	3.88E-09	1.56E-07	43.41
BRICK Bendigo Honed Dark	VIC		12.89	1.04E-06	7.83E-03	103.51	3.88E-09	1.56E-07	43.41
BRICK Bendigo Smooth Shot Light	VIC		12.89	1.04E-06	7.83E-03	103.51	3.88E-09	1.56E-07	43.41
BRICK Bendigo Honed Light	VIC		12.89	1.04E-06	7.83E-03	103.51	3.88E-09	1.56E-07	43.41
BRICK Bendigo Cored Light	VIC		12.89	1.04E-06	7.83E-03	103.51	3.88E-09	1.56E-07	43.41
BRICK Maroochydore	QLD		1.49	1.20E-07	9.04E-04	11.94	4.48E-10	1.80E-08	5.01
BRICK Ulverstone	TAS		10.62	8.59E-07	6.45E-03	85.24	3.20E-09	1.28E-07	35.75

Table 13 (cont.) | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator	GWP-GHG kg CO ₂ eq	PM disease incidence	IRP kBq U-235 eq	ETP - fw CTUe	HTP - c CTUh	HTP - nc CTUh	SQP
Ecotrihex® Campbellfield	VIC	1.27	1.02E-07	7.69E-04	10.16	3.81E-10	1.53E-08	4.26
Ecotrihex® Ottoway Dark	SA	1.54	1.25E-07	9.35E-04	12.35	4.64E-10	1.86E-08	5.18
Ecotrihex® Ottoway Light	SA	1.54	1.25E-07	9.35E-04	12.35	4.64E-10	1.86E-08	5.18
Ecotrihex® Stapylton	QLD	0.01	4.09E-10	3.07E-06	0.04	1.52E-12	6.11E-11	0.02
Ecotrihex® Ulverstone Light	TAS	0.03	2.45E-09	1.84E-05	0.24	9.12E-12	3.66E-10	0.10
Ecotrihex® Ulverstone Dark	TAS	0.03	2.45E-09	1.84E-05	0.24	9.12E-12	3.66E-10	0.10
Versaloc® Bendigo	VIC	14.51	1.17E-06	8.82E-03	116.51	4.37E-09	1.76E-07	48.86
Versaloc® Campbellfield	VIC	8.43	6.82E-07	5.12E-03	67.68	2.54E-09	1.02E-07	28.38
Versaloc® Ottoway	SA	2.50	2.02E-07	1.52E-03	20.08	7.54E-10	3.03E-08	8.42
Versaloc® Stapylton	QLD	13.52	1.09E-06	8.21E-03	108.52	4.07E-09	1.64E-07	45.51
Versaloc® Ulverstone	TAS	8.25	6.68E-07	5.01E-03	66.25	2.49E-09	9.98E-08	27.78

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Acronyms: GWP-GHG = Global warming potential, excluding biogenic uptake, emissions and storage; PM = Particulate matter; IRP = Ionising radiation - human health; ETP - fw = Ecotoxicity - freshwater; HTP - c = Human toxicity potential - cancer effects; HTP - nc = Human toxicity potential - non cancer effects; SQP = Soil quality.

Table 14 | Resource use indicators

PRODUCT GROUP	Indicator	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
	State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
BLOCK Campbellfield	VIC	0.77	0.00	0.77	75.13	0.00	75.13	0.00	0.00	0.00	0.01
BLOCK Maroochydore	QLD	0.77	0.00	0.77	75.13	0.00	75.13	0.00	0.00	0.00	0.01
BLOCK Stapylton	QLD	0.77	0.00	0.77	75.13	0.00	75.13	0.00	0.00	0.00	0.01
BLOCK Ulverstone	TAS	0.77	0.00	0.77	75.13	0.00	75.13	0.00	0.00	0.00	0.01
BRICK Bendigo Smooth Shot Dark	VIC	1.97	0.00	1.97	191.92	0.00	191.92	0.00	0.00	0.00	0.03
BRICK Bendigo Honed Dark	VIC	1.97	0.00	1.97	191.92	0.00	191.92	0.00	0.00	0.00	0.03
BRICK Bendigo Smooth Shot Light	VIC	1.97	0.00	1.97	191.92	0.00	191.92	0.00	0.00	0.00	0.03
BRICK Bendigo Honed Light	VIC	1.97	0.00	1.97	191.92	0.00	191.92	0.00	0.00	0.00	0.03
BRICK Bendigo Cored Light	VIC	1.97	0.00	1.97	191.92	0.00	191.92	0.00	0.00	0.00	0.03
BRICK Maroochydore	QLD	0.23	0.00	0.23	22.13	0.00	22.13	0.00	0.00	0.00	0.00
BRICK Ulverstone	TAS	1.62	0.00	1.62	158.04	0.00	158.04	0.00	0.00	0.00	0.02

Table 14 (cont.) | Resource use indicators

PRODUCT GROUP	Indicator	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
	State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
Ecotrihex® Campbellfield	VIC	0.19	0.00	0.19	18.84	0.00	18.84	0.00	0.00	0.00	0.00
Ecotrihex® Ottoway Dark	SA	0.23	0.00	0.23	22.90	0.00	22.90	0.00	0.00	0.00	0.00
Ecotrihex® Ottoway Light	SA	0.23	0.00	0.23	22.90	0.00	22.90	0.00	0.00	0.00	0.00
Ecotrihex® Stapylton	QLD	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.00
Ecotrihex® Ulverstone Light	TAS	0.00	0.00	0.00	0.45	0.00	0.45	0.00	0.00	0.00	0.00
Ecotrihex® Ulverstone Dark	TAS	0.00	0.00	0.00	0.45	0.00	0.45	0.00	0.00	0.00	0.00
Versaloc® Bendigo	VIC	2.21	0.00	2.21	216.02	0.00	216.02	0.00	0.00	0.00	0.03
Versaloc® Campbellfield	VIC	1.29	0.00	1.29	125.49	0.00	125.49	0.00	0.00	0.00	0.02
Versaloc® Ottoway	SA	0.38	0.00	0.38	37.24	0.00	37.24	0.00	0.00	0.00	0.01
Versaloc® Stapylton	QLD	2.06	0.00	2.06	201.22	0.00	201.22	0.00	0.00	0.00	0.03
Versaloc® Ulverstone	TAS	1.26	0.00	1.26	122.83	0.00	122.83	0.00	0.00	0.00	0.02

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

Table 15 | Waste and Output flow indicators

PRODUCT GROUP	Indicator	State										
		Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal	MJ	kg	MJ
BLOCK Campbellfield	VIC	9.17E-05	7.46E-01	4.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Maroochydore	QLD	9.17E-05	7.46E-01	4.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Stapylton	QLD	9.17E-05	7.46E-01	4.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BLOCK Ulverstone	TAS	9.17E-05	7.46E-01	4.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Smooth Shot Dark	VIC	2.34E-04	1.90E+00	1.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Honed Dark	VIC	2.34E-04	1.90E+00	1.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Smooth Shot Light	VIC	2.34E-04	1.90E+00	1.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Honed Light	VIC	2.34E-04	1.90E+00	1.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Bendigo Cored Light	VIC	2.34E-04	1.90E+00	1.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Maroochydore	QLD	2.70E-05	2.20E-01	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BRICK Ulverstone	TAS	1.93E-04	1.57E+00	8.91E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 15 (cont.) | Waste and Output flow indicators

PRODUCT GROUP	Indicator	Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal
		MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
Ecotrihex® Campbellfield	VIC	2.30E-05	1.87E-01	1.06E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	SA	2.79E-05	2.27E-01	1.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	SA	2.79E-05	2.27E-01	1.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ecotrihex® Stapylton	QLD	9.17E-08	7.46E-04	4.23E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TAS	5.50E-07	4.47E-03	2.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ecotrihex® Ulverstone Light	TAS	5.50E-07	4.47E-03	2.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TAS	5.50E-07	4.47E-03	2.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Versaloc® Bendigo	VIC	2.64E-04	2.14E+00	1.22E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	VIC	1.53E-04	1.25E+00	7.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Versaloc® Ottoway	SA	4.54E-05	3.70E-01	2.10E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	QLD	2.46E-04	2.00E+00	1.13E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Versaloc® Ulverstone	TAS	1.50E-04	1.22E+00	6.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TAS	1.50E-04	1.22E+00	6.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results of the environmental performance indicators: A5

Table 16 | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP marine	EP terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC 11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
BLOCK Campbellfield	VIC	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BLOCK Maroochydore	QLD	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BLOCK Stapylton	QLD	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BLOCK Ulverstone	TAS	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BRICK Bendigo Smooth Shot Dark	VIC	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BRICK Bendigo Honed Dark	VIC	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BRICK Bendigo Smooth Shot Light	VIC	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BRICK Bendigo Honed Light	VIC	23.47	1.19E-02	8.81E-06	23.48	1.59E-07	0.08	1.05E-02	1.94E-04	2.83E-02	0.32	0.08	7.13E-06	59.91	114.03
BRICK Bendigo Cored Light	VIC	34.71	1.75E-02	1.30E-05	34.73	2.35E-07	0.12	1.55E-02	2.87E-04	4.18E-02	0.47	0.12	1.05E-05	88.51	166.27
BRICK Maroochydore	QLD	34.71	1.75E-02	1.30E-05	34.73	2.35E-07	0.12	1.55E-02	2.87E-04	4.18E-02	0.47	0.12	1.05E-05	88.51	166.27
BRICK Ulverstone	TAS	29.60	1.50E-02	1.11E-05	29.62	2.00E-07	0.10	1.32E-02	2.45E-04	3.57E-02	0.40	0.10	8.98E-06	75.51	142.53

Table 16 (cont.) | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
		kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC-11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
Ecotrihex® Campbellfield	VIC	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Ecotrihex® Ottoway Dark	SA	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Ecotrihex® Ottoway Light	SA	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Ecotrihex® Stapyton	QLD	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Ecotrihex® Ulverstone Light	TAS	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Ecotrihex® Ulverstone Dark	TAS	167.30	1.91E-01	2.70E-04	167.49	1.64E-06	0.63	7.54E-02	2.30E-03	1.90E-01	1.90E-01	2.17	0.53	9.26E-05	492.26	1342.77
Versaloc® Bendigo	VIC	151.34	9.14E-02	1.90E-04	151.43	1.38E-06	0.54	6.48E-02	4.26E-03	1.74E-01	1.74E-01	1.97	0.49	6.12E-05	457.39	1294.57
Versaloc® Campbellfield	VIC	151.34	9.14E-02	1.90E-04	151.43	1.38E-06	0.54	6.48E-02	4.26E-03	1.74E-01	1.74E-01	1.97	0.49	6.12E-05	457.39	1294.57
Versaloc® Ottoway	SA	151.34	9.14E-02	1.90E-04	151.43	1.38E-06	0.54	6.48E-02	4.26E-03	1.74E-01	1.74E-01	1.97	0.49	6.12E-05	457.39	1294.57
Versaloc® Stapyton	QLD	151.34	9.14E-02	1.90E-04	151.43	1.38E-06	0.54	6.48E-02	4.26E-03	1.74E-01	1.74E-01	1.97	0.49	6.12E-05	457.39	1294.57
Versaloc® Ulverstone	TAS	151.34	9.14E-02	1.90E-04	151.43	1.38E-06	0.54	6.48E-02	4.26E-03	1.74E-01	1.74E-01	1.97	0.49	6.12E-05	457.39	1294.57

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.

Table 17 | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator	GWP-GHG kg CO ₂ eq	PM disease incidence	IRP kBq U-235 eq	ETP - fw CTUe	HTP - c CTUh	HTP - nc CTUh	SQP
BLOCK Campbellfield	VIC	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BLOCK Maroochydore	QLD	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BLOCK Stapylton	QLD	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BLOCK Ulverstone	TAS	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BRICK Bendigo Smooth Shot Dark	VIC	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BRICK Bendigo Honed Dark	VIC	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BRICK Bendigo Smooth Shot Light	VIC	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BRICK Bendigo Honed Light	VIC	23.29	4.94E-07	1.61E-03	140.21	2.34E-09	1.26E-07	17.03
BRICK Bendigo Cored Light	VIC	34.44	7.30E-07	2.37E-03	197.04	3.46E-09	1.86E-07	25.06
BRICK Maroochydore	QLD	34.44	7.30E-07	2.37E-03	197.04	3.46E-09	1.86E-07	25.06
BRICK Ulverstone	TAS	29.37	6.22E-07	2.02E-03	171.21	2.95E-09	1.59E-07	21.41

Table 17 (cont.) | Additional mandatory and voluntary impact category indicators

PRODUCT GROUP	Indicator	GWP-GHG kg CO ² eq	PM disease incidence	IRP kBq U-235 eq	ETP - fw CTUe	HTP - c CTUh	HTP - nc CTUh	SQP
Ecotrihex® Campbellfield	VIC	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Ecotrihex® Ottoway Dark	SA	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Ecotrihex® Ottoway Light	SA	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Ecotrihex® Stapylton	QLD	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Ecotrihex® Ulverstone Light	TAS	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Ecotrihex® Ulverstone Dark	TAS	165.93	4.26E-06	3.37E-02	876.51	2.27E-08	9.97E-07	262.68
Versaloc® Bendigo	VIC	149.92	3.65E-06	7.44E-01	878.92	3.15E-08	1.30E-06	157.99
Versaloc® Campbellfield	VIC	149.92	3.65E-06	7.44E-01	878.92	3.15E-08	1.30E-06	157.99
Versaloc® Ottoway	SA	149.92	3.65E-06	7.44E-01	878.92	3.15E-08	1.30E-06	157.99
Versaloc® Stapylton	QLD	149.92	3.65E-06	7.44E-01	878.92	3.15E-08	1.30E-06	157.99
Versaloc® Ulverstone	TAS	149.92	3.65E-06	7.44E-01	878.92	3.15E-08	1.30E-06	157.99

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Acronyms: GWP-GHG = Global warming potential, excluding biogenic uptake, emissions and storage; PM = Particulate matter; IRP = Ionising radiation - human health; ETP - fw = Ecotoxicity - freshwater; HTP - c = Human toxicity potential - cancer effects; HTP - nc = Human toxicity potential - non cancer effects; SQP = Soil quality.

Table 18 | Resource use indicators

PRODUCT GROUP	Indicator	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
		MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
BLOCK Campbellfield	VIC	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BLOCK Maroochydore	QLD	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BLOCK Stapylton	QLD	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BLOCK Ulverstone	TAS	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BRICK Bendigo Smooth Shot Dark	VIC	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BRICK Bendigo Honed Dark	VIC	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BRICK Bendigo Smooth Shot Light	VIC	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BRICK Bendigo Honed Light	VIC	2.31E+00	0.00E+00	2.31E+00	6.07E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01
BRICK Bendigo Cored Light	VIC	3.39E+00	0.00E+00	3.39E+00	8.97E+01	0.00E+00	8.97E+01	0.00E+00	0.00E+00	0.00E+00	2.08E-01
BRICK Maroochydore	QLD	3.39E+00	0.00E+00	3.39E+00	8.97E+01	0.00E+00	8.97E+01	0.00E+00	0.00E+00	0.00E+00	2.08E-01
BRICK Ulverstone	TAS	2.90E+00	0.00E+00	2.90E+00	7.65E+01	0.00E+00	7.65E+01	0.00E+00	0.00E+00	0.00E+00	1.81E-01

Table 18 | Resource use indicators (cont.)

PRODUCT GROUP	Indicator		PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
	MJ	MJ	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
Ecotrihex® Campbellfield	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Ecotrihex® Ottoway Dark	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Ecotrihex® Ottoway Light	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Ecotrihex® Stapylton	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Ecotrihex® Ulverstone Light	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Ecotrihex® Ulverstone Dark	2.78E+01	0.00E+00	2.78E+01	5.01E+02	0.00E+00	5.01E+02	0.00E+00	5.01E+02	0.00E+00	0.00E+00	0.00E+00	1.47E+00
Versaloc® Bendigo	1.98E+01	0.00E+00	1.98E+01	4.67E+02	0.00E+00	4.67E+02	0.00E+00	4.67E+02	0.00E+00	0.00E+00	0.00E+00	7.58E-01
Versaloc® Campbellfield	1.98E+01	0.00E+00	1.98E+01	4.67E+02	0.00E+00	4.67E+02	0.00E+00	4.67E+02	0.00E+00	0.00E+00	0.00E+00	7.58E-01
Versaloc® Ottoway	1.98E+01	0.00E+00	1.98E+01	4.67E+02	0.00E+00	4.67E+02	0.00E+00	4.67E+02	0.00E+00	0.00E+00	0.00E+00	7.58E-01
Versaloc® Stapylton	1.98E+01	0.00E+00	1.98E+01	4.67E+02	0.00E+00	4.67E+02	0.00E+00	4.67E+02	0.00E+00	0.00E+00	0.00E+00	7.58E-01
Versaloc® Ulverstone	1.98E+01	0.00E+00	1.98E+01	4.67E+02	0.00E+00	4.67E+02	0.00E+00	4.67E+02	0.00E+00	0.00E+00	0.00E+00	7.58E-01

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

Table 19 | Waste and Output flow indicators

PRODUCT GROUP	Indicator	State											
		Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal	MJ	MJ	MJ	kg
BLOCK Campbellfield	VIC	3.75E-05	3.80E-01	2.27E-07	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
BLOCK Maroochydore	QLD	3.75E-05	3.80E-01	2.27E-07	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
BLOCK Stapylton	QLD	3.75E-05	3.80E-01	2.27E-07	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
BLOCK Ulverstone	TAS	3.75E-05	3.80E-01	2.27E-07	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
BRICK Bendigo Smooth Shot Dark	VIC	3.75E-05	3.80E-01	2.27E-07	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
BRICK Bendigo Honed Dark	VIC	3.75E-05	3.80E-01	2.27E-07	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
BRICK Bendigo Smooth Shot Light	VIC	3.75E-05	3.80E-01	2.27E-07	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
BRICK Bendigo Honed Light	VIC	3.75E-05	3.80E-01	2.27E-07	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
BRICK Bendigo Cored Light	VIC	5.54E-05	5.58E-01	3.35E-07	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
BRICK Maroochydore	QLD	5.54E-05	5.58E-01	3.35E-07	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
BRICK Ulverstone	TAS	4.73E-05	4.77E-01	2.86E-07	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

Table 19 (cont.) | Waste and Output flow indicators

PRODUCT GROUP	Indicator	State																		
		Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal	MJ	MJ	MJ	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
Ecotrihex® Campbellfield	VIC	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
	SA	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
	SA	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
Ecotrihex® Stapyiton	QLD	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
	TAS	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
Ecotrihex® Ulverstone Light	TAS	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
	TAS	5.24E-04	8.33E+00	4.80E-06	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	0.00E+00	0.00E+00	0.00E+00
Versaloc® Bendigo	VIC	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00
	VIC	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00
Versaloc® Ottoway	SA	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00
	QLD	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00
Versaloc® Ulverstone	TAS	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00
	TAS	7.07E-04	4.86E+00	1.07E-04	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	0.00E+00	0.00E+00	0.00E+00

Results of the environmental performance indicators: C1 – C4

Table 20 | Mandatory impact category indicators according to EN 15804

Indicator	GWP- fossil	GWP- biogenic	GWP- luluc	GWP- total	ODP	AP	EP freshwater	EP freshwater	EP freshwater	EP- marine	EP terrestrial	POCP	ADP- minerals & metals*	ADP- fossil*	WDP
Deconstruction and End of life	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC 11 eq.	molH ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
C1 - Deconstruction	3.43	5.46E-04	0.00	3.43	5.03E-07	0.04	5.52E-03	2.63E-05	0.02	0.17	0.05	0.00	0.00	45.04	15.93
C2 - Transportation	5.14	7.35E-04	0.00	5.14	8.27E-07	0.03	3.33E-03	1.70E-04	0.01	0.08	0.03	0.00	0.00	71.16	45.66
C3 - Waste Processing	1.50	5.00E-03	0.00	1.51	2.77E-09	0.01	7.62E-04	5.44E-05	0.00	0.02	0.00	0.00	0.00	6.95	49.98
C4 - Waste Disposal	2.09	6.71E-04	0.00	2.09	7.00E-07	0.01	1.28E-03	4.22E-05	0.00	0.03	0.01	0.00	0.00	48.61	18.62

*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.

Table 21 | Additional mandatory and voluntary impact category indicators

PRODUCT TYPE	Indicator	GWP-GHG	PM	IRP	ETP - fw	HTP - c	HTP - nc	SQP
	Deconstruction and End of life	kg CO ₂ eq	disease incidence	kBq U-235 eq	CTUe	CTUh	CTUh	Pt
All Products	C1 - Deconstruction	3.39	4.87E-06	1.10E-03	2.33E+01	5.71E-10	2.44E-08	6.73
All Products	C2 - Transportation	5.05	4.09E-07	3.07E-03	4.05E+01	1.52E-09	6.11E-08	16.99
All Products	C3 - Waste Processing	1.48	9.49E-08	3.08E-04	5.29E+00	2.46E-10	7.53E-09	4.11
All Products	C4 - Waste Disposal	2.03	8.41E-08	9.32E-04	1.89E+01	4.26E-10	1.77E-08	84.33

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Acronyms: GWP-GHG = Global warming potential, excluding biogenic uptake, emissions and storage; PM = Particulate matter; IRP = Ionising radiation - human health; ETP - fw = Ecotoxicity - freshwater; HTP - c = Human toxicity potential - cancer effects; HTP - nc = Human toxicity potential - non cancer effects; SQP = Soil quality.

Table 22 | Resource use indicators

PRODUCT TYPE	Indicator	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
		MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	MJ
All Products	Deconstruction and End of life										
	C1 - Deconstruction	0.14	0.00	0.14	47.71	0.00	47.71	0.00	0.00	0.00	2.65E-03
	C2 - Transportation	0.77	0.00	0.77	75.13	0.00	75.13	0.00	0.00	0.00	1.11E-02
	C3 - Waste Processing	1.25	0.00	1.25	6.98	0.00	6.98	0.00	0.00	0.00	1.86E-04
All Products	C4 - Waste Disposal	0.29	0.00	0.29	51.42	0.00	51.42	0.00	0.00	0.00	2.77E-02

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

Table 23 | Waste and Output flow indicators

PRODUCT TYPE	Indicator	Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal
		MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
All Products	Deconstruction and End of life								
	C1 - Deconstruction	2.08E-05	4.04E-02	1.51E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	C2 - Transportation	9.17E-05	7.46E-01	4.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	C3 - Waste Processing	4.65E-06	9.11E-02	4.43E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
All Products	C4 - Waste Disposal	2.14E-05	2.80E+02	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results of the environmental performance indicators: D

Table 24 | Mandatory impact category indicators according to EN 15804

PRODUCT GROUP	Indicator	GWP-fossil	GWP-biogenic	GWP-luluc	GWP-total	ODP	AP	EP freshwater	EP freshwater	EP-marine	EP-terrestrial	POCP	ADP-minerals & metals*	ADP-fossil*	WDP
State	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CO ₂ eq.	kg CFC 11 eq.	mol H ⁺ eq.	kg PO ₄ ³⁻ eq.	kg P eq.	kg N eq.	kg N eq.	mol N eq.	kg NMVOC eq.	kg Sb eq.	MJ	m ³
All Products	All states and Plants	-8.45	-5.04E-02	-9.28E-05	-8.50	-2.69E-07	-5.78E-02	-5.05E-03	-4.60E-04	-8.33E-03	-1.06E-01	-2.50E-02	-2.04E-05	-5.46E+01	-3.34E+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 (use) 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.

Table 25 | Additional mandatory and voluntary impact category indicators

PRODUCT TYPE	Indicator	GWP-GHG	PM	IRP	ETP - fw	HTP - c	HTP - nc	SQP
State	kg CO ₂ eq	disease incidence	kBq U-235 eq	CTUe	CTUh	CTUh	CTUh	Pt
All Products	All states and Plants	-8.33E+00	-4.96E-07	-1.02E-02	-5.42E+01	-3.51E-09	-9.37E-08	-6.72E+01

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Acronyms: GWP-GHG = Global warming potential, excluding biogenic uptake, emissions and storage; PM = Particulate matter; IRP = Ionising radiation - human health; ETP - fw = Ecotoxicity - freshwater; HTP - c = Human toxicity potential - cancer effects; HTP - nc = Human toxicity potential - non cancer effects; SQP = Soil quality.

Table 26 | Resource use indicators

PRODUCT TYPE	Indicator	PERE	PERM	PERT	PENRE	PENRM	PENT	SM	RSF	NRSF	FW
	State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ	MJ	m ³
All Products	All states and Plants	-5.72E+00	0.00E+00	-5.72E+00	-5.61E+01	0.00E+00	-5.61E+01	0.00E+00	0.00E+00	0.00E+00	-5.99E-01

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

Table 27 | Waste and Output flow indicators

PRODUCT TYPE	Indicator	Hazardous waste disposed	Non-hazardous waste disposed	Radioactive waste disposed	Components for re-use	Material for recycling	Materials for energy recovery	Exported energy, electricity	Exported energy, thermal
	State	MJ	MJ	MJ	MJ	MJ	MJ	kg	MJ
All Products	All states and Plants	2.08E-05	4.04E-02	1.51E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

7 Interpretation of results

- For brick products, the vast majority of environmental impacts are in the Product stage (A1-A3), which contributes to 39-84% of the GWP impacts (range provides for the use of different cement types, and cement loads in particular products). For Block, Ecotrihex® and Versaloc® products, Product stage (A1-A3) and Construction stage (A5) are the highest contributions to environmental impacts, with similar impacts in total GWP.
- Within the manufacturing stage:
 - Cement is the largest contributor to almost all environmental and resource use impacts. It accounts for up to 64% of total Global Warming Potential (GWP).
 - The production of masonry products at most sites is responsible for a small proportion of GWP and WDP (both are less than 14%), except masonry products manufactured at Ulverstone, which have proportion of more than 59% of WDP.
- Distribution (A4) accounts for less than 10% of GWP impacts.
- End of life deconstruction and demolition, transport, waste processing and disposal (Module C) make up less than 7% of total GWP impact. Disposal accounts for a high proportion of Non-hazardous waste, where maximum proportion of Module C is 98% for brick.
- The potential benefits from recovery and recycling of product (Module D) can provide significant benefits from avoided production of primary material. The benefits from avoided production are up to 6% of the cradle to grave greenhouse gas emissions and 49% for Water Depletion Potential.
- The main quantities of waste are non-hazardous waste disposed, primarily from product waste after use. The waste from Adbri's manufacturing site is relatively small, largely due to all product scrap being recycled on site leaving minute amounts of feed mix to be wasted.
- Ecotrihex® products have the highest GWP impacts of all the product types. This is due to the high quantities of cement required at construction stage (A5).





References

1. Australian Life Cycle Assessment Society (ALCAS). The Australian Life Cycle Inventory Shadow Database v1.31. (2018)
2. Australian Life Cycle Assessment Society (ALCAS). Australian Life Cycle Inventory (AusLCI) v1.28. (2018)
3. British Standards Institution. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products, BS EN 15804:2012+A2:2019. (2019)
4. British Standards Institution. Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements, BS EN 16757:2017. (2017)
5. Ecoinvent Centre. Ecoinvent version 3 database. Zurich: ETH, Agroscope, EMPA, EPFL, PSI. (2019) Retrieved from www.ecoinvent.org.
6. Frischknecht, R. The Environmental Relevance of Capital Goods in Life Cycle Assessments of Products and Services. Int. J LCA. (2007)
1. International Organization for Standardization. ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework
2. International Organization for Standardization. ISO 14044:2006. Environmental management – Life cycle assessment – Requirements and guidelines
3. International Organization for Standardization. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
4. The International EPD System. General Programme Instructions for The International EPD System version 3.01. (2019) Retrieved from www.envirodec.com.
5. The International EPD System. Product Category Rules (PCR) for Construction Products, PCR 2019:14 v1.11. (2021) Retrieved from www.envirodec.com.
6. The International EPD System. Complementary Product Category Rules (C-PCR) to PCR 2019:14 Cement and Building Lime. (2022) Retrieved from www.envirodec.com.

always*ready*

Adbri Limited

ABN 15 007 596 018

Adbri Masonry Pty Ltd

ABN 31 009 687 521

Registered Office

Level 1, 157 Grenfell Street
Adelaide SA 5001

adbri.com.au

© 2023

The Adbri logo, Adbri Masonry logo, Ecotrihex and Versaloc are Australian registered trade marks of Adbri Limited or related bodies corporate.

The EPD Australasia Logo is an Australian registered trade mark of IVL Svenska Miljoinstitutet AB used with permission.