PUBLIC DISCLOSURE STATEMENT

BRICKWORKS BUILDING PRODUCTS PTY LTD

PRODUCT CERTIFICATION

FY2023-24

Australian Government

Climate Active
Public Disclosure Statement

An Australian Government Initiative

NAME OF CERTIFIED ENTITY	Brickworks Building Products Pty Ltd
REPORTING PERIOD	1 July 2023 – 30 June 2024 Arrears report
DECLARATION	*To the best of my knowledge, the information provided in this public disclosure statement is true and correct and meets the requirements of the Climate Active Carbon Neutral Standard.* 
	David Fitzharris Executive General Manager – Brickworks Australia and New Zealand 03/04/25

Australian Government
Department of Climate Change, Energy, the Environment and Water

Version 9.

1. CERTIFICATION SUMMARY

TOTAL EMISSIONS OFFSET	359 tCO_2-e
CARBON OFFSETS USED	30% ACCUs, 70% VCUs
RENEWABLE ELECTRICITY	N/A
CARBON ACCOUNT	Prepared by: Brickworks Building Products Pty Ltd
TECHNICAL ASSESSMENT	21 December 2023 Energetics Next technical assessment due: FY2026

Contents

2.CERTIFICATION INFORMATION

Description of product certification

This product certification is for bricks and pavers manufactured at Brickworks' operations in Horsley Park Plant 1 and 2, Bowral and Punchbowl (NSW), Wollert (Vic), Golden Grove (SA) and Rochedale (QLD). Longford (TAS) is covered by a separate certification.

- Functional unit: tonnes CO2e per one thousand Single Brick Equivalents (1,000 SBE) of bricks or pavers – specified by product type – manufactured by Brickworks in Australia and used in various applications throughout Australia and overseas.
- Offered as: opt-in product
- Life cycle: cradle-to-grave

Plant 3 and Bellevue operations were closed in FY2023 and are therefore no longer covered by this PDS. The Cardup operations was in care and maintenance in FY2024.

The responsible entity for this product certification is Brickworks Building Products Pty Ltd, ABN 63 119 059 513.

This Public Disclosure Statement includes information for FY2023-24 reporting period.

Brickworks are currently working towards producing EPDs for our Australian made products. An EPD was not available at the time of producing this PDS. The carbon inventory has been prepared and verified based on the Climate Active Carbon Neutral Standard for products and services, the ISO14040:2006 and ISO14044:2006 standards for life cycle assessment.

Description of business

Brickworks Building Products Pty Ltd (Brickworks) is one of Australia's largest, best known and most diverse building material manufacturers. Our products include clay bricks and pavers, concrete masonry blocks, retaining wall systems, stone, concrete, terracotta and solar roof tiles, terracotta façades and lightweight building systems.

Brickworks has been transformed from originally a New South Wales state-based operation to a national organisation with currently eight brick manufacturing operations in NSW, Victoria, Tasmania, South Australia and Queensland (see Figure 1).

Austral Bricks is the subsidiary of Brickworks that manufactures and sells Australian made clay bricks and pavers for the Australian and overseas markets. Austral Bricks holds multiple ABNs in each state, and multiple brands including Daniel Robertson, Bowral Bricks and Nubrik, therefore for the purpose of Climate Active, the certification is held by Brickworks Building Products Pty Ltd and Austral Bricks and its brands will use the Climate Active certification to sell carbon neutral bricks.

Our bricks and pavers are kiln-fired products of different dimensions and weight. We have undertaken a life cycle assessment (LCA) that covers all our products manufactured at our eight production sites across Australia. Brickworks offers carbon neutral bricks in two ways:

- to selected clients and projects (Opt in),
- all customers who purchase bricks made at Austral Bricks Longford (See the Austral Bricks (TAS) PDS)

For this purpose, the LCA has been built into Brickworks' custom carbon calculator, a tool that allows us to easily calculate the total amount of greenhouse gas emissions associated with the lifecycle of any given brick type and for the exact quantity of bricks supplied to a client or building project.

The total carbon inventory to be offset is assessed annually based on the quantity of carbon neutral certified products sold.

3.EMISSIONS BOUNDARY

Inside the emissions boundary

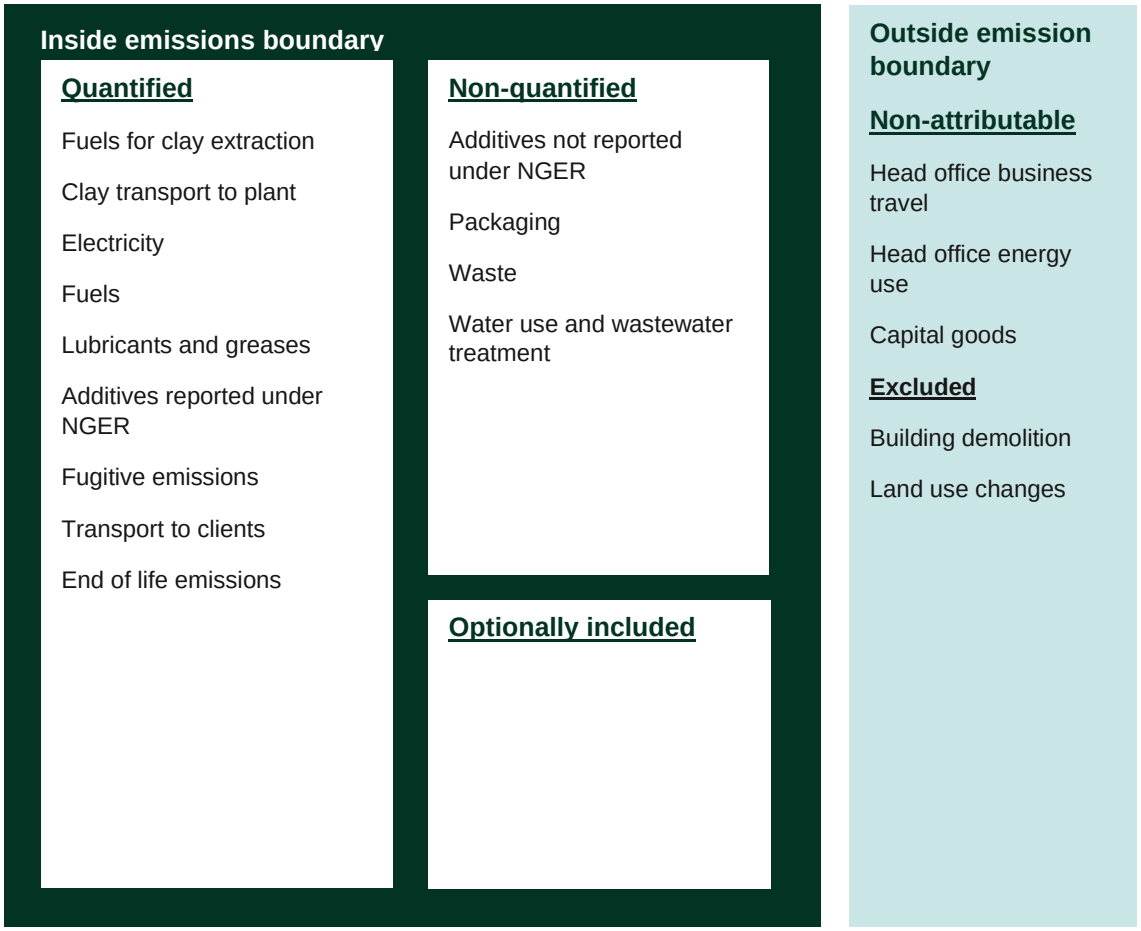
All emission sources listed in the emissions boundary are part of the carbon neutral claim.

Quantified emissions have been assessed as 'attributable processes' of a product or service. These attributable processes are services, materials and energy flows that become the product or service, make the product or service and carry the product or service through its life cycle. These attributable emissions have been quantified in the carbon inventory.

Non-quantified emissions have been assessed as attributable and are captured within the emissions boundary, but are not measured (quantified) in the carbon inventory. All material emissions are accounted for through an uplift factor. Further detail is available at Appendix C.

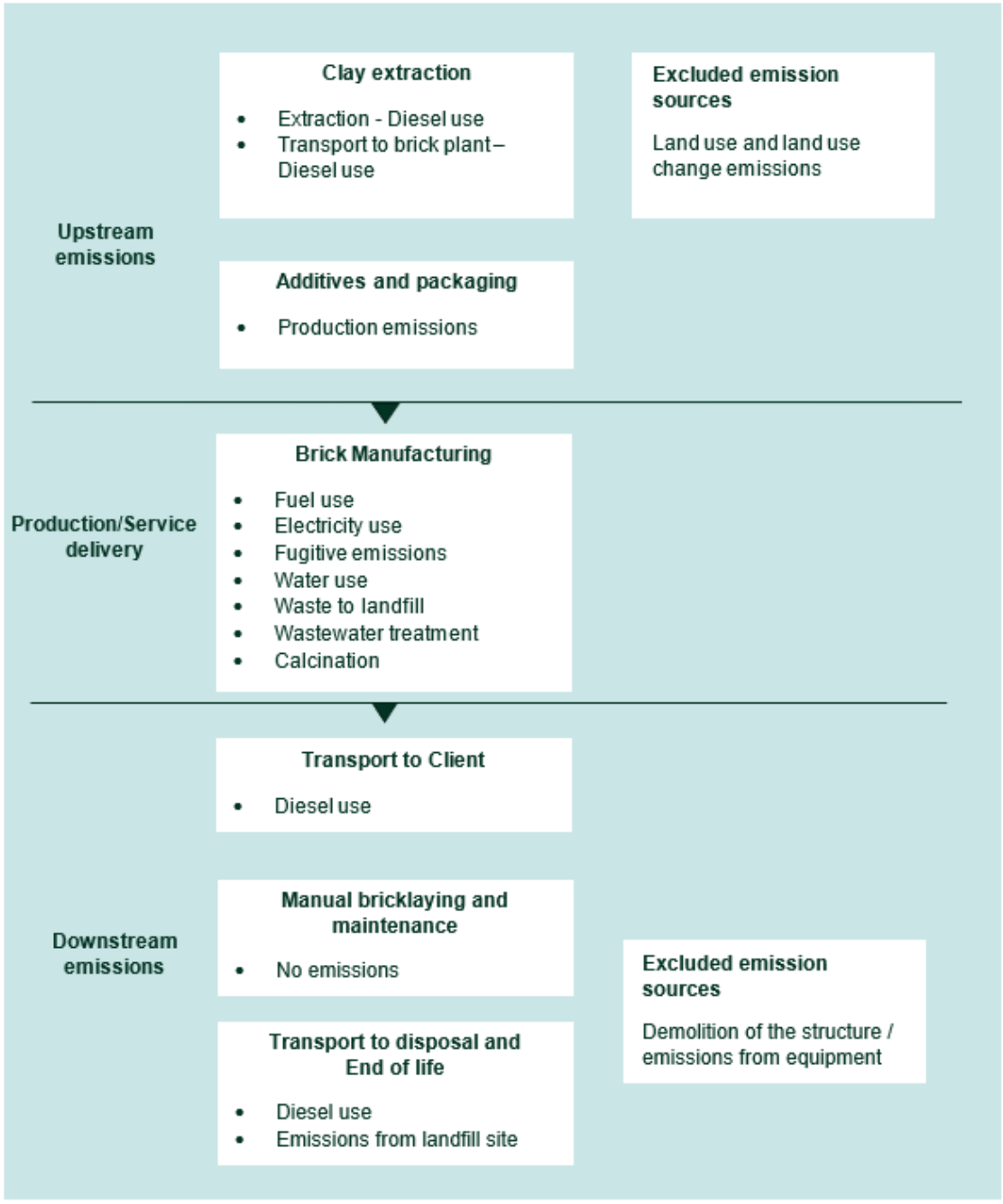
Outside the emissions boundary

Non-attributable emissions have been assessed as not attributable to a product or service. They can be **optionally included** in the emissions boundary and therefore have been offset, or they can be listed as outside of the emissions boundary (and are therefore not part of the carbon neutral claim). Further detail is available at Appendix D.



Product / Service process diagram

Cradle-to-grave boundary



4. EMISSIONS REDUCTIONS

Emissions reduction strategy

Brickworks is committed to social and environmental responsibility. As a large and diverse building products manufacturer, we believe we have a responsibility to our shareholders, employees, industry, environment and the wider community. Brickworks accepts responsibility for environmental protection which is integral to the conduct of its commercial operations. Brickworks' key objective is to comply with environmental laws and regulations which relate to its environmental aspects and minimise environmental harm by operating in a manner that reaches an appropriate balance between environmental, technical, economic and social objectives. We recognise that all employees have a major role to play in protecting the environment. To achieve our environmental policy commitments, the company will actively provide for, encourage, and support training in environmental issues and sustainability.

As a subsidiary of Brickworks Limited, Austral Bricks has the backing of professional teams in environment, sustainability and research and development. Brickworks' sustainability strategy, 'Build for Living: Towards 2025', recognises the substantial environmental and social impacts of the built environment. The strategy focuses on the opportunity to make buildings and cities safe, resilient and sustainable through reducing carbon emissions. The strategies are available on Brickworks' website: https://www.brickworks.com.au/sustainability/ and https://www.brickworks.com.au/climate-related-impacts-and-responses/.

Last year Brickworks announced a new carbon target: to achieve 15% reduction in Scope 1 and 2 greenhouse gas emissions by 2030, from a 2022 baseline, across our combined Australian and North American operations. In response to the subdued market conditions, the Company has taken the opportunity to carry out increased maintenance activities and intermittent plant shutdowns during FY2024, ahead of the anticipated strong demand through the rest of the decade. This has influenced a reduction in greenhouse gas emissions in FY2024 of 22% compared to the FY2022 baseline.

The carbon target is also underpinned by our stretch target for a 10% increase in gas efficiency at Austral Brick plants by 2030 since FY2018. Since FY2018, which marked the start of a strategic 10-year investment vision to drive energy efficiency, our Austral Bricks business has seen an 8% improvement in gas efficiency.

Bioenergy Transformation Strategy

Our goal is to transition to a low carbon economy, while providing high thermal mass products that minimise energy consumption through the operational phase of a home.

Clay bricks are a naturally energy efficient material, absorbing heat energy, storing it and releasing it later into the environment. This thermal lag from thermal mass saves lifetime carbon emissions by reducing demand for artificial heating and cooling in homes.

The thermal mass results in a reduction in energy consumption over the lifetime of a building, with up to 40% reduced heating and cooling loads when combined with insulation, compared to lightweight

construction alternatives.

At Brickworks, we are also focussed on reducing embodied carbon through the manufacturing process. Brickworks has 10 years of experience in providing carbon neutral products from our Longford Tasmania facility using 73% bioenergy of the site's energy mix. Brickworks sees a range of opportunities to replicate the success of this low carbon brick manufacturing through the Brickworks Bioenergy Transformation strategy.

Our bioenergy transformation strategy includes:

- increased use of renewable energy sources, with a focus on bioenergy.
- best practice manufacturing efficiency, including investment in the latest kiln technology, and
- innovation in raw materials and product design – including brick voids, on-board fuels, raw material innovation and production innovation.

Brickworks will use our product strengths to develop the next generation clay brick and concrete block wall systems. Our sustainable product innovation strategy focus is to provide a wide range of thermal mass product options with high recycled content and lower embodied carbon across roofing and walling products. By 2030, Brickworks and our partners will invest over $22.6 million into research and development into our sustainable innovation focus areas including: the thermal mass benefit of products, light-weighting, raw material optimisation to reduce embodied carbon and increase recycled content, sustainable design elements and product innovation.

Climate Related Strategy and Programs

In Australia, Brickworks Limited carbon emissions have followed a general downward trend, with a 56% decrease in FY2024 compared to the base year 2005/06 (Scope 1 and 2).

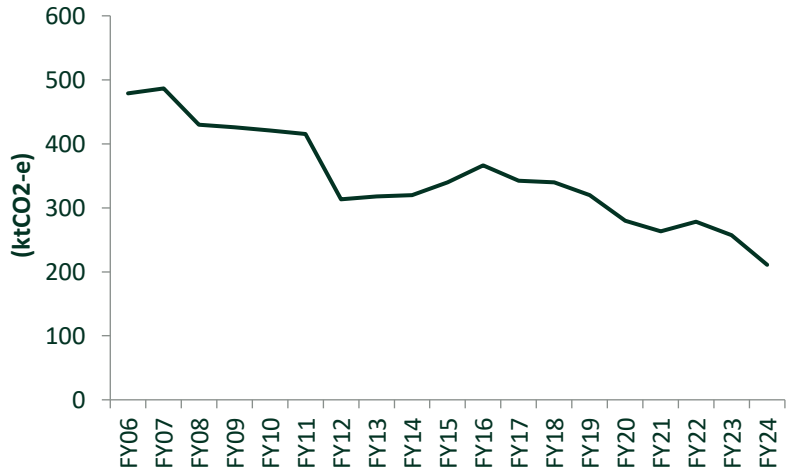


Figure 1. Brickworks Building Products Australia Greenhouse Gas Emissions Since 2005 (ktCO2-e)

The decrease is attributed to efficiencies gained from alternate fuels, manufacturing consolidation, equipment upgrades and operational improvements. Brickworks has invested over $400 million dollars

since 2006 in equipment upgrades and operational improvements (including new plants) and carbon reduction strategies.

Our climate-related strategy, targets and programs build on these achievements, focusing on four key areas, including efficiency, lower carbon energy sources, innovation and improving the energy efficiency of homes over lifetime operations. Each focus area has deliverables to drive performance as referenced below.

Brickworks climate related strategic focus areas and deliverables

	Manufacturing energy efficiency strategy	**Lower Carbon Energy Sources**	**Innovation**	**Improve home energy efficiency over lifetime operations**
Strategy focus area	Achieve global leadership in leading manufacturing excellence and efficiency	Increasing use of bioenergy and low carbon fuels Renewable Electricity and Gas Purchasing Strategy	Develop the next generation clay brick and concrete block wall systems, through light-weighting, on-board fuels, raw material optimisation and product innovation	Provide thermal mass products such as bricks and roof tiles which can reduce heating and cooling bills by up to 40% annually using cavity brick compared to lightweight construction[1]
Deliverables	Stretch target for 10% increase in gas efficiency at Austral Bricks plants by 2030 (FY2018 baseline)	15% reduction in Scope 1 and 2 greenhouse gas emissions by 2030, from a 2022 baseline, across our combined Australian and North American operations Continued investment into developing feasible renewable biomethane opportunities Bioenergy Transformation Strategy Complete the Brickworks Hydrogen Project	Year on year increase into R&D investment into the next generation of clay brick and concrete block wall systems. This represents more than $22.6 million invested by 2030 by Brickworks and our partners Share learnings and explore opportunities with value chain Increase the volume of verified sustainable products to 25%	Invest in research for thermal design and lifecycle education Share learnings and explore opportunities with value chain

Emission reductions actions

Efficiency upgrades - Brickworks has a long history of investing in the latest kiln and manufacturing technologies which is a key approach in how Brickworks has driven a general downward trend in carbon emissions. During FY2019, the Austral Bricks Horsley Park Plant 2 kiln was shut down in preparation for an upgrade to a state-of-the-art brick manufacturing facility. Construction of the new Plant 2 facility was

[1] A Study of the Thermal Performance of Australian Housing, University of Newcastle, 2011-2017. Study is currently being updated to include thermal research in 7 Star Home designs under the Nationwide House Energy Rating Scheme.

completed in FY2023 and com commissioning completed in FY2024. This facility, now has the capacity to manufacture 130 million bricks per year, is the most advanced brick plant in the world, delivering best in its class fuel efficiency, and setting a new standard for brick manufacturing. This has resulted in a 57% improvement in energy intensity and 40% improvement in Scope 1 and 2 greenhouse gas intensity compared to FY2018.

Exploring renewable electricity opportunities: In FY2024, Brickworks installed 1.2 MW of rooftop solar across multiple sites, generating 934 MWh annually. Upcoming installations include 3 MW at Plant 2 in Western Sydney and 1,460 kW in Melbourne. The Western Sydney plant set to cover 19% of its electricity needs.

Biofuels - Brickworks has long-since used biogas and sawdust for renewable energy generation. The Alternative Fuels Program saw Brickworks Australia achieve 11% energy use composition of biofuels in FY24. In 2024 multiple plants were investigating trialling using small amounts of various biofuels as onboard fuel which replaces some of the energy traditionally provided by natural gas.

Landfill gas - Austral Bricks Horsley Park, NSW, Plant 21 has used landfill gas since 2013. The combustion of landfill gas emits 10 times less carbon than natural gas. Horsley Park used 107,000 GJ of landfill gas throughout the year, preventing approximately 4,800 tonnes of carbon emissions.

Sawdust Sawdust is the main fuel source at Austral Bricks Longford, Tas and is a waste acquired from various Tasmanian sawmills. The site used 119,000 GJ of sawdust throughout the year. While the use of sawdust is less energy efficient than natural gas, its bioenergy component means that net carbon emissions from the combustion of sawdust is 40 times lower than natural gas avoiding 6,000 tonnes of greenhouse gas emissions.

Light-weighting to improve energy efficiency – Using enhanced clay materials, our Queensland and NSW brick factories have increased core percentage for some products from 27-28% to 41%, reducing material use by 18%, cutting energy consumption, and maintaining/improving product quality while increasing kiln capacity. These gains are being rolled out across selected Austral Brick products.

Vehicle and Logistics Efficiency **-** Brickworks continuously modernises its trucks after five years to provide up to date safety features for the community and public and improved fuel efficiency. In FY23, six trucks were replacement with Euro V specification. All company vehicles were fitted with telematics providing drivers and managers with real time monitoring and feedback on fuel efficiency indicators.

Continued innovation

Our sustainable product innovation strategy focus is to provide a wide range of thermal mass product options with high recycled content and lower embodied carbon across roofing and walling products.

During FY2024, strategic research and development projects were successfully completed and embedded into production including new products and efficiency gains. These successful projects highlight the continued potential for significant advancements across our five sustainability innovation focus areas. The relevant projects for Austral Bricks are described below.

Thermal mass - Investment into updating critical thermal mass research demonstrating benefits from thermal mass with the University of Newcastle.

Light-weighting and higher recycled content - Brickworks' dedication to excellence means our products are fired in some of the leading energy-efficient kilns, with ongoing research to reduce brick weight through enhanced core percentage and innovative core patterns, resulting in savings on clay, energy, fuel, and ease for bricklayers. As mentioned above, our Queensland and NSW brick factories have increased core sizing for some products improving energy efficiency. These gains are being rolled out across selected Austral Brick products.

Raw material optimisation - Optimal raw material mixes can reduce embodied carbon or process heat demands. Brickworks commitment to innovation continues to be rewarded by significant developments in energy savings and premium product development. Ongoing research into traditional clay materials has provided us with a deep understanding of their physical and chemical properties. This knowledge allows us to successfully develop raw material optimised mixes which require less process heat energy, reducing the embodied carbon of bricks.

Exploring additional biofuels opportunities – We are actively advancing various feasibility studies for a series of projects designed to significantly boost the utilisation of bioenergy. These opportunities encompass harnessing additional landfill gas resources, integrating alternative organic raw materials, and generating on-site bioenergy through anaerobic digestion. Brickworks is assessing the feasibility of a 253 TJ renewable bioenergy facility to be located next to a brick plant in Horsley Park, NSW. The project recently lodged a development application with the NSW Government. We are also assessing the feasibility of LFG cleaning to supply our Queensland Rochedale brick manufacturing site.

5.EMISSIONS SUMMARY

Emissions over time

Brickworks has completed a comprehensive life cycle assessment for our Australian brick manufacturing facilities. This assessment includes all bricks and pavers made at the facilities and covers the emissions boundary as previously described. The table below presents the emissions overtime since the beginning of the carbon neutral certification in 2018/19.

Emissions since base year	**Life cycle emissions**					
Production location	(kg CO2-e/tonne bricks)					
	Base year 2018-19	Year 1 2019-20	Year 2 2020-21	Year 3 2021-22	Year 4[2] 2022-23	Year 5[2] 2023-24
Wollert (Vic)	201.1	240.2	231.4	214.2	211.4	217.3
Longford (Tas)[3]	102.4	138.5	104.7	101.1	107.1	105.3
Golden Grove (SA)	175.9	215.0	169.2	172.0	219.1	217.6
Horsley Park Plant 1 (NSW)	202.2	241.3	203.9	203.7	206.3	193.2
Horsley Park Plant 2 (NSW)	369.4	408.4	n/a	n/a	n/a[4]	215.8
Horsley Park Plant 3 (NSW)	195.8	234.9	161.7	179.1	197.1	n/a[5]
Bowral (NSW)	319.8	358.8	299.9	279.4	317.1	324.1
Punchbowl (NSW)	289.7	328.7	271.3	269.6	290.8	289.5
Bellevue (WA)	214.5	253.6	223.5	205.4	254.4	n/a[5]
Cardup (WA)	328.1	367.2	337.2	320.0	315.1	n/a[6]
Rochedale (QLD)	213.0	252.1	212.0	210.6	229.6	226.2

[2] The Brickworks custom built carbon calculator, designed by a certified Life Cycle Assessment (LCA) practitioner, uses the weight of our bricks before firing to calculate emissions for each Opt-in product. The emissions factors have been published previously are the unfired life cycle emissions per tonne. However, outside of this custom built calculator, using pre-fired weights provides a less accurate representation of life cycle emissions per tonne of bricks to an external reader. To enhance transparency for readers of this PDS, the FY2024 life cycle emissions have been adjusted to reflect the fired weight of the bricks. FY2023 emissions data has also been adjusted to ensure a consistent historical comparison. All offset calculations are still calculated using the customer built calculator using the pre-fired brick weights and therefore this change does not affect the historical or current offset calculations.

[3] All products from our Longford Plant (TAS) are certified under a separate climate active certification. Please refer to Austral Bricks (TAS) climate active PDS for further details. Life cycle emissions disclosed may not match due to differing transport boundaries between the two Product Disclosure Statements.

[4] Plant 2 shut down for major upgrades between FY2021 and FY2023. Upgrades to plant were fully commissioned in FY24.

[5] Plant 3 and Bellevue were closed in FY2023

[6] Cardup factory is in care and maintenance as of FY2024

Significant changes in emissions

Product locations with greater than (+/- 10%) change in the emission intensity are listed below in Table 4. This also provides reasons for these fluctuations in our emissions.

Significant changes in emissions			
Attributable process	**Previous year emissions** (t CO_2-e)	**Current year emissions** (t CO_2-e)	**Reason for change**
Horsley Park Plant 2	408.4	215.8	Significant upgrades to Plant 2 since FY2020 leading to a 47% reduction t CO_2-e per tonne of product.

Use of Climate Active carbon neutral products, services, buildings or precincts

N/A

Emissions summary

Life cycle stage / Attributable process / Emission source	**tCO_2-e/tonne bricks**[7]
Fuel use (diesel) at clay quarry	0.0137
Fuel use (diesel) for transport of raw materials	0.003
On-site energy: Natural gas used for firing clay	0.1348
On-site energy: Electricity	0.0337
On-site energy: Other energy sources	0.005
Additives reported under NGER	0.0003
CO2 released (from organic carbon) during production	0.001
Uplift factor for packaging, business travel and other overhead	0.002
Uplift factor for additives not reported under NGER	0.002
Transport of bricks to customer (assuming 50km)	0.0108
Manual application and manual maintenance/cleaning	0
Transport of bricks to end-of-life landfill	0.0108
Bricks in landfill	0
Attributable emissions (tCO_2-e / t bricks)	**0.217**

Product / Service offset liability	
Emissions intensity per functional unit (average t CO2e/000SBE)[8]	0.747
Emissions intensity per functional unit including uplift factors	Uplifts included above
Number of functional units covered by the certification	479.874
Total emissions (tCO_2-e) to be offset	**359**

[7] The contribution of emission sources to the inventory will vary by site and depends on site to client transport requirements. This table shows an example of the contribution of various emission sources to the life cycle footprint of bricks produced at our largest facility in Wollert (Victoria), assuming 50 km transport to client by delivery truck.

[8] Emission intensity per functional unit is based on the actual data of products sold and transport to the project site.

6.CARBON OFFSETS

Eligible offsets retirement summary

Offsets retired for Climate Active certification

Type of offset unit	Quantity used for this reporting period	Percentage of total units used
Australian Carbon Credit Units (ACCUs)	108	30.08%
Verified Carbon Units (VCUs)	251	69.92%

Project name[9]	Type of offset unit	Registry	Date retired	Serial number	Vintage	Total quantity retired	Quantity used in previous reporting periods	Quantity banked for future reporting periods	Quantity used for this reporting period	Percentage of total used this reporting period
Northern Savanna burning project Qld	ACCU	ANREU	2/09/2020	3,801,409,481 – 3,801,409,730	2019-20	250	190	0	60	16.71%
Paroo River North Environmental Project native forest regeneration Qld	ACCU	ANREU	2/09/2020	3,788,417,534 – 3,788,417,617	2019-20	84	0	64	20	13.37%
Paroo River North Environmental Project native forest regeneration Qld	ACCU	ANREU	2/09/2020	3,786,369,101 – 3,786,369,266	2019-20	166	0	138	28	13.37%

[9] The Thaa-Nguigarr Carbon Project, Qld offsets previously reported in the FY23 Brickworks Opt in PDS have been transferred to the Austral Bricks (TAS) Pty Ltd PDS. No credits were used as part of the Opt In PDS, therefore no double counting of these units has occurred.

Project name	Type of offset unit	Registry	Date retired	Serial number	Vintage	Total quantity retired	Quantity used in previous reporting periods	Quantity banked for future reporting periods	Quantity used for this reporting period	Percentage of total used this reporting period
Usak Wind Power Plant, Turkey	VCU	Verra Registry	22/12/2021	8493-25265219-25269218-VCS-VCU-1590-VER-TR-1-1546-01012015-31122015-0	2015	4000	446	3303	251	69.92%
								Total eligible offsets retired and used for this report	359	
								Total eligible offsets retired this report and banked for use in future reports	3505	

Co-benefits

Northern Savanna KACCUs (ERF104944) is an early dry season savanna burning project aimed at reducing late dry season wildfires. The project is run by the Alka Bawar (Kalpowar) Aboriginal Corporation (ABAC) and is situated above the 1,000 mm rainfall isohyet. Uncontrolled wildfires late in the dry season are common in Northern Australia, emitting large volumes of greenhouse gases. In addition, the wildfires threaten cultural sites, essential infrastructure and biodiversity.

To achieve compliance with the Methodology, the proponent undertakes strategic fire management planning and implementation, including early dry season prescribed burns (i.e. fires occurring between January 1 and July 31). This strategic burning is intended to reduce the risk of late dry season wildfires (i.e. fires occurring on or after 1 August), at which time the fuels generally have a lower moisture content, resulting in a more complete burn with higher greenhouse gas emissions. The Project is intended to generate annual revenue from the sale of ACCUs, which will support ongoing conservation management and indigenous-owned cattle operations.

The project has significant cultural and environmental co-benefits. A fire management program was instigated from 2017 and continues to the present. This mitigates wildfire risk, conserves vegetation and animal species, protects wetlands and controls weeds. Burning takes place prior to July 31st each year, before the start date of the late dry season (LDS) of the 1st of August. The operations are conducted by staff and contractors as required. •

Paroo River North Environmental Project KACCUs (ERF104646) This project establishes permanent native forests through assisted regeneration from in-situ seed sources (including rootstock and lignotubers) on land that was cleared of vegetation and where regrowth was suppressed for at least 10 years prior to the project having commenced.

Usak Wind Power Plant, Turkey is a wind farm in Banaz Town of Usak Province, providing renewable electricity to the Turkish grid. The project also stimulates the economic development as wind power, being an infinite and natural resource, is ecologically more sustainable than other fossil fuel-based energy generation. From a local perspective, the project provides employment opportunities for local people. Ancillary works are undertaken by local companies providing opportunities to advance technological capacity.

7. RENEWABLE ENERGY CERTIFICATE (REC) SUMMARY

Renewable Energy Certificate (REC) Summary

N/A

APPENDIX A: ADDITIONAL INFORMATION

Product Description

Brickworks Building Products Pty Ltd (Brickworks) is one of Australia's largest, best known and most diverse building material manufacturers. Our products include clay bricks and pavers, concrete masonry blocks, retaining wall systems, stone, concrete, terracotta and solar roof tiles, terracotta façades and lightweight building systems.

Brickworks has been transformed from originally a New South Wales state-based operation to a national organisation with currently eight brick manufacturing operations in NSW, Victoria, Tasmania, South Australia and Queensland. Austral Bricks is the subsidiary of Brickworks that manufactures and sells Australian made clay bricks and pavers. Austral Bricks holds multiple ABNs in each state, and multiple brands including Daniel Robertson, Bowral Bricks and Nubrik, therefore for the purpose of Climate Active, the certification is held by Brickworks Building Products Pty Ltd and Austral Bricks and its brands will use the Climate Active certification to sell carbon neutral bricks.

The manufacturing process for bricks and pavers is identical and for the purpose of this document, pavers may be referred to as bricks. It starts with mining clay and shale and mechanically processing it prior to shaping and firing the bricks in kilns fueled predominantly by natural gas.

Clay bricks are used in construction; typically walling systems, planter boxes, etc. Clay pavers are used in paving and landscaping applications.

Bricks are a building material predominately used in the construction of walls, pillars, and pavement.

Bricks hold many benefits including:

- Offer a long life
- Low maintenance
- Durable
- Healthy
- Used in energy efficient building design
- Fire resistant
- Excellent acoustic properties
- Reusable and recyclable
- Inert

Table 1 and Table 2 present examples of the products studied in this LCA.

The carbon inventory has been prepared and verified based on the Climate Active Carbon Neutral Standard for products and services, the ISO14040:2006 and ISO14044:2006 standards for life cycle assessment.

Table 1: Typical brick product configurations (Source: Austral Bricks)

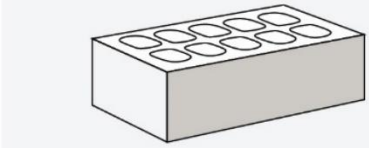
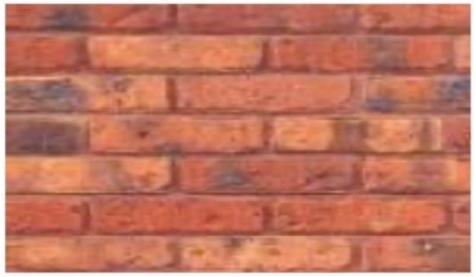
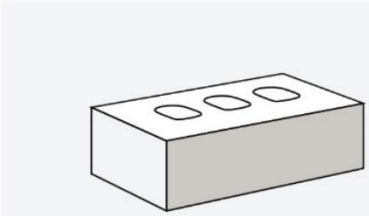
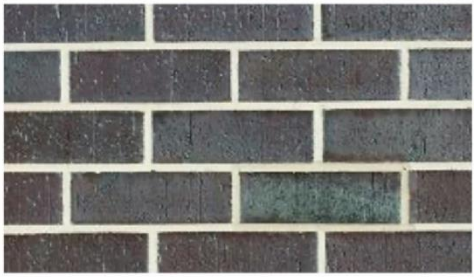
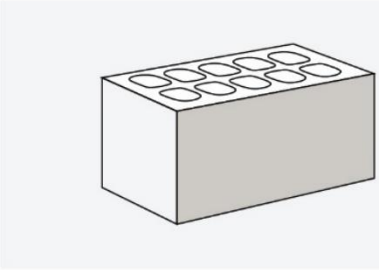
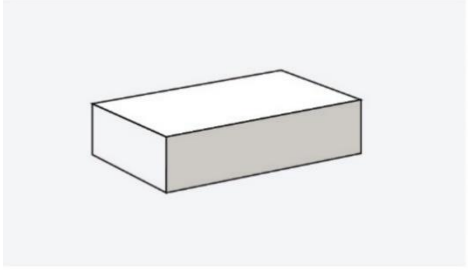
Brick shape and core hole configuration	Examples - bricks in wall application
 Standard brick with 10 core holes	
 Standard brick with 3 core holes	
 Twin brick	

Table 2: Typical paver product configuration (Source: Austral Bricks)

Paver shape	Example - pavers in paving application
 Classic paver (no core holes)	

Brickworks Climate Active certifications

Brickworks certifies selected Australian made clay brick products as carbon neutral under the Climate Active program. Brick products can become carbon neutral certified in two ways:

- All bricks made in Tasmania are carbon neutral and available to all customers. Austral Bricks Tasmania has held Carbon Neutral Certification since 2013-14.
- On a project and/or client basis for all other Australian brick factories. This option entails negotiation with our clients. i.e. for the type and quantity of bricks and pavers supplied to a project or to a client.

Brickworks holds two Climate Active Licences, one for each scenario.

The functional unit for this certification is one thousand (1,000) bricks or pavers – specified by product type – manufactured by Brickworks in Australia and used in various applications throughout Australia and overseas.

Our bricks and pavers are kiln-fired products of different dimensions and weight. We have undertaken a life cycle assessment (LCA) that covers all our products manufactured at our eleven production sites across Australia.

For this purpose, the LCA has been built into Brickworks' custom carbon calculator, a tool that allows us to easily calculate the total amount of greenhouse gas emissions associated with the lifecycle of any given brick type and for the exact quantity of bricks supplied to a client or building project.

The total carbon inventory to be offset will be assessed annually based on the quantity of carbon neutral certified products sold.

Emissions boundary

For each life cycle stage, all attempts have been made to identify and quantify material flows, energy flows and emission sources. The inputs include materials, fuels and energy while the outputs include products, emissions and waste.

For the purposes of this certification, the embodied energy incorporated in the infrastructure (buildings, plant, equipment, roads, vehicles, etc.) associated with manufacturing bricks and pavers is excluded from the product system. Other capital goods (e.g. power lines) are excluded as well. This is due to the long lifetime of capital goods in the brick lifecycle and the expected impact of this exclusion on the footprint is small.

Brickworks has applied a cut-off limit for flows smaller than 1% of expected greenhouse gas emissions. This means we have estimated emissions based on data from our existing LCA for bricks manufactured in Longford, instead of collecting detailed information for these smaller emission sources for each site. These are listed as non-quantified sources in Figure 2 below.

Note: Mortar and/or other materials used to bond bricks in their application are excluded from the carbon footprint assessment. The reasons for this exclusion are:

- Brickworks does not supply the mortar to clients, and therefore has no control over the composition and quantity of mortar used.
- Furthermore, the bricks and pavers are used in a range of applications that have varying requirements regarding ancillary materials. Any attempt to capture these requirements within the scope of this certification would introduce additional uncertainty

Product/Service emissions summary notes

Brickworks has undertaken an LCA for all bricks made in Australia, allowing us to calculate the emissions intensity of each product individually (based on product characteristics and site processes) in the context of the place where it is used (transport to client).

The contribution of emission sources to the inventory will vary by site and depends on site to client transport requirements. The table published in this PDS shows an example of the contribution of various emission sources to the life cycle footprint of bricks produced at our largest facility in Wollert (Victoria), assuming 50 km transport to client by delivery truck.

When determining the emissions associated with bricks supplied to a client or project, we use the actual mass of the bricks supplied and actual transport distance from plant to client to get an accurate carbon footprint for the consignment.

The LCA has been built into Brickworks' custom carbon calculator, a tool that allows Brickworks to easily calculate the total amount of greenhouse gas emissions associated with the lifecycle of any given brick type and for the exact quantity of bricks supplied to a client or building project.

The total carbon inventory to be offset is assessed annually based on the quantity of carbon neutral.

APPENDIX B: ELECTRICITY SUMMARY

N/A.

APPENDIX C: INSIDE EMISSIONS BOUNDARY

Non-quantified emission sources

The following emissions sources have been assessed as attributable, are captured within the emissions boundary, but are not measured (quantified) in the carbon inventory. These emissions are accounted for through an uplift factor. They have been non-quantified due to one of the following reasons:

1. **Immaterial** <1% for individual items and no more than 5% collectively
2. **Cost effective** Quantification is not cost effective relative to the size of the emission but uplift applied.
3. **Data unavailable** Data is unavailable but uplift applied. A data management plan must be put in place to provide data within 5 years.
4. **Maintenance** Initial emissions non-quantified but repairs and replacements quantified.

Relevant non-quantified emission sources	Justification reason
Additives not reported under NGER	Data unavailable (but uplift applied & data plan in place)
Packaging	Data unavailable (but uplift applied & data plan in place)
Waste	Immaterial
Water use and wastewater treatment	Immaterial

Excluded emission sources

Attributable emissions sources can be excluded from the carbon inventory, but still considered as part of the emissions boundary if they meet **all three of the below criteria**. An uplift factor may not necessarily be applied.

1. A data gap exists because primary or secondary data cannot be collected **(no actual data).**
2. Extrapolated and proxy data cannot be determined to fill the data gap (**no projected data**).
3. An estimation determines the emissions from the process to be **immaterial**).

Emissions Source	No actual data	No projected data	Immaterial
Land use and land use change emission	Yes	Yes	Yes
Demolition of the structure / emissions from equipment	Yes	Yes	Yes

Data management plan for non-quantified sources

The data management plan below outlines how more rigorous quantification can be achieved for material (greater than 1%) non-quantified emission sources.

The following items meet the condition of ‘attributable’ but are below the cut-off and are considered non-quantified. We have applied uplift factors based on the previous LCA for bricks manufactured in Longford.

- Additives not reported under National Greenhouse and Energy Reporting (NGER) Act 2007: We use a large range of additives to give each brick its unique properties (colour, glaze, etc.). Additives that are energy carriers (e.g. char, sawdust, vegetable oils, starch-based additives) are reported under our NGER obligations and have been included based on actual use and emission factors. The remaining additives are mainly minerals (e.g. iron oxide, manganese oxide) or frits (glass containing colorant). Using conservative literature data applicable to additives used at Longford (Tas), based on Brickworks’ NCOS LCA FY19, the weighted average emission factor was established as 214 kg CO2e/t of additives not already reported under NGER. This equates to 1.4 kg CO2e per tonne of bricks. This factor has been applied as the uplift factor across all products.

- Packaging, waste to landfill, water use and wastewater treatment: Based on Brickworks’ NCOS LCA FY19, the total of greenhouse gas emissions associated with these sources added up to 2.2 kg CO2e per tonne of bricks. This factor has been applied as the uplift factor across all products.

Cumulatively, the uplift factors account for 2% of the products’ life cycle emissions.

APPENDIX D: OUTSIDE EMISSION BOUNDARY

Non-attributable emissions have been assessed as not attributable to a product or service (do not carry, make or become the product/service) and are therefore not part of the carbon neutral claim. To be deemed attributable, an emission must meet two of the five relevance criteria. Emissions which only meet one condition of the relevance test can be assessed as non-attributable and therefore are outside the carbon neutral claim. Non-attributable emissions are detailed below.

1. **Size** The emissions from a particular source are likely to be large relative to other attributable emissions.

2. **Influence** The responsible entity could influence emissions reduction from a particular source.

3. **Risk** The emissions from a particular source contribute to the responsible entity's greenhouse gas risk exposure.

4. **Stakeholders** The emissions from a particular source are deemed relevant by key stakeholders.

5. **Outsourcing** The emissions are from outsourced activities that were previously undertaken by the responsible entity or from outsourced activities that are typically undertaken within the boundary for comparable products or services.

Non-attributable emissions sources summary

Emission sources tested for relevance	Size	Influence	Risk	Stakeholders	Outsourcing	Justification
Head Office business travel	N	Y	N	N	N	Corporate business travel emissions (at 738-780 Wallgrove Rd, Horsley Park NSW) have been excluded from the boundary, as these emission sources are not attributable to the products.
Head Office energy use	N	Y	N	N	N	Corporate head office energy use emissions (at 738-780 Wallgrove Rd, Horsley Park NSW) have been excluded from the boundary, as these emission sources are not attributable to the products.
Capital goods	N	Y	N	N	N	The embodied emissions of capital goods (plant equipment, buildings, infrastructure) are considered non-attributable to the product. This is consistent with industry standard LCAs for construction products, as outlined in the Product Category Rules (PCR) of the International EPD System and has been verified by the Registered Consultant that has compiled our inventory.

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