# National Carbon Offset Standard
# Carbon Neutral Program
## Public Disclosure Summary

An Australian Government Initiative

## 1. Organisation and Product Information

Table 1: Organisation and Product Information

| | | |
|---|---|---|
| Organisation Name | Austral Bricks (Tas) Pty Ltd | |
| Name of the subject(s) of certification | Bricks and pavers produced in the Austral Bricks (Tas) Longford Plant | |
| Type of certification (tick all applicable) | ☐ Organisation<br>☐ Part of organisation | ✓ Product/service<br>☐ Event |
| Reporting year period | From 1/07/2013 | To 30/06/2014 |
| Emissions in this reporting year | TBA t $CO_2$-e | |
| Base year period[1,2] | From 1/07/2012 | To 30/06/2013 |
| Emissions in the base year | 3401.9 t $CO_2$-e | |

[1] First year for which the GHG Inventory has been completed – this will be considered to be the base year against which emission reduction activities will be measured.

[2] For events, a reference case can be provided against which emissions may be compared.

# 2. Description of Organisation Activities

Brickworks Ltd (Brickworks) is one of the major players in the Australian brick industry.

Brickworks has been transformed from originally a New South Wales state based operation to a national organisation with manufacturing operations in NSW, Victoria, Tasmania, South Australia, Western Australia and Queensland. Austral Bricks is a subsidiary of Brickworks. Austral Bricks manufactures and markets clay products such as bricks and pavers. The manufacturing process involves mining clay and shale and mechanically processing it prior to shaping and firing the bricks in kilns fuelled predominately by natural gas.

This NCOS application concerns bricks manufactured at Brickworks' operation in Longford, Tasmania – Austral Bricks Tasmania (see Figure 1). At this site Austral Bricks Tasmania produces a range of bricks and pavers for the Tasmanian and Victorian markets (see Figure 2).

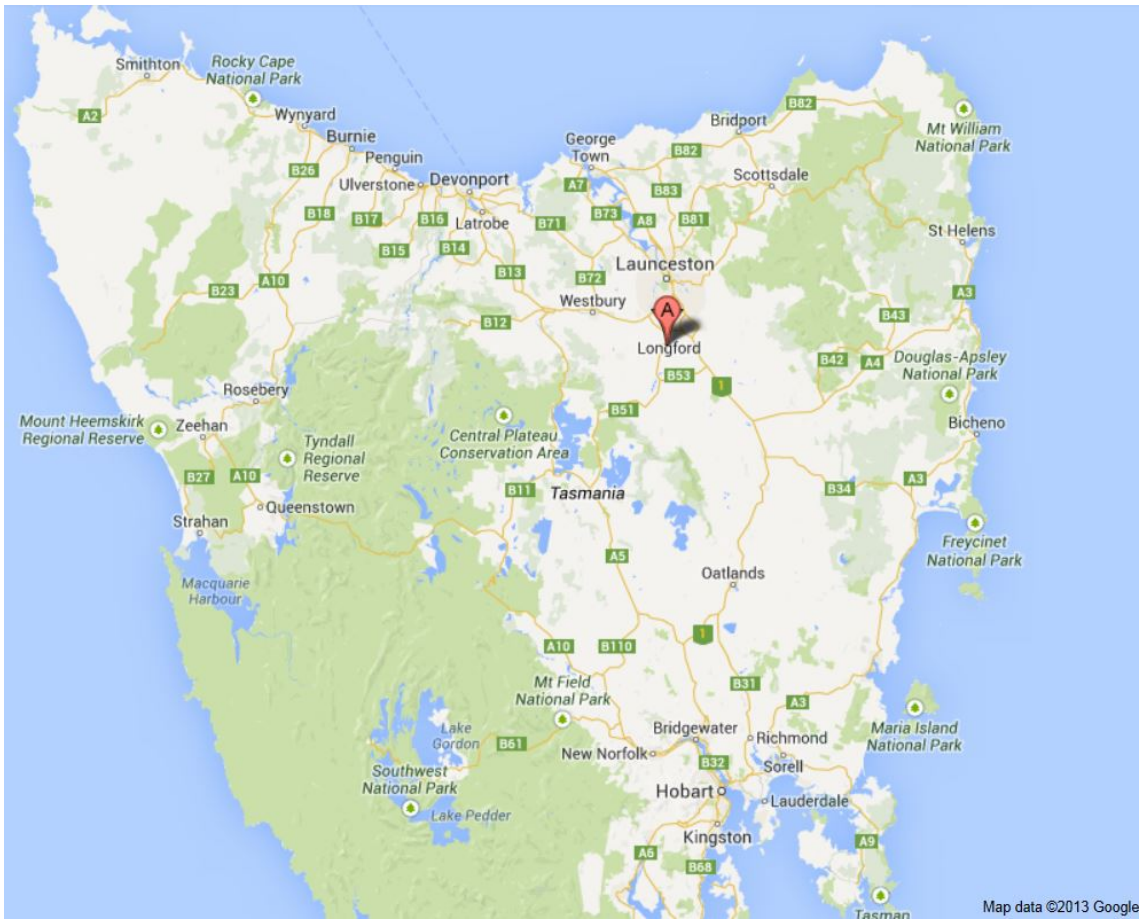


Figure 1: Plant location in Longford, Tasmania (Source: Google maps)


Figure 2: View of Longford plant storage yard (Source: Google maps)

# 3. Organisational & Geographic Boundary/ Scope & system Boundary

The items included in this chapter cover all mandatory issues from the ISO14044:2006 standard – Goal and scope definition section (International Organization for Standardization 2006b).

**Product system description**

This NCOS LCA encompasses the complete life cycle of bricks and pavers:

- Raw material extraction
- Transport of raw materials to Longford
- Brick and paver manufacturing at Longford
- Packaging of fired products
- Transport to customers
- Application in works
- Use and maintenance during their life time
- Demolition and disposal at end-of-life

Other attributable processes include non-production related company facilities at Longford (i.e. offices), company vehicles and business travel of staff based in Longford.

The bricks and pavers can be applied in a range of construction works. Ancillary items that might be required for the application, such as mortar, have been excluded as these items are not supplied by Austral Bricks Tasmania.

A description of the processes in each life cycle stage is provided hereafter. This section refers mostly to bricks only. Unless specifically stated, the process is identical for pavers.

**Raw materials**

Natural clay minerals, including shale, make up the main body of brick. Small amounts of manganese and other additives (sawdust, coal) are blended with the clay to produce different colours. Production waste (brick batts) is ground and recycled back into the clay mixture, resulting in a situation where no production waste leaves the Longford facility.

A variety of coating materials and methods are used to produce brick of a certain colour or surface texture. To create a typical coating, sand is mechanically mixed with some type of colorant (e.g. manganese, red oxide, char, sawdust, etc.). Sometimes frit (a glass containing colorant) is added to produce surface textures.

**Extraction of raw materials**

Clay and other minerals are extracted from the earth using typical mining equipment. Some clay pits require removal of a top layer before the clay can be extracted. Land use and land use change emissions related to clay extraction have been excluded from this assessment as there are likely to be negligible. Clay pits typically operate for many years with limited annual land use change furthermore any attempt to determine the land use emissions would be impractical due to lack of verifiable data.

Diesel used to power equipment is the main greenhouse gas emission source.

**Transport of raw materials to Longford**

All raw materials are transported to Longford by truck. Materials sourced from outside Tasmania require additional shipping. Raw materials such as clay and shale are 'stock piled' in proportioned layers for a desired mixture.

**The brick manufacturing process**

The initial step in producing bricks is crushing, followed by grinding. The raw materials are crushed by a crusher and then go through a pan mill for grinding. Particle size is controlled by a screen installed in the grinding machinery. The raw materials are mixed homogeneously in the crushing and milling process. Next, the blend of ingredients desired for each particular batch is sent on to the brick shaping processes (extrusion). Once the bricks are formed, they are dried to remove excess moisture that might otherwise cause an explosion during the ensuing firing process. The bricks are fired in a tunnel kiln and then cooled. Finally, they are dehacked — automatically stacked on pallets and particleboard, wrapped with plastic bands, plastic corner protectors and potentially shrink film.

The Longford plant uses mainly sawdust to fire the kiln. Sawdust is a zero value by-product from sawmills. Detailed information on the contribution of sawdust to a mill's total income is not available. For the purpose of this LCA the saw dust has been treated as a zero value (waste) material, which means no embodied emissions (scope 3 resulting from energy use and land use change) are associated with the production of sawdust. We note that scope 3 emissions factors for biomass fuels are not available through the NGA factors workbook."

**Transport of bricks to the customer**

Packaged bricks are transported to Tasmanian customers using Austral Bricks Tasmania's own fleet of trucks. These trucks have specific booms to unload the

bricks safely (see Figure 3). Contractors are used to transport bricks to customers in other states (mainly Victoria), overseas and parts of North-West Tasmania.

Austral Bricks Tasmania has provided fuel consumption data for its own trucks. Literature data have been used to estimate fuel use by contractors based on transport volumes (mass) and distances. Shipping has been included for all transport to the Australian mainland (via Port of Melbourne, Victoria) and bricks that have been exported to Yokohama (Japan) and Auckland (New Zealand). An estimation of transport of exported bricks from port to the end user is also included


Figure 3: Typical delivery truck

**Application of bricks and pavers in their application**

Bricklaying is mostly a manual exercise. Therefore there are no emissions associated with the application of bricks and pavers.

Note that ancillary materials, such as mortar, are not included within the system boundaries.

**Use and maintenance of bricks and pavers**

Bricks and pavers are inert. Therefore there are no (greenhouse gas) emissions directly associated with the products during use.[3]

Bricks do not require regular, extensive cleaning under normal circumstances. However there are a number of mechanisms that can lead to stains or damaged bricks. Examples[4] are:

- Mortar smears. These are the result of the bricklaying process and can be easily wiped off with water before they have hardened. Removing hardened mortar smears requires a hydrochloric acid based cleaner.
- Stains – Efflorescence (see Figure 4). Crystallised salts on the surface of bricks can mostly be removed with a dry brush.

[3] When bricks are used in the wall of a building they become part of the functional unit of that building. The operational energy used by the building depends on many factors and cannot be related to the bricks alone. Therefore, operational energy is outside the system boundary of this LCA.
[4] Source: Think Brick Australia, Industry Reference Guide, Fifth Edition 2009

- Stains – Insoluble white deposits (e.g. Calcium). These deposits can be removed with particular acids.
- Stains – Iron oxide, manganese, vanadium stains. These stains can occur for various reasons when the mineral or oxide is present in the bricks. They can be removed with specific *acid based cleaning solutions.*

Apart from these examples walls might also be stained with organic growths, soils, timber and soots and smoke. It is clear that there is not a single or typical scenario for cleaning of bricks, especially given that many of the causes for smears or stains are external.

It is also not practical to define a cleaning scenario related to a single brick (or 1,000 Single Brick Equivalents – SBEs) as illustrated by Figure 4: many problems are restricted to minor areas on a wall.

It is also not practical to define a cleaning scenario related to a single brick (or 1,000 Single Brick Equivalents – SBEs – as per the functional unit, see section 5) as illustrated by Figure 4: many problems are restricted to minor areas on a wall.

In summary, the emissions from cleaning are likely to be negligible, although determining actual emissions is not possible due to a lack of statistically relevant data. For these reasons, cleaning of bricks has been excluded from the carbon footprint assessment.

Figure 4: Efflorescence; the result of soluble salts that migrated to the surface
(Source: Think Brick Australia, Industry Reference Guide, Fifth Edition 2009)

The service life of bricks depends on the application. However, their durability means that under normal circumstances replacements are not required. The carbon footprint presented in this report is expressed for 1,000 SBEs and excludes any replacements.

Maintenance of bricks during their service life is not required under normal circumstances.

**Demolition of bricks and pavers**

Demolition is excluded from the life cycle of a brick or paver as it is assumed that demolition only takes place when the structure (e.g. house) is demolished. Given the scarcity of reliable data on demolition processes and their limited estimated impact (<5%) on the overall environmental impacts of a building.

### Disposal at end-of-life

In Tasmania, bricks are currently not recycled. Therefore, all bricks and pavers are assumed to go to landfill. In Victoria, 56% of masonry products is recycled(Hyder Consulting 2012). This percentage is likely an overestimate for clay bricks, although this detail is not available. Bricks can be recycled into rubble for landscaping, road foundations, pathways, etc. Only a very small percentage of bricks get recycled into new bricks. The recycled products typically replace sand, crushed rocks or clay. The environmental impacts and benefits from recycling have not been taken into account in this study, as a cut-off has been applied after transport to the recycling facility.

We assume bricks are transported 50 km from the building site to the landfill site (or recycling facility) by truck.

### Capital Goods

Due to the long lifetime of plant and equipment used in the brick manufacture, the emissions are likely to be negligible and are also difficult to determine and allocate to a SBE relative to their likely significance

## 4. Diagram of the Boundary of the Subject of Certification

The system boundary (shown in Figure 5) describes which processes are included and excluded in the LCA. The LCA for Austral Bricks Tasmania covers the full life cycle of clay bricks and pavers manufactured in Longford, Tasmania.

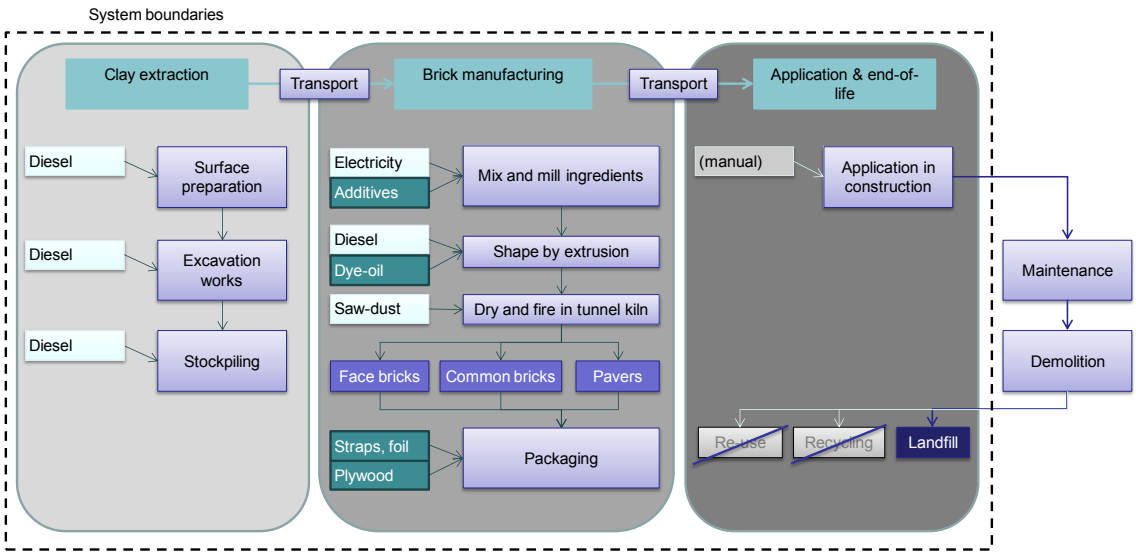


Figure 5: LCA System Boundary Diagram according to ISO14044 principles

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

For the purposes of this study, 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.

Austral Bricks Tasmania has applied a cut-off for flows smaller than 1% (mass and expected environmental impact). This means it has estimated environmental impacts, instead of collecting detailed information for these smaller emission sources.

Figure 6 shows how a product footprint is related to a company's emission reporting. Austral Bricks Tasmania reports its scope 1 & 2 emissions under the National Greenhouse and Energy Reporting Act 2007 (Commonwealth of Australia 2007). The footprint of bricks and pavers includes upstream and downstream emissions as well.

Figure [1.1] The relationship between the *Corporate, Scope 3, and Product Standards* for a company manufacturing product A

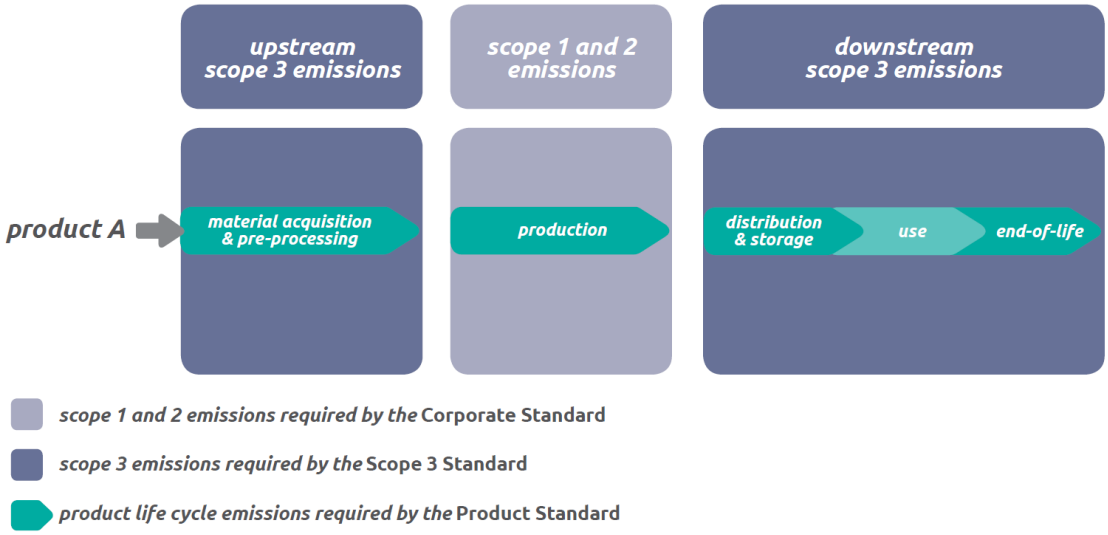


Figure 6: Relationship between GHG Protocol standards (Source: World Resources Institute and World Business Council for Sustainable Development 2011)

Austral Bricks Tasmania has checked the definition of the system boundary in this study with requirements from the GHG Protocol Product Life Cycle Accounting and Reporting standard (World Resources Institute and World Business Council for Sustainable Development 2011, Chapter 7). The system boundaries as defined by the GHG Protocol are slightly different from the ISO 14040 and ISO 14044 standards.

Based on this evaluation we have decided to add two emission sources to the footprint:

- Business travel of employees based in Longford
- Company vehicles of employees based in Longford.

The system boundaries according to the GHG Protocol are depicted in Figure 7.

After inclusion of these additional items we believe all relevant requirements have been met.

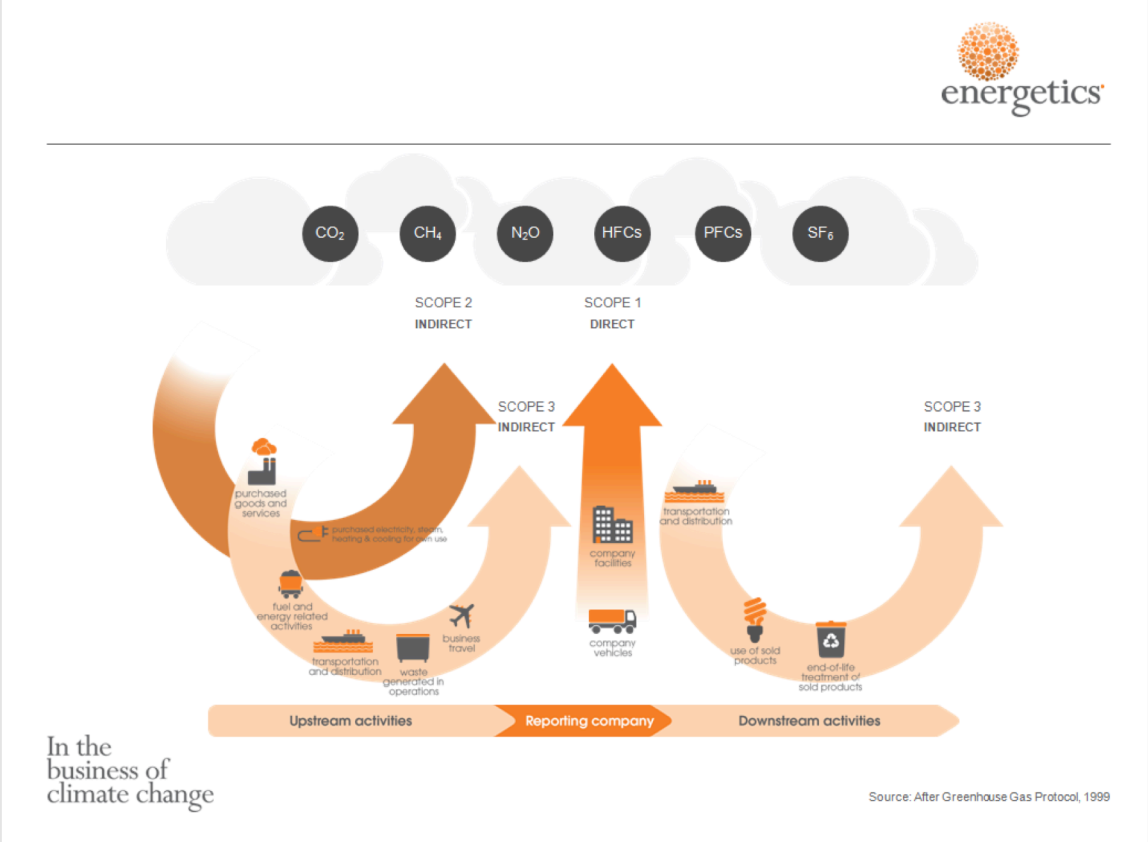


Figure 7: Emission sources covered by this LCA, GHG Protocol

# 5. Purchase of GreenPower and Retirement of GreenPower Eligible Large-Scale Generation Certificates (LGCS)

N/A

# 6. Purchase of NCOS Carbon Neutral Products

N/A

# 7. Total Carbon Footprint

Table 2: Summary of Emissions

| Scope | Emission source | Emissions (t $CO_2$-e)[5] |
|---|---|---|
| 1 | Truck vehicle fleet (diesel); on-site vehicles | 153 |
| 1 | Truck vehicle fleet (diesel); transport to customers, delivery trucks and company cars | 246 |
| 1 | Company cars (petrol) | 20 |
| 1 | Kiln fuel (bituminous coal) use | 294 |
| 1 | Kiln fuel (natural gas) use | 99 |
| 1 | Kiln fuel (saw dust) use | 215 |
| 1 | Body additive (char) use | 106 |
| 1 | Body additive (sawdust) use | 6 |
| 2 | Longford plant electricity use | 782 |
| 3 | Truck vehicle fleet (diesel extraction & distribution losses); on-site vehicles | 12 |
| 3 | Truck vehicle fleet (diesel); transport to customers, delivery trucks and company cars | 19 |
| 3 | Company cars (petrol) | 2 |
| 3 | Kiln fuel (bituminous coal) production and distribution | 15 |
| 3 | Kiln fuel (natural gas) production and distribution | 15 |
| 3 | Kiln fuel (saw dust) production and distribution | 0 |
| 3 | Kiln fuel (bituminous coal) distribution | 1 |
| 3 | Kiln fuel (saw dust) distribution | 68 |
| 3 | Body additive (char) production and distribution | 6 |
| 3 | Body additive (sawdust) production and distribution | 0 |
| 3 | Body additive (manganor) production and supply | 2 |
| 3 | Body additives transport to Longford | 17 |
| 3 | Longford plant electricity transmission and distribution losses | 78 |
| 3 | Clay, sand & shale extraction | 28 |
| 3 | Clay, sand & shale transport to Longford | 126 |
| 3 | Various face additives - extraction / production | 49 |
| 3 | Various face additives - transport to Longford | 3 |
| 3 | Overhead - water use | 2 |
| 3 | Overhead - waste water | 2 |
| 3 | Overhead - Cardboard to recycling | 0 |
| 3 | Overhead - Solid waste to landfill | 20 |
| 3 | Overhead - business travel (LAU-SYD) | 1 |
| 3 | Overhead - business travel (LAU-MEL) | <1 |
| 3 | Packaging - Plastic Wrap - polyester strap | 37 |
| 3 | Packaging - Austral labels - PP film | 1 |
| 3 | Packaging - DR labels - PP film | 1 |
| 3 | Packaging - Pallets FUM -EXPORT | 1 |
| 3 | Packaging - Pallets -930 X 940 | 2 |
| 3 | Packaging - Export plastic strap - polyester | 5 |
| 3 | Contractor vehicle fleet; off-site vehicles; transport to customers | 275 |
| 3 | Third party shipping; off-site; transport to customers | 405 |
| 3 | End-of-life - transport to landfill | 289 |

[5] Emissions = Activity data x energy content factor (if applicable) x emission factor converted to tonnes $CO_2$-e

| Scope | Emission source | Emissions (t $CO_2$-e)[5] |
|---|---|---|
| 3 | End-of-life - bricks in landfill | 0 |
| Total carbon footprint in tonnes $CO_2$-e | | 3402 |
| Average carbon footprint per functional unit (1,000 Single Brick Equivalent (SBE)) in tonnes $CO_2$-e | | 0.288 |

# 8. Carbon Offset Purchases and Retirement for this Reporting Period

Upon determination of final tonnes of carbon emissions required to be offset, Brickworks will engage an accredited provider of carbon offsets (such as VCUs) to purchase and surrender the offsets as required under the NCOS at the end of the reporting period. The carbon emissions to be offset will be determined based on the production volume of the bricks and pavers during the reporting period.

After the first reporting period (13-14FY), Brickworks will also determine and offset the carbon emissions associated with the bricks and pavers that were in the yard at the end of the base year period (12-13FY) so that all the bricks sold in the first reporting period can be accounted for the carbon neutrality.

The purchase and surrender of the offsets will occur within 3 months after the first reporting period. It is Brickworks intention to utilize offsets generated from Australia and NZ Projects as well as offsets generated in overseas projects.

# 9. Emission Reduction Measures

Austral Bricks Tasmania understands and accepts its responsibility for environmental protection which is integral to the conduct of its commercial operations. Austral Bricks Tasmania's objective is to comply with all applicable environmental laws, regulations and community standards in a commercially effective way. We are committed to encouraging concern and respect for the environment and emphasising every employee's responsibility for environmental performance.

Reducing energy consumption, emissions and associated costs are key issues organisations are facing in a carbon constrained world with increasing energy prices. Austral Bricks Tasmania actively participates in greenhouse gas reporting scheme and will participate in energy efficiency program which will lead to significant reductions in energy consumption and greenhouse gas emissions. These programs include:

- Energy Efficiency Opportunities (EEO) Act 2006 – this programme encourages large energy users to implement management systems aimed at measuring and analysing energy usage within their plants and identifying and implementing energy reduction strategies. Austral Bricks Tasmania will be assessed under the EEO program during 13-

14FY and the assessment of the plant will be conducted. The management team of Austral Bricks Tasmania will review the recommendations made in the assessment. Projects will ranked according to payback period and projects with a feasible internal rate of return will be analysed in details to ensure that management have sufficient information to make informed decisions as to whether or not a project will be implemented. The team will also monitor the progress of the energy savings initiatives and will undertake a formal review process to evaluate projects post implementation. The team continually seeks energy efficiency ideas from the site to ensure the process is on going.

- National Greenhouse and Energy Reporting (NGER) Act 2007 – this programme requires organisations to measure and report their energy consumption, production and greenhouse gas emissions under strict protocols. The data is subsequently collated and reported to Senior Management and the Board

Austral Bricks Tasmania produces low embodied carbon bricks fired in traditional kilns fuelled by saw dust at over 1000$^{o}$C. The management team has implemented numerous initiatives to reduce energy consumption and greenhouse gas emissions as below. These initiatives will drive down energy consumption per unit of production.

**Installation of gas burner system:**
Traditionally, coal has been added to brick body in order to provide energy in the firing process and create desired surface finish in the Longford plant. By introducing a gas burner system in certain part of the kiln and adjusting the manufacturing parameters, Austral Bricks Tasmania has succeeded to reduce the usage of coal and create the desired surface finish.

The $CO_{2\text{-}e}$ emissions from coal were *[1]538.7t $CO_{2\text{-}e}$ in 11-12FY which equates to 52.65kg $CO_{2\text{-}e}$ /1000SBE (based on the production volume of 10,231). The $CO_{2\text{-}e}$ emissions from gas were *[2]99.4t $CO_{2\text{-}e}$ and the emissions from coal were *[2]294.39t $CO_{2\text{-}e}$ in 12-13FY which equates to *[2]33.34kg $CO_{2\text{-}e}$/1000SBE. The difference in the $CO_{2\text{-}e}$ emissions can be attributed to the installation of gas burners. Therefore, the net reduction of inefficient coal addition by installing the gas burner system for 12-13FY would be;

(52.65(kg $CO_{2\text{-}e}$) – 33.34(kg $CO_{2\text{-}e}$)) X 11,811 (production volume in 12-13FY in 1000SBE)
= 228,070kg $CO_{2\text{-}e}$ which is 228.1t $CO_{2\text{-}e}$.
***1 Data obtained from Brickworks EEC report**
***2 Data obtained from Consumptions report summary and LCA calculations for NCOS**

**New saw dust drying system:**
In order to induce complete combustion of saw dust and provide sufficient energy to fire bricks efficiently, saw dust needs to be dried before it is injected into the kiln. Large portion of the electric usage in the Longford plant was attributed to the electric saw dust dryer system. In order to make this process more energy efficient, the dryer system has been replaced with a more efficient gas dryer system. The system has been installed during 12-13FY and it is being commissioned during 13-14FY.

Approximately 50kW drop was observed by turning off the existing electric dryer system (observation at the plant). Since the accurate efficiency of the new gas dryer system cannot be obtained until the full operation of the system (as it is a custom made retro-fit system), a 30% reduction of total energy usage is assumed. Therefore, anticipated $CO_{2\text{-}e}$ reduction is;

50kw (capacity of current system) X 24 (hours/day) X 350 (operation days) X 0.3 (30% saving) = 126,000kWh which equates to 25.2t CO2-e based on NGA factors 2013

**New lighting system:**
In order to reduce electricity use in the plant, the metal halide lighting system is being replaced with more efficient induction lighting system. 14 units have been replaced in 12-13FY and 40 units are planned to be replaced in 13-14FY.

Changing of 500W sodium vapour lighting system to 250W induction system results the reduction of 250W/unit. 14 units were replaced during this reporting period and estimated total energy saving was 14 units X 250W X 24 (hours/day) X 350 (operation days) = 29,400 kWh which equates to 5.9t $CO_{2\text{-}e}$ based on NGA factors 2013. Replacement of 40 units are planned for this reporting period and anticipated total energy saving is 40 units X 250W X 24 (hours/day) X 350 (operation days) = 84,000 kWh which equates to 16.8t $CO_{2\text{-}e}$ based on NGA factors 2013

Table 3: Emission Reduction Measures

| Emission source | Reduction Measure | Scope | Status | Reduction t $CO_2$-e |
|---|---|---|---|---|
| Black Coal | Installation of gas burner to replace coal | 1 | Implemented this reporting period | 228.1 |
| Natural gas and Wood | Pre-drying of saw dust | 1 | Planned for future reporting period | 25.2 |
| Electricity | Replacement of light bulb | 2 | Implemented this reporting period | 5.9 |
| Electricity | Replacement of light bulb | 2 | Planned for future reporting period | 16.8 |
| Total emission reductions implemented in this reporting period | | | | 234.0 |
| Total expected emission reductions in future reporting periods | | | | 42.0 |

# 10. Other Information [Optional]

# 11. Declaration

To the best of my knowledge and having implemented the quality controls and standards required under the NCOS Carbon Neutral Program and made all appropriate inquiries, the information provided in this Public Disclosure Summary is true and correct.

| | |
|---|---|
| Mark Finney | |
| Name of Signatory | Signature |
| Austral Bricks East Coast General Manager | |
| Position / Title of Signatory | |
| 17/12/2013 | |
| Date | |