

BRICKWORKS

LIMITED

Energy Efficiency Opportunities Report

Controlling Corporation

Brickworks Limited

Period to which this report relates

Start 1st July 2008 End 30th June 2009



Energy Efficiency
Opportunities

Brickworks Limited understands and accepts its responsibility for environmental protection which is integral to the conduct of its commercial operations. Brickworks' objective is to comply with all applicable environmental laws and 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. During the year, in excess of \$23.5 million was spent on capital projects aimed at improving our environmental performance or rehabilitating operational sites.

Through participation in the Scheme (EEO), Brickworks has made significant reductions in energy consumption and have identified future energy reduction projects. A whole of business approach to identify, investigate and evaluate energy efficiency opportunities has enabled us to reduce our energy consumption. A substantial effort has been made to collect accurate and reliable data and establish systems to accurately report energy use. Historical data has been collected and shows that energy use in manufacturing has been reduced by 22% through energy efficiency improvements over the last 10 or so years. This corresponds to a reduction in carbon dioxide emissions of 35%.

In June 2009 Austral Bricks NSW received 'Bronze Level Recognition' for demonstrated commitment to sustainability and achieving environmental improvements through the Department of Environment and Climate Change's Sustainability Advantage Program. To achieve this the division had to demonstrate active participation in Sustainability Advantage, demonstrate leadership and commitment to sustainability, establish planning and management systems for environmental practice (including processes for continuous improvement), engage staff, suppliers customers and the industry in promoting sustainability activity, and demonstrate achievements and environmental outcomes in the last 12 months. To date, Bronze level recognition is the highest level achieved by any participant in the program, and Austral is one of only 13 companies awarded this level.

Brickworks Limited accepts its responsibility to strive for a sustainable future. The responsibility includes:

- Actively working to a sustainable future through manufacturing improvements and the development of energy efficient products.
- Supporting sustainability initiatives whenever possible.
- A commitment to the Brickworks Environmental Policy.
- Complying with all applicable legislation and laws pertinent to sustainability.

Sustainability is considered throughout our activities. A brief overview is given below.

Prudent Use of Resources: The extraction of the raw materials for clay bricks is carefully controlled to minimise environmental impacts and to conserve natural resources. Austral Bricks also reduces the amount of raw material that is extracted by sourcing materials that have been extracted from construction sites and recycling brick waste generated during production back into the process as raw materials.

Energy Efficient Production Techniques: The efficient production of bricks is a high priority. A large proportion of production now uses natural gas as the main energy source, which produces less greenhouse gas emissions than coal or oil. Energy efficiency is also continually strived for during production through process improvements.

Water Conservation: Only small amounts of water are used in the production process and water management practices are conducted. A number of water recycling initiatives have been and will be implemented throughout our operations all over Australia. Some of our operations are completely water self sufficient through the collection and reuse of water.



Resource Conservation: Extensive recycling and reuse occurs throughout production. A major initiative is the recycling of the clay waste generated during production back into the process.

Striving for a Sustainable Future: Austral Bricks Pty Ltd is actively working to a sustainable future through its environmental endeavours, not only in its manufacturing capacity, but also by actively being involved in the field of sustainability. Examples of this include our support for the Solar Hydrogen project at the University of New South Wales, our status as a HIA Green Smart Leader and our support (through the Think Brick Australia) of the energy efficiency research occurring at the University of Newcastle.

Part 1 – Information on assessments completed to date

Table 1.1 – Description of the way in which the Corporate Group (or part of it) has carried out its assessments

Brickworks Limited senior management established an EEO Steering Committee to assist the organisation meet its obligations under the EEO legislation. The primary role of the Committee is to ensure that the organisation meets the 6 key elements of the EEO Assessments. The commitment by senior management in forming this committee forms the basis of meeting the “leadership element”.

Under the guidance of the Steering Committee Brickworks Limited has undertaken Energy Efficiency Opportunities assessments during 2008 – 2009 of its three brick manufacturing plants at Craigieburn, Summerhill and Wollert in Victoria. The group also undertook a review of the Corporate Car Policy. Brickworks have now conducted a review of approximately 46 % of the organisation’s total energy consumption.

Brickworks Limited used the Energy Savings Action Plan (ESAP) methodology developed by the NSW Government, as the basis of the assessment for plants at Craigieburn, Wollert and Summerhill. These reviews also involved compliance with the Victorian Government’s EREP Legislation. A substantial audit based assessment complying with Australian standard AS/ANZ 3598:2000 was undertaken to identify where energy was being used and look for energy saving opportunities.

The review of these sites included the following process steps:

- Identifying an energy and production baseline;
- Conducting a site management review to identify current energy management policies and procedures;
- Conducting a site technical review to calculate an energy mass balance, energy use by sub-activity specific energy indexes by main energy use and efficiency and savings opportunities.
- The audit and management reviews were undertaken in November 2008, with a management review conducted at the same time.

These reviews provided feedback and efficiency opportunities from both a management and technical perspective. Brickworks Limited has set up a Cross Functional Team to address energy efficiency matters. This team incorporates managerial staff, operational managers, environmental managers, engineers and technical managers with appropriate skills and expertise to analyse energy and process data. This team meets the “people element” required under EEO regulations. The team interacts with Brickworks Limited’s alliance partners and onsite contractors.

The Cross Functional Team followed up on the recommendations made in the audit. The Team relied on the hurdle rates established for efficiency projects and took into account the EEO Legislative requirements. Projects were ranked according to payback period and projects with an internal rate of return were analysed in detail to ensure that management have sufficient information at hand to make informed decisions as to whether or not a project has or will be implemented. The team also monitored the progress of the energy savings initiatives and also undertook 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. The outcomes of its findings are reported to the EEO Steering Committee.

The EEO Steering Committee disseminates EEO and Energy information to senior management and to the sites, with the aim of increasing energy efficiency awareness, across the organisation. (Key element 6 of the program).

The outcomes of these assessments and review process can be found below in Part 2

Table 1.2 – Energy use assessed

Group member and/or business unit and/or key activity and/or site that has had an assessment completed by the end of this reporting period.	Period over which assessment was undertaken ¹	Energy use per annum in GJ ² in the current reporting year
Austral Bricks Craigieburn (VIC)	1/07/08-30/06/09	867,909
Austral Bricks Summerhill (VIC)	1/07/08-30/06/09	542,766
Austral Bricks Wollert (VIC)	1/07/08-30/06/09	477,475
Brickworks Limited Car Policy	1/07/08-30/06/09	41,674
Austral Bricks Scoresby (VIC)	1/07/06-30/06/08	76
Austral Bricks Plant 1 Horsley Park (NSW)	1/07/06-30/06/08	362,867
Austral Bricks Plant 2 Horsley Park (NSW)	1/07/06-30/06/08	5,527
Austral Bricks Plant 3 Horsley Park (NSW)	1/07/06-30/06/08	458,723
Eureka Tiles Victoria	1/07/06-30/06/08	73,595
Total energy assessed		2,830,612
Total energy use of the group in the current reporting year		6,141,511
Total energy assessed expressed as a percentage of total current energy use		46.08%

Table 1.3 – Accuracy of energy use data

Entity	% achieved	Reasons for not achieving data accuracy to within $\pm 5\%$
Austral Bricks Craigieburn (VIC)	+/- 5%	Not applicable
Austral Bricks Summerhill (VIC)	+/- 5%	Not applicable
Austral Bricks Wollert (VIC)	+/- 5%	Not applicable
Brickworks Limited Car Policy	+/- 5%	Not applicable
Austral Bricks Scoresby (VIC)	+/- 5%	Not applicable
Austral Bricks Plant 1 Horsley Park (NSW)	+/- 5%	Not applicable
Austral Bricks Plant 2 Horsley Park (NSW)	+/- 5%	Not applicable
Austral Bricks Plant 3 Horsley Park (NSW)	+/- 5%	Not applicable
Eureka Tiles Victoria	+/- 5%	Not applicable

Part 2 - Energy Efficiency Opportunities that have been identified and evaluated

Part 2A - New Assessments completed during the reporting period

Austral Bricks Craigieburn

Energy use of the entity during the current reporting period

867,909	GJ
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Table 2.1 – Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	6	1356	120,376	0	121,732
Business Response*	Under Investigation	2	0	119,472	0	119,472
	To be Implemented	3	1356	904	0	2,260
	Implementation Commenced	1	0	0	0	0
	Implemented					
	Not to be Implemented					

Austral Bricks Wollert

Energy use of the entity during the current reporting period

477,475	GJ
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Table 2.1 – Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	3	0	412	0	412
Business Response*	Under Investigation	2	0	412	0	412
	To be Implemented					
	Implementation Commenced	1	0	0	0	0
	Implemented					
	Not to be Implemented					

Austral Bricks Summerhill

Energy use of the entity during the current reporting period

542,766	GJ
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Table 2.1 – Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	6	1,356	119,048	0	120,404
Business Response*	Under Investigation	2	0	118,145	0	118,145
	To be Implemented	3	1,356	903	0	2,259
	Implementation Commenced	1	0	0	0	0
	Implemented					
	Not to be Implemented					

Brickworks Limited Corporate Car Policy

Energy use of the entity during the current reporting period

41,674	GJ
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Table 2.1 – Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	2	1,630			1,630
Business Response*	Under Investigation					
	To be Implemented					
	Implementation Commenced	1	1,630			1,630
	Implemented	1	0			0
	Not to be Implemented					

Part 2B - Update of assessments originally reported in previous reporting periods

Austral Bricks Plant 1 Horsley Park

Energy use of the entity during the current reporting period

362,867	GJ
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Table 2.3 - Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	6	1,365	529	0	1,894
Business Response*	Under Investigation	0	0	0	0	0
	To be Implemented	0	0	0	0	0
	Implementation Commenced	1	1,365	0	0	1,365
	Implemented	2	0	173	0	173
	Not to be Implemented	3	0	356	0	356

Austral Bricks Plant 2 Horsley Park

Energy use of the entity during the current reporting period

5,527	GJ
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Table 2.3 - Opportunities assessed to an accuracy of ±30% or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	1	162,913	0	0	162,913
Business Response*	Under Investigation	0	0	0	0	0
	To be Implemented	0	0	0	0	0
	Implementation Commenced	0	0	0	0	0
	Implemented	1	162,913	0	0	162,913
	Not to be Implemented	0	0	0	0	0

Austral Bricks Plant 3 Horsley Park

Energy use of the entity during the current reporting period

458,723	GJ
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Table 2.3 - Opportunities assessed to an accuracy of $\pm 30\%$ or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – \leq 4 years	> 4 years	
Outcomes of assessment*	Total Identified	6	456	929	152	1,537
Business Response*	Under Investigation	0	0	0	0	0
	To be Implemented	0	0	0	0	0
	Implementation Commenced	0	0	0	0	0
	Implemented	1	32	0	0	32
	Not to be Implemented	5	424	929	152	1,505

Austral Bricks Scoresby

Energy use of the entity during the current reporting period

76	GJ
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Table 2.3 - Opportunities assessed to an accuracy of $\pm 30\%$ or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – \leq 4 years	> 4 years	
Outcomes of assessment*	Total Identified	1	555,558	0	0	555,558
Business Response*	Under Investigation	0	0	0	0	0
	To be Implemented	0	0	0	0	0
	Implementation Commenced	0	0	0	0	0
	Implemented	1	555,558	0	0	555,558
	Not to be Implemented	0	0	0	0	0

Eureka Tiles Victoria

Energy use of the entity during the current reporting period

73,595	GJ
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Table 2.3 - Opportunities assessed to an accuracy of $\pm 30\%$ or better

Status of opportunities identified		Number of opportunities	Estimated energy savings per annum by payback period (GJ)			Total estimated energy savings per annum (GJ)
			0 – < 2 years	2 – ≤ 4 years	> 4 years	
Outcomes of assessment*	Total Identified	1	0	0	60,263	60,263
Business Response*	Under Investigation	0	0	0	0	0
	To be Implemented	0	0	0	0	0
	Implementation Commenced	0	0	0	0	0
	Implemented	1	0	0	60,263	60,263
	Not to be Implemented	0	0	0	0	0

Part 2C - Details of at least three significant opportunities found through EEO assessments

Table 2.5 – Description of 3 significant opportunities

Opportunity 1 – Car Policy
<p>Brickworks undertook a review of the existing Car Policy to identify fuel saving opportunities. As a result of the review, the following parameters were introduced into the Car Policy:</p> <ul style="list-style-type: none"> • Company vehicles must now have fuel consumption of less than 10 litres per 100 kms. • Restricted to a maximum number of 6 cylinders and • Engine capacity of less than 3 litres. <p>In addition, preference for LPG or Diesel as a fuel source is encouraged through financial incentives to employees.</p> <p>Under the policy, 180 vehicles have been replaced over the period 1 July 2007 to 30 June 2009, which represents 49.5% of the total fleet.</p> <p>In 2006/07, the fleet comprised 94.2% Petrol vehicles, 5.8% Diesel vehicles and no LPG vehicles. As of June 2009, the fleet was made up of 27.5% Diesel vehicles, 27.1% LPG vehicles and 45.4% Petrol vehicles. As a result 54.6 % of the fleet is on a less environmentally damaging fuel, (compared to 5.8% in 2007) an 888% improvement.</p> <p>In terms of CO₂e emissions 140 of the 180 replaced vehicles have lower emissions, with another 7 with equivalent emissions, resulting in 81.7% of the fleet emitting less CO₂e than it did 2 years ago.</p> <p>Based on the kilometres travelled, 162 tonnes of CO₂e has been saved which is a 9.2% reduction (1,755 tonnes to 1,592 tonnes). This equates to an average of 261 grams of CO₂e per km, down from 277 grams of CO₂e per km. This reduction is equivalent to the removal of 18 vehicles off the road, which is an effective fleet reduction of 10.2% in car equivalents (based on 180 replacements).</p> <p>The energy savings, in terms of GJ of fuel consumption, for the 180 replaced vehicles has fallen from 25,266 GJ to 23,637GJ, a reduction of 1,630GJ or a 6.5% reduction in energy.</p> <p>In terms of financial savings, for the 180 replaced vehicles there has been an estimated saving (based on National Average Fuel prices as at 1 June 2009 inclusive of GST) of \$189,292.51 pa, or \$1,045.81 per vehicle</p>
Opportunity 2 – Truck Fleet
<p>Brickworks Limited has reviewed the national truck fleet and identified this as an area for significant energy savings and reduction of emissions. The existing truck fleet consists of trucks with Euro 1 (as defined by European emission regulations for heavy-duty diesel engines) or at best Euro 2 engines. With recent advances in engine technology heavy vehicles are now available with improved emission control and improved fuel economy.</p> <p>Euro 4 and Euro 5 engines are now commercially available and have advanced diesel engine technology in combination with selective catalytic reduction exhaust gas after treatment. Euro 4 and Euro 5 engines utilise exhaust gas recirculation which results in reduced nitrogen oxide emissions and reduced diesel particulate emissions. The inclusion of selective catalytic reduction further</p>

reduces nitrogen oxide in the exhaust gas. In commercial vehicles the engine is optimised for low fuel consumption. The vehicles are fully automatic which improves fuel economy by eliminating incorrect gear selection.

After review of the potential energy savings the Board approved the purchase of 18 new Rigid and Prime mover trucks for Austral Bricks and Austral Masonry. The combined fuel saving would be around 127,000 litres of diesel or a 19% reduction in fuel use. This will correspond to a reduction of CO₂e and other emissions of around 340 tonnes annually.

Opportunity 3 – Wollert Efficiency Outcome

Brick manufacturing plants are overall more efficient now than in the past, with excess kiln and dryer heat being recycled to improve fuel efficiency. While waste is continuously being reduced, any waste clay and fired product can be recycled via re-introduction to the raw material preparation process.

As part of the EEO program Brickworks Limited undertook an assessment of the Scoresby manufacturing plant in Victoria. The assessment highlighted plant inefficiencies, including energy inefficiencies. The outcome of this assessment prompted the closure of the plant and replacement with a modern more fuel-efficient plant at Wollert.

Austral Bricks recently commissioned the state of the art brick plant at Wollert, which is one of the most fuel-efficient kilns in the business, and utilises the latest technology in brick-making processes. The latest of scrubber technology has been installed on the kiln stack with great success, reducing emissions to well below legal limits. Electricity consumption is also significantly reduced with highly-efficient variable frequency electric drives on machines. The conversion from hydraulic to electric machinery has had the added benefit of eliminating the subsequent disposal of hundreds of litres of waste oil per year. Water on this site is collected and recycled to provide all the necessary water for manufacturing, eliminating the use of town water. This new plant is another step by Austral Bricks towards further reducing the embodied energy of our clay products.

The Wollert plant has been operational now for over 12 months and is using 40% less energy to manufacture a similar quantity of bricks.



Part 4 – Declaration

The information included in this report has been reviewed and noted by the board of directors and is to the best of my knowledge, correct and in accordance with the *Energy Efficiency Opportunities Act 2006* and *Energy Efficiency Opportunities Regulations 2006*.

Mr Lindsay Partridge
Managing Director
Brickworks Limited