



Australian Government

Department of Resources, Energy and Tourism

Energy Efficiency Opportunities

CASE STUDY UPDATE

MIDLAND BRICK

IN 2005/6 MIDLAND BRICK UNDERTOOK AN ENERGY EFFICIENCY OPPORTUNITIES (EEO) TRIAL ASSESSMENT. THE RESULTS WERE PUBLISHED IN A CASE STUDY IN APRIL 2007. THIS UPDATE OF THE EARLIER CASE STUDY PRESENTS NEW INFORMATION ON PROGRESS TO DATE.

Midland Brick uses **1.62 PJ** of energy annually, representing some **40%** of total production costs.

When the original case study was written in 2007, Midland Brick had just completed an assessment for kilns 7 and 8 which account for around 40% of site energy use. Although the company had sought opportunities to improve efficiency many times in the past, the EEO assessment enabled Midland Brick to take a fresh look at production processes from an energy perspective. It identified over 50 projects that would both save energy and have other non-energy benefits including productivity, quality and safety improvements.

The first case study noted that improved data collection and monitoring would be a priority for future development. The subsequent installation of additional meters and more detailed analysis of gas consumption in kilns 7 and 8 highlighted more opportunities to improve efficiency and helped to prioritise projects for implementation. The knowledge and experience gained from the initial assessment helped Midland Brick to develop energy efficiency policies and procedures that integrate EEO into core business systems. These procedures were applied to the assessment of kilns 9 and 10 which use 46% of total site energy.

This update on the assessment at Midland Brick covers outcomes achieved to date and some of the lessons learned through EEO participation. These include the need for detailed data analysis and adequate resourcing of the assessment.



OUTCOMES ACHIEVED SO FAR

A summary of the opportunities identified to date is provided in *Table 1* on page 2. The three projects completed so far and the five additional projects to be implemented in 2009 for kilns 7 and 8 are expected to save 106,371 GJ of energy and 5,400 tonnes of CO₂ emissions each year. These savings are equivalent to approximately 16% of the energy consumed by kilns 7 and 8 (651,000 GJ) and 6.5% of the total energy used at the site (1,627,500 GJ). These energy savings are equivalent to taking 1800 motor vehicles off the road.

The more recent assessment of kilns 9 and 10 has identified 26 projects, 23 of which are under investigation to establish energy savings, implementation costs and production benefits.

Status of opportunities		Kilns 7 & 8			Kilns 9 & 10
Outcomes of assessment	Total number of opportunities identified	58			26
	Total estimated energy savings per year (GJ)	106,371			Not yet available
Business response		Projects	Savings as a % of total kiln energy use	Estimated energy savings in GJ	Projects
	Under investigation	49	-	-	23
	To be implemented	4	16%	77,922	0
	Implementation commenced	1			0
	Implemented	3		28,449	0
	Not to be implemented	1	-	-	3

Table 1: Status of opportunities

ADDITIONAL ASSESSMENT FINDINGS AND ACTIVITIES

KILNS 7 AND 8

The initial assessment of kilns 7 and 8 revealed that Midland Brick's data collection methods were inadequate. As a result, a new gas metering system was installed. This enabled accurate data analysis in accordance with the EEO requirements, revealing that kiln 7 used around 13.5% more gas than kiln 8. The reasons for the difference were linked to kiln modifications made over many years. The kiln has been recalibrated to its original design specification. Burners have been returned to their original configuration, valves and gas regulators have been serviced, and the dampers that control air to the dryers automated. Energy savings from these projects are expected to save around **23,530 GJ** per year. Kiln operators now have greater control over the firing process and this has delivered non-energy benefits including increased productivity and improved product quality.

Another of the high priority projects identified for kilns 7 and 8 was improved electrical demand control. Midland Brick is currently installing new electrical meters which will enable the company to identify trends and establish benchmarks for electricity consumption.

While the initial assessment of kilns 7 and 8 outlined in the 2007 case study identified 53 opportunities, the improved data collection processes enabled a further five opportunities to be identified, bringing the total to 58.

KILNS 9 AND 10

The assessment of kilns 9 and 10 commenced in late 2008. Unlike the initial assessment, which relied heavily on an external consultant, this assessment was undertaken entirely by the project team at Midland Brick. The Energy Efficiency Coordinator was able to build on his experience with the assessment of kilns 7 and 8 to more effectively utilise resources. For example, a detailed Project Management Plan was developed, drawing heavily on the *EEO Assessment Handbook*. This document sets out the key steps in the assessment, including actions, key performance indicators (KPIs), targets and responsibilities. Resources allocated to the assessment included an Energy Efficiency Advisory Group to provide strategic management and an Energy Efficiency Assessment Team to do the work. The KPIs and targets assigned to individual managers will be used as a measure for staff performance appraisals. This more formal, documented procedure has facilitated greater efficiency in the assessment for kilns 9 and 10 than the previous assessment undertaken for kilns 7 and 8 in 2006.

A workshop to brainstorm potential opportunities held in November 2008 involved all members of the Assessment Team. This was organised by the Energy Efficiency Coordinator with help from a chemical engineer, who spends approximately 15% of his time on energy-related projects. The outcome of the workshop was a list of 26 potential opportunities. Some of these were similar to those identified for kilns 7 and 8 because the manufacturing process is virtually the same. Following a preliminary analysis it was decided that of the 26 potential opportunities, 10 would be investigated immediately, 13 would be 'parked' for investigation at a later date and three would not proceed.

In addition to the energy saving benefits the team identified opportunities which also delivered non-energy benefits. For example, one opportunity involves capture and reuse of hot combustion air which is currently lost from under the kiln cars at the exit of kilns 9 and 10. The recovered hot air is used to heat fresh air in a heat exchanger to improve combustion efficiency. The non-energy benefits are expected to include:

- improved brick quality through better control of kiln performance,
- improved safety by reducing ambient heat in the kiln shed, and
- longer life of kiln cars due to reduced thermal shock.

LESSONS LEARNED

Several lessons were learned from the assessment of kilns 7 and 8 which were used to inform later assessments.

The EEO recommended requirement that 'energy and material flows' aim to accurately define within $\pm 5\%$ a minimum of 80% of the site's energy use and all processes that use more than 0.1 PJ of energy, reinforced the importance of accurate data collection and analysis of each kiln. The new meters installed in kilns 7 and 8 allowed Midland Brick to identify additional energy efficiency opportunities and to accurately measure the benefits. New gas and electricity meters are now being installed in other parts of the manufacturing plant.

Another lesson learned from the 2006 assessment was the need to allocate sufficient resources to ensure that it is undertaken effectively and efficiently. The earlier investigation of opportunities for kilns 7 and 8 was difficult because it was undertaken by plant operators who were busy with their normal work. This time the investigation was faster and easier because four undergraduate engineering students were engaged to carry out the initial assessments ('scope definition') under supervision of the Energy Efficiency Coordinator. Their reports are expected to provide sufficient information for a decision to be made about which projects are worth pursuing further.

In addition, Midland now appreciates the value of a rigorous investigation of opportunities. For the assessment of kilns 7 and 8, the initial decision about which projects would be implemented was made by

senior managers on the basis of perceived feasibility. Opportunities are now being assessed in more detail using the project evaluation process applied to other projects at Midland Brick. The level of accuracy is consistent with the EEO requirement for opportunities to be evaluated with costs and benefits quantified to $\pm 30\%$.

"It's not too difficult to get a team of individuals enthused about investigating energy efficiency opportunities. Almost everyone is doing something at home to reduce their energy use. People want a chance to make a difference at work as well. And it's also not too difficult to get management involved because there are easy dollar savings and product quality improvements. We are finding opportunities in areas long overlooked. The business has benefited in other ways too. The company is better able to 'sell' its environmental credentials – it gives us a marketing advantage.

"The main challenge now is turning enthusiasm into procedures that can be integrated into our operational plans so that we will continue to identify, evaluate and benefit from opportunities as technology advances and energy prices rise."

Nigel Hogarth – Project Manager

NEXT STEPS

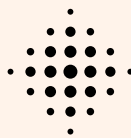
A major effort is underway to complete projects on kilns 7 and 8. Resources are concentrated on automating gas control on the burners. A Capital Proposal will be raised to progress priority projects from the assessment.

The scope definition reports for kilns 9 and 10 were submitted to the Advisory Group for a decision on which projects will be implemented in 2009. Further testing is required prior to project implementation. Some of these will be undertaken during a planned shutdown of kiln 9 in May 2009.

The key challenge for Midland Brick will be integrating energy efficiency into operational plans, systems and procedures to ensure optimal savings in energy costs, and to position the company for the introduction of the Carbon Pollution Reduction Scheme.



Australian Government
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National Framework
for Energy Efficiency

ENHANCING AUSTRALIA'S ECONOMIC PROSPERITY

The Department of Resources, Energy and Tourism thanks Midland Brick for sharing the information in this case study. Readers should be aware that this case study outlines key learnings and does not necessarily mean that the Department has verified that the assessment has met all legal requirements.

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The aim of the Energy Efficiency Opportunities program is to increase the uptake of cost effective energy efficiency opportunities by Australian industry through improving the identification, evaluation and public reporting of energy efficiency opportunities by large energy using corporations.