



## Industry Case Study

# MIDLAND BRICK

Midland Brick's parent company, Boral, signed up as a trial company for the Energy Efficiency Opportunities program in 2005.

As a major energy user, Midland Brick in Perth focuses on energy use as a way to reduce costs. The Energy Efficiency Opportunities program provided fresh impetus and a new approach which allowed the company to identify opportunities in a more systematic and inclusive way, and to revisit opportunities that had been identified previously. The projects that emerged from the initial assessment will have significant benefits for the company in reducing energy costs and improving productivity.

Midland Brick's objectives for the assessment were to identify opportunities to reduce costs through improved energy efficiency, and to demonstrate leadership by being one of the first companies to conduct an assessment for the Energy Efficiency Opportunities program. The majority of the assessment, as described in this case study, was completed in eight months.



### BUSINESS BENEFITS ACHIEVED SO FAR

Over 50 energy efficiency opportunities have been identified so far. The major focus has been on Kilns 7 and 8, which account for 40 per cent of overall site energy use. Preliminary analysis of 12 opportunities has shown that they will generate energy savings of approximately 0.27 PJ per year. This is approximately equivalent to 19,000 tonnes of CO<sub>2</sub> equivalent per year, or the energy use of 5,000 households per year.

The opportunities for Kilns 7 and 8 being investigated in detail include upgrading and automating control of the burners, adding doors to the end of the kilns, and adding insulation. The investigation is still underway, but the projects are expected to reduce the energy costs for Kilns 7 and 8 by 10-20 per cent. They will also generate other business benefits, including:

- improved productivity and product quality by reducing temperature variations through automating gas control of the kilns; and
- improved safety by fixing leaks and insulating the kilns.

Midland Brick expects to identify additional opportunities when it extends the assessment to the other kilns and processes at the site.



## About the company

A subsidiary of building products company Boral, Midland Brick is Australia's second largest producer of clay bricks and pavers and the largest single-site brick manufacturing operation in the world. The plant is located in Perth, Western Australia, and produces 330 million bricks per year. Midland Brick manages the whole production and sales process for its bricks and pavers, including quarrying, transporting, storing, batching, drying, kilning, selling and marketing.

## Energy use at Midland Brick

Energy costs represent around 40 per cent of total manufacturing costs at Midland Brick. Most energy is natural gas used for gas burners in the dryers and kilns that fire the bricks.

## The assessment

### The project team

Midland Brick initiated the trial assessment by bringing together a project team to broadly identify opportunities. This group included the project manager, Nigel Hogarth, who coordinated project development and assessment activities, an electrical engineer, a business unit manager, a kiln supervisor, a data analyst, a business improvement analyst and an external energy efficiency consultant. These people agreed to sponsor individual opportunities, and to meet regularly to discuss energy efficiency project opportunities. A project coordinator was also selected from this group to maintain focus and momentum.

The composition of the team changed after projects were scoped to provide the necessary expertise for project evaluation.



A production supervisor explaining the production process during the project team's site familiarisation tour

## Data collection

A site familiarisation tour for the project team was organised to improve the team's understanding of the production process and operational issues. While most people knew their own part of the site well, the tour allowed them to collectively explore their diverse perspectives and experience, and also see the site from an energy perspective.

The team already had spreadsheets showing annual energy consumption for the last five years with energy efficiency calculations. Further baseline information was collected from energy invoices and daily natural gas and production data. This information gathered by the project team was used to set the context for the opportunities workshop.



New energy efficient kiln cars with better insulation and heat sealing properties reduce heat loss from the kilns

## Energy opportunities workshop

The workshop began with a series of presentations to highlight major areas of energy use. The team identified 53 potential opportunities across all aspects of the brick making process during workshop discussions, and allocated and recorded responsibility for each opportunity.

## Opportunities identified and investigated

While many energy efficiency opportunities were identified, the project team limited the focus of the trial assessment to a detailed investigation and evaluation of the opportunities identified for Kilns 7 and 8. These kilns were selected because they offer the most potential for energy improvement – they were built in the 1970s and are likely to be in operation for another fifteen years.

The key opportunities identified and investigated for Kilns 7 and 8 included:

- 1. Upgrading to more efficient burners.** The company engaged a kiln specialist to determine the combustion efficiency of the existing burners and compare it with newer products. To support other investigations and improve understanding of how to optimise energy use, the kiln specialist also developed an energy balance and a pressure balance, and determined the energy loss underneath the kiln cars and the overall efficiency of the kiln operation.
- 2. Automating gas control of the burners.** This opportunity was incorporated into the upgrade of the new efficient burners in order to reduce energy consumption, and improve productivity and product quality through the maintenance of more stable temperatures.

Adding a door to the end of each kiln and a variable speed dryer to the fan will allow more air to be redirected back to the dryer. The company intends to implement this opportunity next financial year.



3. **Insulating the kilns and fixing heat leaks.** The company is purchasing a thermographic camera to identify sources of heat loss and improve ongoing energy management across the whole site. Once the thermal analysis is completed in Kilns 7 and 8, a program of works will be scheduled to add insulation and fix any significant leaks. The team has already commenced a maintenance program to fix known leaks and this has resulted in immediate energy savings.
4. **Improving electrical demand control** through the installation of electrical metering.
5. **Adding a door to the end of each kiln and a variable speed dryer to the fan.** This will allow more air to be redirected back to the dryer. To investigate this opportunity, the company measured the heat energy exiting from the kilns to determine the likely savings that could be achieved by adding doors. Quotes were then sought for the work to be done. Based on these quotes, the company has budgeted to implement this opportunity next financial year.

The estimated energy cost saving from the kiln projects is 10-20 per cent of energy used by the two kilns. In addition to their energy savings and financial returns, these opportunities were chosen because:

- they are expected to improve productivity, product quality and workplace safety;
- it is possible to measure the impacts of these projects, mainly utilising existing monitoring systems; and
- their implementation is expected to build staff enthusiasm for the Energy Efficiency Opportunities program and other environmental issues.

The remaining four kilns on the site will be assessed over the next two years.

## Project management and reporting

The tracking system developed by Midland Brick for energy efficiency opportunities projects is designed to feed directly into their public report. Information included on the system for each project includes the:

- site
- business area
- project identification number
- brief description
- status of the opportunity
- whether it was identified before or after the assessment
- the estimated energy saving
- type of energy used
- financial costs and benefits
- payback period
- accuracy level of the estimated energy saving

The system has therefore been designed to align with the reporting requirements for Energy Efficiency Opportunities so that information for public reports can be generated quickly and easily. For example, companies are required to report on the total number of projects identified, project status ('identified', 'under investigation', 'to be implemented', 'implementation commenced', 'implemented' and 'not to be implemented'); the type of energy used (gas or electricity), the total estimated energy savings and net financial benefits available from opportunities with 0-2 and 2-4 year paybacks, and the accuracy range of the data. Information that may be reported on a voluntary basis includes information on projects identified or implemented prior to the assessment, and Midland Brick's tracking system will allow them to do this.

## Lessons learned

### Internal communication

Midland Brick's parent company, Boral, puts the reduction of energy use and greenhouse gas emissions as one of its top sustainability objectives across the company. The trial assessment provided a structure for clearly communicating company-wide objectives to a large energy using site.

### Progressive assessments

As a diverse corporation, Boral chose to undertake its energy efficiency opportunity assessments progressively. It began at Midland Brick because the business had a strong culture of continuous improvement and a willingness to learn. This experience will inform the design of assessments at other Boral sites and businesses.

The collection of energy consumption data early in the process helped to get staff interested in the assessment.



Within Midland Brick, the detailed investigation stage of the assessment focused on two kilns that were considered a high priority for improvement, knowing that many of the findings would be applicable to other kilns. The assessment process itself could also be refined and then rolled out to the other activities on the site.

## The right expertise

Midland Brick used external consultants in two roles. An energy consultant was engaged to facilitate the overall assessment process, including initial data collection, running the workshop and prioritising opportunities. A consultant with specialist technical expertise in kilns was then engaged to undertake detailed evaluations of the projects identified for Kilns 7 and 8.

## The role of the project champion

A motivated and effective project champion is essential. At Midland Brick, Nigel Hogarth holds a meeting of his energy team every two weeks to review progress. Meeting minutes include a list of action items and timelines which is continuously updated.

Team members are more likely to be motivated if they can see progress being made. At Midland Brick, the collection of energy consumption data early in the process made people realise how much energy the company uses, helping to generate interest in the assessment. It also enabled them to recognise the progress that was being made, such as the early efficiency improvements that were achieved from the kiln maintenance program.

All the data was converted into one standard unit (MJ) and consumption was linked to the amount used to produce a tonne of product. These initiatives made the data easier for staff to understand and made the assessment more relevant to their work.

The outcomes of the assessment are being communicated to the energy team as well as the other staff at Midland Brick. Nigel has written progress reports in the site's newsletter, which linked the project to CO<sub>2</sub> emissions from power stations and the broader environmental benefits of energy efficiency. This was designed to motivate staff by demonstrating how efficiency can contribute not just to the company's profitability, but to sustainability goals as well.

## Taking a fresh look at energy

The assessment demonstrated the value of seeing production processes from an energy efficiency perspective. Although energy makes up a high percentage of site costs and opportunities for improving efficiency had been sought many times in the past, the assessment still found significant additional savings. It also identified projects that would save energy but would also have other productivity, quality and safety benefits.

## Don't delay assessments

The assessment at Midland Brick was undertaken at a busy time for the company. It was at full production capacity due to strong demand for its products, and the skills shortage in Western Australia made it difficult to attract staff. Despite these challenges, the high priority given to the assessment by management meant that it was able to be conducted. The benefits to the company will be achieved more quickly as a result.

***“The energy efficiency perspective hasn't only been about ancillary energy savings. We've been able to identify projects with significant production benefits as well ... Already we know the business benefits are significant.”***

Greg Smith,  
General Manager Operations

## Next steps

The remaining opportunities identified during the assessment will continue to be investigated and considered for implementation. The focus to date has been on Kilns 7 and 8 but over 50 opportunities were identified during the initial assessment.

The evaluation of energy efficiency opportunities is to be integrated within the company's existing operating and capital expenditure through its 'Performance Enhancement Program' (PEP) system. This system ensures that the appropriate individuals will be involved in making the decision to proceed or defer the investigation of an identified opportunity. The site has appointed a PEP Manager to ensure that an effective evaluation is undertaken. In order for such a system to be successful, a clear and accurate evaluation of energy efficiency's place within the capital expenditure approval system will be established and reflected in the targets set at site and business unit level.

Data collection and monitoring was identified as an area that would need to be developed further at Midland Brick, particularly for Kilns 7 and 8 where process monitoring and control is limited and parts of the operation are manually controlled. Metering, monitoring and reporting systems will be further developed to facilitate the ongoing assessment and tracking of energy efficiency improvement activities.

Energy Efficiency Coordinator, Nigel Hogarth (right) and Kilns Supervisor, Mike Robson, discussing the kiln door project



The Department of Industry, Tourism and Resources thanks Midland Brick for its involvement in the trial to test and develop aspects of the Energy Efficiency Opportunities program, and for sharing its results and the lessons learned. Readers should be aware that this case study is based on a trial assessment and may not represent a complete assessment as required by legislation.

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