



Australian Government

Department of Resources, Energy and Tourism

## Energy Efficiency Opportunities

### CASE STUDY

# ONESTEEL – NEWCASTLE ROD MILL

THIS CASE STUDY EXAMINES HOW ONESTEEL IS EMBEDDING ENERGY EFFICIENCY INTO ITS CORE BUSINESS PROCESSES.

OneSteel began its first assessments for the Energy Efficiency Opportunities program at their Sydney Steel Mills group, which includes Newcastle Rod Mill, Sydney Melt Shop and Sydney Bar Mill, in mid 2008. The management team for the project decided to use the assessments as an opportunity to build the company's capacity to understand and manage energy use, and to generate long term business benefits. The company's approach has three key elements:

- new organisational structures and management systems that integrate energy efficiency in core business processes
- the development of energy efficiency tools to assist in the identification and evaluation of energy efficiency opportunities
- a cultural change program that aims to engage and motivate staff to use energy more efficiently.

This approach is consistent with one of the key objectives of the Energy Efficiency Opportunities assessment framework, which is to embed energy efficiency in 'business as usual' processes. It has enabled OneSteel to achieve significant business benefits that go well beyond compliance with the program.

This case study describes the new systems and tools that were initially developed for the Sydney Steel Mills group and are now being rolled out across OneSteel.

### BUSINESS BENEFITS ACHIEVED SO FAR

By June 2009 OneSteel had identified 15 energy saving opportunities for the Newcastle Rod Mill. Of these, eleven adopted opportunities (those that have been or will be implemented) are expected to achieve annual energy savings of 67,933 gigajoules (GJ), or over six percent of total energy use.

Other operational and business benefits have also been achieved. For example:

- The installation of oxygen sensors in the reheat furnace, which are used to adjust the air to fuel mixture, has **increased yield** by approximately 0.2 percent. This equates to a saving of over \$300,000 per year.
- The installation of more efficient air compressors has **reduced operational risks** because they are more reliable and easier to maintain than older models.



### ABOUT THE COMPANY

OneSteel is an Australian-based manufacturer and distributor of steel and finished steel products. The company's activities encompass every stage of the steel-making process including mining, smelting, product manufacturing, recycling, distribution and sale of finished products.

OneSteel's major manufacturing facilities are located in Whyalla in South Australia, Melbourne, Western Sydney, Newcastle and Brisbane. There are also smaller manufacturing, recycling and distribution facilities throughout regional Australia and in New Zealand, Asia, the Pacific and the United States. The company offers more than 40,000 products globally and employs more than 11,500 people.

### ENERGY USE AT THE NEWCASTLE ROD MILL

The Newcastle Rod Mill converts long steel bars (billets) into thinner steel rods, with diameters ranging from 5.5 to 18mm. This steel can then be sold to the market as finished product, or can be used to manufacture concrete reinforcement products. Some is also sent to other OneSteel mills to be formed into wire products.

The mill used 904,967 GJ of energy in 2008-09, the majority of which was natural gas for the reheat furnace. The billets are heated to around 1100°C and then proceed through a series of rolling stands that mould the steel into different profiles. The product is then wound into coils ready for distribution or further processing.

### ONESTEEL'S APPROACH TO ENERGY EFFICIENCY

The assessment framework for the Energy Efficiency Opportunities program requires companies to look at six key elements when assessing energy use: leadership; people; information, data and analysis; opportunity identification and analysis; decision making; and communicating outcomes. OneSteel has addressed each of these, and in doing so it has developed new structures, governance systems and tools, not only to aid its participation in the program, but also to make energy efficiency part of its core business processes.



Billets travel through a series of rolling stands to change their size and shape

## LEADERSHIP

Energy efficiency has become a higher priority at OneSteel over the past five to ten years. This has been driven primarily by increasing energy costs and the introduction of the Energy Efficiency Opportunities program, which has raised the profile of energy efficiency with senior management at both a corporate and site level. OneSteel's Sustainability Principles document, signed by the CEO, states a commitment to increased energy efficiency and OneSteel is working towards establishing corporate level targets for energy efficiency in the next one to two years.

Energy audits have been undertaken in the past. These were undertaken as one-off events rather than as part of an integrated energy efficiency program. Based on the learning from this experience, the management team decided to take a different approach for the Energy Efficiency Opportunities program.

The aim was to integrate energy efficiency in 'business as usual' processes by allocating responsibility for energy efficiency to key people across the organisation; by developing a comprehensive energy management system and energy efficiency tools that would improve the capacity of the organisation to identify and evaluate opportunities; and by engaging the workforce as a whole in energy efficiency activities.

## PEOPLE

OneSteel has allocated responsibility for energy efficiency across the organisation. At a corporate level, energy and greenhouse issues are managed by the Executive General Manager for Technology, Safety and Services. OneSteel has also established a new position, the **Principal Energy Efficiency Engineer**, to oversee the standardisation of Energy Efficiency Opportunities compliant energy management systems across the company. When the first energy efficiency assessments were planned in early 2008 it became clear that a full-time resource would need to be allocated to the project. The new position of **Energy Efficiency Engineer** was established for Sydney Steel Mills. A **Technical Energy Group (TEG)** was formed at each of the Sydney Steel Mill group businesses, which consist of site personnel with knowledge of key energy consuming equipment.

An **Energy Champion** at each of the sites has also been identified. This role is normally undertaken by the Technical Superintendent because of their detailed knowledge of the site and authority to allocate resources to energy efficiency assessments. The champion works closely with the Energy Efficiency Engineer to collect data and organise the assessments.

While these individuals have specific responsibility for the management and coordination of energy efficiency programs, a number of initiatives are underway to ensure that responsibility is shared across the organisation at both a management and an operational level.

For example, energy assessments are coordinated through a new group, called the **OneSteel Technical Energy Network (OSTEN)**. Its role is to identify opportunities and to share the knowledge gained from each assessment between the businesses and sites. It includes two people from each of the represented sites: a 'champion', i.e. a site lead team member with responsibility for resource allocation, and a 'representative' at the engineering level (normally a combustion, electrical or environmental engineer).

OSTEN has established a series of **Energy Best Practice Groups**. There are currently four high priority groups: combustion systems, compressed air, electric motors, and hydraulics and lubrication systems. The groups participate in focus area audits in their field of expertise and develop new standards for the procurement, operation and maintenance of key pieces of equipment across the company. In procurement, for example, the standard for motors will target consideration of life cycle cost in addition to up-front costs.

## INFORMATION, DATA AND ANALYSIS

The first step in the data collection process for Newcastle Rod Mill was to undertake an **energy mass balance (EMB)** for the site. This was challenging because of the limited amount of detailed data in some parts of the process. There are sub-meters on all of the main energy-using processes but the interval between data collection varies and is not considered ideal. A proposal is being prepared to install real-time meters and to make data accessible by all staff through the intranet.

The mass balance was useful in identifying the main energy-consuming process and in challenging some assumptions about energy efficiency opportunities. For example, it had always been assumed that a significant amount of heat is lost through the walls of the reheat furnace at Newcastle Rod Mill. The mass balance revealed heat losses of only five to six percent, making any investment in new coatings to further insulate the furnace non-viable.

The first assessments at Newcastle and Sydney highlighted the need for an improved data collection and KPI tracking system for Energy Efficiency Opportunities and other government programs. A new **Energy Tracking System** was therefore developed to record, monitor and communicate energy consumption and greenhouse gas emissions data. The system is also employed to store and track all energy reduction opportunities and to link these to energy consumption data (see Figure 1). The system is accessible through the company's intranet site and is accessible by all staff.

The purpose of the energy tracking system is to:

- generate company-wide energy consumption data, including total energy use, energy use per tonne and energy use by type
- show how and where energy is being used across the company
- communicate this data to management and staff in a visual form that allows them to easily understand and monitor energy use
- record and track energy efficiency projects and to link completed projects to trends in energy consumption
- generate aggregated data for reporting purposes.

The tracking system was originally designed to support the Energy Efficiency Opportunities program but it is now being expanded and improved to meet other business needs. For example, the focus has been expanded to incorporate other resource tracking in the form of water and waste, so that it can now be used to communicate a wide range of environmental performance indicators.

### NEWCASTLE ROD MILL TOTAL ENERGY FY 0910

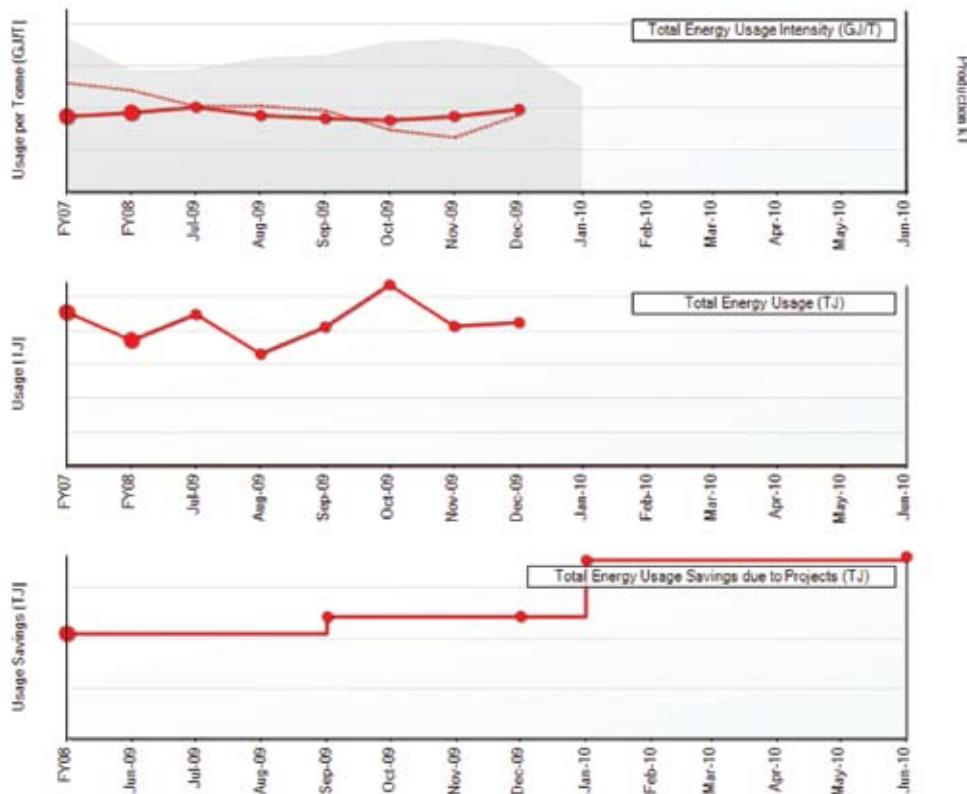


Figure 1: Example of graphs from the Energy Tracking System



Technical Superintendent Bill Stavros, who is also the energy champion at the Newcastle Rod Mill, in front of the daily KPI reports

## OPPORTUNITY IDENTIFICATION AND EVALUATION

OneSteel developed an **Energy Auditing Tool** to support the formal identification of energy reduction opportunities, and to make the process as efficient and productive as possible. Using dynamic Excel spreadsheets, the tool takes a user through all of the steps necessary to identify improvement opportunities. This starts with a pre-audit analysis, which includes:

- identification of the business unit that will be covered by the assessment
- analysis of baseline energy consumption data for the mill, including total energy consumption and energy intensity per tonne
- analysis of energy consumption over time including understanding reasons for variation
- identification of the key pieces of energy consuming equipment used at the site and their energy use, carrying out internal and external benchmarking against comparable operations and also for specific pieces of larger equipment.

The information on energy use by type of equipment is obtained from the overall site energy mass balance, and is used to break down the assessment into a series of **focus area audits**. OneSteel has found that assessments focused on specific process—rather than the operation as a whole—are much more effective and a more efficient use of staff time because each one only involves the people with knowledge and experience in that area.

After the pre-audit analysis has been completed, focus area workshops are held with relevant subject area experts. At Newcastle Rod Mill the audits were divided into four focus areas: water treatment and lubrication/hydraulics; reheat furnace; compressed air; main and finishing mills. At each workshop participants used auditing templates from the energy auditing tool to identify and consider energy efficiency opportunities, and at the end of the workshop the tool was used to generate a summary of the opportunities and potential savings.

All of the identified projects and their status are recorded in the Energy Tracking System. The system includes a ranking tool which is used to evaluate projects against criteria that are based on those used in the capital expenditure approvals process, i.e. financial cost and benefit and impact on operational, safety and environmental risks. This provides a 'first cut filter' which helps to prioritise projects for implementation, investigation or business case development through the capital approvals process.

The calculation of energy savings can be very difficult, particularly where there is inadequate information on baseline energy consumption. To assist in this process OneSteel developed an **Energy Opportunity Savings Calculator** to align with each of the focus areas in the auditing tool. For example, it shows how to calculate the flow and wasted energy from a compressed air leak, or the savings that might be expected after installing a new motor. Apart from making the investigation process more efficient, the tool will ensure that every assessment in OneSteel is based on the same methodology.

## COMMUNICATING OUTCOMES

The Energy Tracking System makes it easier for the project team to communicate the outcomes of the assessment to the business and site lead teams, senior management, the OneSteel board and the Department of Resources, Energy and Tourism. Its availability on the company's intranet site means that the data is accessible by all staff, and the Sydney Steel Mill Environment Superintendent sends a link to the system in monthly Environment Reports which are distributed to all senior and middle level management.



Steel billets are pushed from the reheat furnace

## LESSONS LEARNED & KEY CHALLENGES REMAINING

### NEW ORGANISATIONAL STRUCTURES AND GOVERNANCE SYSTEMS HELP TO EMBED ENERGY EFFICIENCY IN 'BUSINESS AS USUAL'

OneSteel placed a high priority on the development of new organisational structures (such as OSTEN), and energy management system and energy efficiency tools to support compliance with the Energy Efficiency Opportunities program. The aim was to integrate energy efficiency within business processes by allocating responsibility to people across the company and providing them with standard procedures for the identification, evaluation and documentation of opportunities. Data collection and reporting systems have also been expanded and coordinated through the Energy Tracking System.

This approach has a number of benefits that go beyond compliance. It supports business improvement by ensuring that energy efficiency opportunities are considered during procurement, operation and maintenance processes. Improved systems for data collection and energy efficiency have improved OneSteel's capacity to respond to increasing energy prices and a possible future carbon price. The Energy Tracking System has also provided a platform for improved monitoring, management and reporting of environmental performance across the company, including energy, greenhouse gas emissions, water and waste.

### BENEFITING FROM SITE-BASED KNOWLEDGE AND IDEAS

During the assessment it became clear that personnel at each of the sites have a lot of passion, knowledge and experience. They are also interested and keen to participate in energy efficiency programs. Energy efficiency opportunity assessments have provided both a formal and informal process for the identification and review of opportunities.

OneSteel have also learned that it is important to provide regular feedback to staff on progress and achievements relating to energy efficiency improvements, to maintain their enthusiasm.



Robyn Hayles, Sydney Steel Mill Energy Efficiency Engineer (left); with Michelle Woolnough, Principal Energy Efficiency Engineer for OneSteel

**“With the introduction of the Energy Efficiency Opportunities program, OneSteel has further developed its Energy Management Systems. OneSteel has developed compliant Energy Management Systems which have aided internal energy awareness and the identification of energy reduction opportunities. This has assisted us in continuing to build a portfolio of potential energy efficiency projects.”**

**Leo Selleck, Executive General Manager  
- Technology, Safety & Services**

## NEXT STEPS

### FURTHER ASSESSMENTS AND INVESTIGATION OF OPPORTUNITIES

The opportunities identified to date will continue to be evaluated and implemented where viable. As assessments are undertaken at the remaining manufacturing sites covered by the program, the portfolio of ideas will continue to be expanded and knowledge shared across the company through OSTEN.

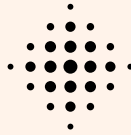
### ORGANISATIONAL CHANGE MANAGEMENT

OneSteel encourages the use of an **organisational change management program** with the introduction of any new policy, process, or technology. This recognises that an initiative will only be effective if people understand and support it through adequate engagement. OneSteel is therefore developing a program to engage the entire workforce, from senior level management through to the shop floor.

A culture survey has been distributed across all manufacturing sites to gather baseline data on attitudes and behaviour. The results have been used to refine the change management approach and staff will be re-surveyed every six to twelve months to monitor progress and further enhance the program. The following key areas will be addressed in further deployment of the change plan over the coming period: operations, training, systems, best practice and procurement.



**Australian Government**  
**Department of Resources,  
Energy and Tourism**



**National Framework  
for Energy Efficiency**

## **ENHANCING AUSTRALIA'S ECONOMIC PROSPERITY**

The Department of Resources, Energy and Tourism thanks OneSteel for sharing its results and the lessons learned. Readers should be aware that as this case study is based on a continuing assessment and may not represent a complete assessment as required by legislation.

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Energy Efficiency Opportunities  
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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.