

Energy Efficiency Review

Alcoa of Australia, Kwinana Refinery, Western Australia

Public Report - 2006

Introduction

The Kwinana Refinery has made significant improvements in energy efficiency since commencing production in 1963 and particularly in the last five years. Energy performance in the refinery's power house has been far better than industry guidelines for equipment of a similar age.

In May 2006, a detailed strategic analysis & energy assessment was carried out comparing the performance of the plant to theoretical best energy usage and best practice using current technology. A team of energy experts conducted the assessment over 10 working days and involved many of the technical & operational personnel from the location. The study identified a few opportunities for further improvement.

This event followed a previous energy assessment conducted by *The Alcoa Energy Efficiency Network, Knoxville, USA* – a team of contracted experts in the field of energy reduction. The team confirmed some of the opportunities earlier identified and recommended actions that would reduce the gap between actual performance and theoretical best. They were very complimentary on Kwinana refinery's energy management systems and focus on energy reduction.

The Kwinana Refinery was the first Alcoa location to be fully assessed to the requirements of the Energy Efficiency Opportunities Act.

The team identified the following opportunities to further reduce energy intensity and subsequent green house emissions.

Summary of Opportunities

Opportunities	Status	Impact	Payback	Total
Previously identified	Implemented	(3.8%)		3.8%
Previously identified	Under investigation	(1.7%)	>4 years	1.7%
Total identified by EEO assessment	Under investigation	(0.9%)		0.9%
	To be implemented	0.03 GJ/tonne (0.25%)	3 – 4 Years	0.25%
	Not to be implemented	0.011 GJ/tonne (0.1%)	> 4 years	0.1%

Top Opportunities

- 1. Improved Heater cleaning** utilising new tube drilling equipment which is best practice technology from the USA. this allows heater tubes to be cleaned quickly and efficiently, saving energy through better heat transfer. The project will be completed in 2007 at a cost of over \$0.145M. A saving in steam efficiency of over 0.2 GJ/tonne is predicted in 2007.
- 2. Cogeneration of power and steam** The opportunity for a cogeneration power plant was identified prior to the EEO assessment but the assessment further confirmed its potential benefits. Two of these plants have been established at the Pinjarra refinery, substantially reducing green house gas emissions. The project would be a joint endeavour with Alinta Limited and if approved by the respective managements, would allow the plant to operate with significantly lower energy requirements thereby reduce green house emissions.
- 3. Installation of new High Efficiency Calciner** – This project is being evaluated. It would involve purchase and installation of a new state-of-the-art calciner. This new equipment costing in excess of \$60M would enable the plant to reduce its energy consumption and green house emissions by up to 3 %.
- 4. Installation of new slurry storage tank** - This project identified at the assessment has the potential to increase the efficiency with which steam is used in the digestion process. The new tank will use waste steam to heat the slurry before the digestion process, thereby reducing the requirement for fresh steam from the boilers.

Outcomes of the Verification Process

The Kwinana Refinery measures all key parameters such as temperatures, flows and heat transfer measures on a constant basis using its process control management system. This system updates constantly – every minute and in some areas, every six seconds. The data from this system, which is provided with calibration checks, was used in the analysis of the energy used and relative gains from the projects.

A rigid self assessment program and periodic audits have been used to confirm the accuracy of the data.