

ENERGY EFFICIENCY OPPORTUNITIES

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Ensham
RESOURCES

EXECUTIVE SUMMARY

Idemitsu Australia Resources Pty Ltd (Idemitsu) is the controlling corporation for the purposes of the *Energy Efficiency Opportunities Act 2006*. Ensham Resources Pty Ltd (Ensham) is the only member of the Idemitsu Group to trigger the Energy Efficiency Opportunities (EEO) requirements. During this reporting period Idemitsu energy use totalled 2,330,730 GJ; 82% of this is attributable to Ensham Resources.

This report updates the *Ensham Energy Efficiency Third Public Report*, published in December 2010. During the 2010/11 reporting year, Ensham Coal Mine consumed 1,901,980 GJ of energy (using a whole-of-mine approach incorporating contractor diesel use). These results are a 27% improvement in energy use per tonne of run of mine coal as compared to the previous report. The energy reductions can primarily be attributed to the diesel key performance indicators (KPIs) for vehicles, switching off flood lighting around site and reduced pre-strip soil handling.

Ensham's overall business strategy is to transition from open cut mining to underground mining methods over the next 10 years to access coal at greater depths, therefore further reducing energy used to extract coal.



ABOUT ENSHAM

Ensham operates a large coal mine 40 kilometres north east of Emerald in Central Queensland. In 2011, the operation introduced underground mining to its existing open-cut operations. The mining operation includes numerous integrated activities, many of which are conducted under contract by separate corporate entities. While these contractors are responsible for providing effective services, as per the contract conditions, Ensham maintains overall mine planning and operational responsibility (a whole-of-mine approach).

Ensham therefore conducts its EEO assessments in the context of this whole-of-mine approach. Energy use and energy KPIs are both analysed and reported in a whole-of-mine context and as required under EEO.

Ensham has adopted a continuous improvement process in its business operations. Energy management has been integrated into existing management systems, and energy data is identified and reported at both corporate and operational levels within the organisation.



KEY ACHIEVEMENTS (2010/2011)

Ensham has an established Energy Policy, Implementation Framework, Energy Team and energy accountabilities across key positions within the organisation.

During this reporting period, emphasis was placed on improving energy data measurement and management, detailed opportunity assessments and, where appropriate, implementation of energy efficiency projects at the mine site. Key activities include:

Completed	Ongoing
Installation of solar hot water in all new accommodation	Transitioning from electric to solar hot water heating across existing camp accommodation
Installation of electricity sub-metering infrastructure around the mine site	Replacement of inefficient air conditioning systems and management systems to regulate and reduce air conditioner use
Reduced hours of operation of reject conveyor belt	Installation of more efficient lighting on draglines
Use of purchased waste oil in blasting activities	Investigating the use of own waste oil in blasting activities
Installation of on-site fuel metering system	Reviewing existing on-site fuel metering system for further efficiencies

Ensham Mine will continue to improve and integrate energy efficiency throughout the site as a key strategy to reduce ongoing operating costs. Ensham aims for ongoing improvement and the EEO assessment process has been a valuable contributor to this ongoing commitment to energy efficiency.

SITE ENERGY USE (2010/2011)

Ensham Coal Mine consumed 1,901,980 GJ of energy in the reporting period 1 July 2010 to 30 June 2011, equating to 208,957 tonnes of CO₂-e greenhouse gas emissions.

ENERGY EFFICIENCY OPPORTUNITIES IDENTIFIED AND EVALUATED (2007–2011)

Status of opportunities assessed to an accuracy of better than or equal to $\pm 30\%$

Status of opportunities identified	Number of opportunities	Energy Type	Payback 0 < 2, 2-4 or 4+ (years)	Annual net energy savings (GJ)
Implemented	4	Electricity	0 < 2 years	70,555
	4	Diesel	0 < 2 years	29,296
Implementation commenced	1	Electricity	2 - 4 years	15,660
	2	Diesel	2 - 4 years	10,324
To be implemented	2	Diesel	0 < 2 years	45,540
Under investigation	1	Electricity	2 - 4 years	4,428
Total opportunities identified	14			175,803

Status of opportunities assessed to an accuracy of worse than $\pm 30\%$

Status of opportunities identified	Number of opportunities	Energy Type	Payback 0 < 2, 2-4 or 4+ (years)	Annual net energy savings (GJ)
Implemented	1	Electricity	0 < 2 years	857
Implementation commenced	1	Electricity	2 - 4 years	4,752
To be implemented	2	Electricity	0 < 2 years	12,865
	2	Electricity	2 - 4 years	10,800
Total opportunities identified	6			29,274

ENERGY EFFICIENCY PROJECT EXAMPLES



1. Transition to solar hot water

Following a successful trial to measure the performance of solar hot water systems versus electric systems, Ensham has completed a full costing and investigation of installing solar powered hot water systems to provide hot water for its onsite accommodation.

Ensham continues to undergo a staged transition from electric to solar hot water heating. All new accommodation units have been provisioned with solar hot water, and electric units on existing accommodation will be gradually replaced. Installation of the solar systems will potentially save 4,752 GJ of energy per annum.

2. Improved lighting on draglines

Ensham's mine site has 224kW of lights installed on its four draglines, with the lighting configuration resulting in the bulbs running 24 hours a day, seven days a week, consuming approximately 1.96 GWh per annum.

Investigations identified alternative options that would improve the lumens by 25% per watt compared to the existing lighting. This will deliver significant safety advantages as well as providing suitable switching to enable dawn to dusk switch-off, reducing energy consumption by 50% and resulting in savings of approximately 1,261 GJ of energy per annum.

Ensham continues to install the new, energy efficient lighting on its draglines. As installation of the new lighting will require the use of a 130 tonne crane, the retrofits will be timed to coincide with planned dragline maintenance shutdowns.

3. Fuel Metering System

Ensham is in the process of reviewing its on-site fuel metering system with a view to replacing it for a more accurate measure of diesel use at the Mine.

Fuel metering provides Ensham with the ability to monitor fuel consumption at an individual vehicle's level. This data will be used to improve the energy mass balance at an activity level across the operations and establish target KPIs for vehicle diesel use. This activity is expected to result in an energy saving of approximately 39,600 GJ per annum.

The data from the fuel metering system will also assist in assessing and validating energy savings of a number of EEO projects.

4. Electricity sub-metering

Ensham has introduced electricity sub-metering to key infrastructure located around its mine site including draglines, Coal Crusher Plant, underground mine and rail head, as well as the mine accommodation and office, contractor camp and farm supply.

Sub-metering provides a greater understanding of electricity consumption on Ensham's mine site by providing benchmarking data and allowing for monthly comparisons of energy use.

Sub-metering data is available at 30 minute intervals, providing an accurate picture of electricity consumption on site and allowing Ensham to continue identifying energy efficiency opportunities.

5. Reject conveyor belt on Coal Handling Plant

Following the introduction of electricity sub-metering, Ensham has successfully reduced the amount of energy used by the reject conveyor belt at its Coal Handling Plant.

The reject conveyor belt motor previously ran 24 hours a day, seven days per week, averaging electricity use of approximately 12,848kW per month. By reducing the hours of operation, power usage has reduced by almost 75%, to approximately 3,240 kW per month.

6. Waste oil trial in blasting activities

Ensham is investigating the use of waste oil in blasting activities. Specifically, Ensham is trialling the use of waste oil in the fuel mix of the Ammonium Nitrate Fuel Oil (ANFO) used in blasting. The current oil component of ANFO is 6%. The trial substituted 10% of this oil component with waste oil (approximately 0.6%).

Blasting breaks down overburden – the soil, rocks and other matter located above the coal seam – to enable the draglines to excavate before the coal is mined.

Trial results showed the waste oil product performed well, with no adverse impacts. As a result, a further stage of the trial has begun to trial 30% of waste oil in the ANFO mix. It is anticipated this activity may reduce energy usage by approximately 5,960 GJ per annum.

In addition to purchasing waste oil for the trial, Ensham is also testing waste oil from its own maintenance operations for use in blasting activities. Early results show that some of this oil is suitable for use in blasting, and Ensham is continuing to investigate the use of separating usable waste oil from non-usable oil.



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