

Ways to drive mining energy spend down

While energy efficiency can help mining businesses reduce energy consumption costs, as well as mitigate carbon price risks, the industry has been slow to adopt wide-ranging energy efficient practices.

In 2010, the Australian Government released outcomes from the Mining Sector's Energy Efficiency Opportunities (EEO) Program, which highlighted that there is a range of energy saving opportunities available with reasonable paybacks such as process control, energy measurement, improved maintenance practices, and retrofitting. However, a number of mining businesses did not pursue these potential savings, with only 58 per cent of minerals miners and 65 per cent of coal miners pursuing known opportunities with paybacks of 0 to 2 years, which equated to an average financial return of \$15.62 per GJ.

There are many reasons why energy efficiency benefits are not pursued, including a historical perception of low energy prices, prioritisation of rapid production expansion, the discretionary nature of some energy efficiency projects, uncertain life of mine projections precluding projects with a payback longer than a couple of years, and site perceptions that energy efficiency schemes are simply regulatory burdens.

However, the case to implement energy efficiency has become increasingly compelling for miners as wholesale electricity prices soar, and energy consumption and intensity increases for existing mines due to expansion plans and lower grade ores.

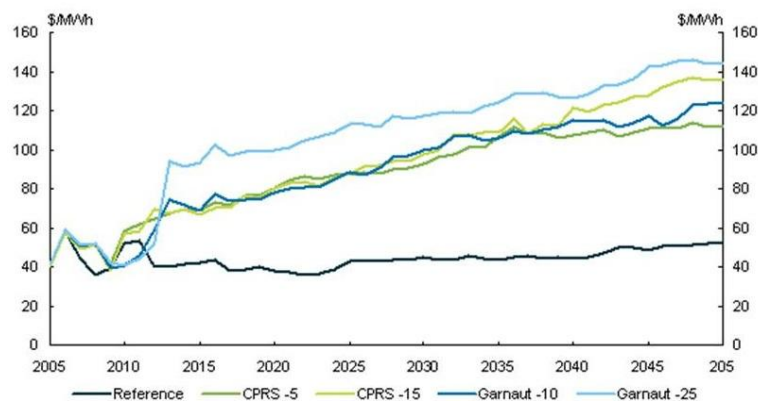


Figure 1: Average wholesale electricity prices across Australia. Wholesale electricity prices are expected to increase significantly. Source: Australian Treasury. Note: Prices in mid-2007 dollars.

The wholesale prices of gas and diesel, which are popular primary fuels for mine site generation in Western Australia, have also increased in the last few years.

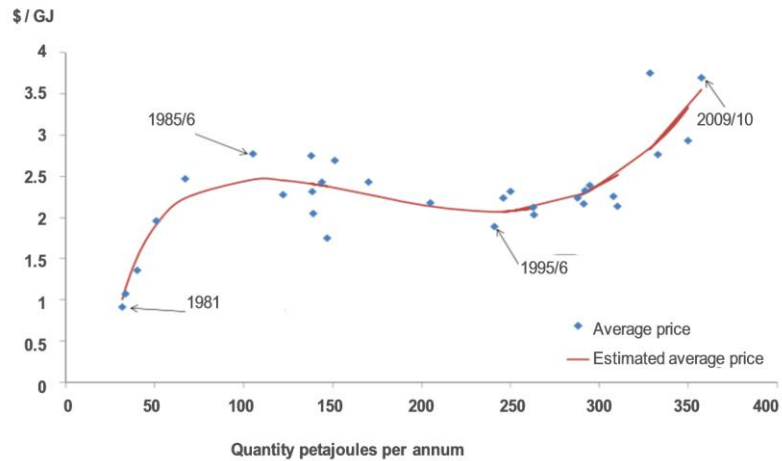


Figure 2: Average price per Gigajoule in Western Australia. The average price of gas in WA has risen and is expected to increase rapidly as legacy contracts are replaced by new contracts. Recent contracts have been reported as high as A\$9-11 GJ. Key contributors to price shifts include that the WA energy supply value chain is tied to global markets, and gas production costs are expected to rise as field developments will be in deeper water with fewer liquids and more impurities. Source: Economics and Industry Standing Committee (2011), 'Inquiry into Domestic Gas Prices'.

Until now, the major focus of many mines has been on identifying a range of energy efficiency options (EEO) in the process plant – a core driver of power consumption. However, there are a number of other practical solutions to reduce energy demand that can have a significant impact on the bottom line, yet are not as widely exploited because businesses are less familiar with other options as being major energy saving sources. The leading mining businesses will be those who think strategically about energy efficiency and place sufficient priority on successfully identifying and executing EEO initiatives right across the value chain and support functions in addition to their regulatory reporting requirements.

Care for your auxiliary services

While the energy consumption of auxiliary services* is comparatively less than other assets (e.g. mills and mobile plant), auxiliary systems can be a source of significant energy reduction opportunities. For example, industrial energy efficiency assessments have demonstrated that sites can reduce air leak rates by up to 35 per cent, thereby reducing energy wastage. In another example, at Newmont's Tanami Mining operations, installing intercoolers for diesel generation sets has an estimated capital cost of \$515k, and can provide significant savings of approximately 500 kL of diesel per year, which is equivalent to a payback period of less than two years.

Maximising process efficiency from mine to mill

Process optimisation efforts have traditionally treated extraction and processing phases as separate activities. As a result, mining businesses often focus on optimising the performance of their AG/SAG mills to increase energy efficiency at the expense of other assets, as the mills are the most energy intensive assets. However, extraction and processing activities are intimately linked. In order to optimise particle size, and maximise recovery and energy reduction, businesses should consider optimisation strategies that evaluate the entire operation – from the blasting process to the comminution circuit, and all the interactions in between.

Improved mobile plant maintenance will yield gains

There is much talk about miracle fuel additives, electric haul trucks and alternative materials handling methods but today's reality involves more basic measures, such as monitoring tyre pressure, optimising haul load and reducing waste, which are more likely to produce acceptable payback periods as maintenance is generally low cost. The more immediate challenge is to implement reliable fuel monitoring and management systems where projects can be evaluated accurately, and operations can be managed against credible and tested metrics.

Supply only what you must

A mine can take years to fully develop, but the conveyors, mine ventilation and hydro systems are designed, built and installed up front. As a result, conveyors, fans, pumps and other system components are often substantially oversized and run at maximum rate when they could be run slower.

Businesses could further reduce energy wastage by installing adjustable speed drives (ASDs) which control the frequency of electrical power supplied to the motor. Having ASDs on fans and pumps saves energy by allowing the volume of air or fluid moved to match the system demand. The savings from ASDs are compelling – under an 80 per cent variable speed scenario, energy consumption is reduced by 50 per cent. In addition, ASDs may extend the lifespan by reducing the maintenance requirements of the load (e.g. the conveyer or pump) and the motor itself, due to operating more efficiently.

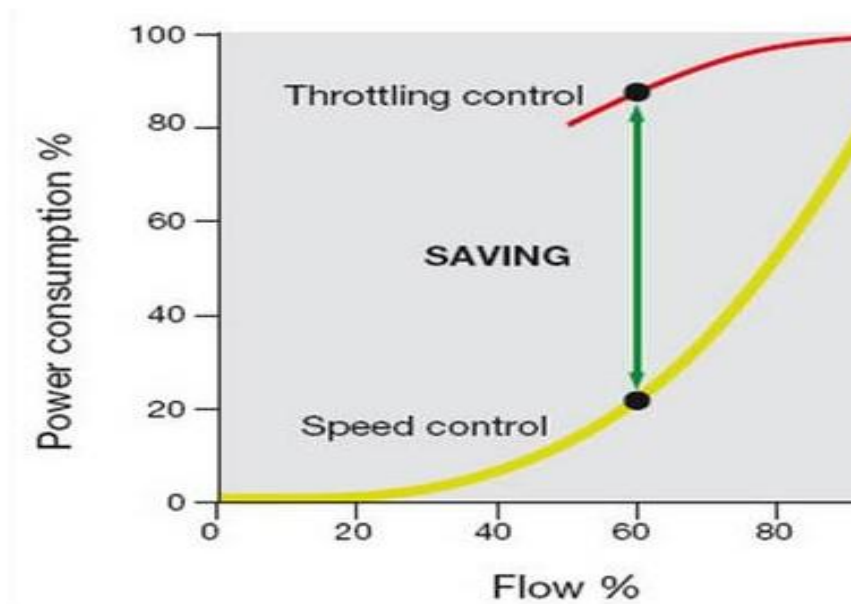


Figure 3: Comparison of power consumption using throttling control (with a valve or damper) and speed control (with an ASD). 75 per cent of fan speed provides 75 per cent of the flow, but uses only 42 per cent the power needed to generate that flow. ASDs allow businesses to reduce flow and reduce power consumption. For example, by lowering flow to 50 per cent, power consumption is reduced to 12.5 per cent. Source: Tomi Ristimäki (2008) 'Energy efficiency through Variable-Frequency Drives'.

Recover heat if you can use it

A significant amount of heat (i.e. energy) that is contained in compressed air and refrigerant, boiler exhaust and process streams is often dissipated through site cooling towers and other chiller systems. Reclaiming this heat and using it to warm cold fluids, turns an unused resource into a valuable one.

For instance, where there is a source (a cooling load on site) and a simultaneous requirement (a heating load on site), businesses should consider installing heat recovery technologies, such as heat exchangers. The key is to ensure the right source supplies the right sink.

To optimise recovery of heat, a well-established process known as Pinch Analysis can be carried out. Developed in the UK over 30 years ago, this methodology ensures the maximum quantity of available heat is applied in the right places.

Conclusion

There are numerous practical energy efficiency options available to miners, many which lie beyond the usual scope of EEO efforts. Further, the cost and payback periods of these options are comparatively lower than commonly cited capital improvement projects.

Miners considering these options will be able to develop energy efficiency strategies that surpass compliance requirements, and enable them to more effectively respond to the wider energy challenges of rising cost pressures and increased expectations for environmental stewardship.

* Auxiliary services include power generation equipment and services such as air compressors, steam boilers and refrigeration systems.

Marchment Hill Consulting has offices in three locations which serve Australia and New Zealand, Asia and the Middle East.

Melbourne
Level 4
530 Lonsdale Street
Melbourne VIC 3000
Ph: 03 9602 5604
Fax: 03 9642 5626

Brisbane
Level 5
199 George Street
Brisbane QLD 4000
Ph: 07 3012 7242

Perth
Unit 14
123a Colin Street
Perth WA 6005
Ph: 08 9322 5422

marchmenthill.com