

The bottom line

Driving value through energy
management in mining

Thought leadership series | Vol. 1

The triple bottom-line imperative

Energy represents a tremendous improvement opportunity for mining companies since savings derived from more proactive energy management are inextricably linked to profitability.

The mining sector operates on a massive scale, and accordingly, it is a massive energy consumer. Energy is one of the biggest expenses for mining companies, constituting approximately 30% of total cash operating costs. This would include not just what the mine draws from the grid, but also the diesel, LNG and CNG it consumes as well as the explosives that are used. After all, explosives comprise energy that is put into the system and can be optimised. Most organisations do not manage this as a portfolio and don't have full visibility into what is such a significant cost driver for the system.

Although much of the sector has over the past 18 months experienced lower energy expenses (\$/t) due to depressed oil and natural gas prices, through the same period many mining companies showed an increase in energy intensity (GJ/t), thus effectively wasting the opportunity to create a more sustainable footprint while prices were low. This could be particularly problematic considering that energy is poised to account for an even bigger share of mining input costs in the future, even if energy prices remain flat.

Based on Deloitte's experience, companies can reduce their energy consumption by 15-20% in existing mines through an effective energy management program, and up to 50% for new mines by rethinking the mine design with energy management in mind.

In Australia, for instance, energy consumption and intensity in mining and mineral processing is rising at around 6% per annum, largely due to the declining grade of ore bodies and the rising amount of waste that must be removed to access them.^{1,2} On the other side of the world, the Mining Association of Canada acknowledges that energy intensity is increasing for its members since underground mines must develop new production zones at much greater depth, which requires extra energy for ventilation, pumping, cooling, hoisting and sustaining the infrastructure.³ And, these conditions are being echoed around the globe.

Increasing energy intensity alone should provide sufficient reason for mining companies to think carefully about how they manage energy, and many have begun to do that. At the very least, mining companies are examining their supply side energy procurement practices in an attempt to obtain better terms, and are tasking their operational groups with looking at more efficient technologies in high-consumption areas such as hauling and comminution. Some of the more progressive organisations are moving toward greater electrification and are exploring renewable power options, such as solar arrays combined with diesel generation. The scope of these efforts, however, is often narrow, as is the lens through which mining companies view the business case for producing and consuming energy more cleanly and efficiently.

For this reason, along with a propensity to default to traditional ways of doing things, they may be overlooking an opportunity to drive value through energy management across the triple bottom line of financial, environmental, and social performance. Furthermore, amid

more difficult operating conditions, constraints around energy availability and reliability, and the likelihood of future fossil-fuel price volatility, this opportunity may be more significant and have greater strategic ramifications than previously envisioned.



Bottom-line benefits

While still the top driver, cost savings is only one part of the energy management equation. Renewable power generation provides a means for companies to manage the uncertainty of future fuel prices. For instance, after the initial upfront investment has been amortised, solar and wind installations produce power at a guaranteed low price. The health, safety and environmental (HS&E) benefits are substantial as well, and they are rising in importance considering the renewed focus on carbon reduction spawned by 'COP21', the 21st convening of the Conference of Parties to the 1992 United Nations Framework on Climate Change. More than 175 countries endorsed the resulting UN Paris Climate Change Agreement, and many are aggressively moving to codify their carbon reduction goals.⁴

During 2016, carbon pricing or other market mechanisms have either already been implemented or are scheduled to commence by the end of the year in approximately 40 countries and more than 20 cities, states and regions, including seven of the ten largest global economies.⁵ From an Australian perspective, the Safeguard Mechanism under the Federal Government's Emissions Reduction Fund commenced on 1 July 2016. The Safeguard Mechanism requires facilities with annual emissions over 100,000 tonnes of carbon dioxide equivalent (tCO₂e) to keep their emissions at or below a baseline set by the Clean Energy Regulator.⁶ Facilities that exceed their baseline levels will be required to purchase and surrender Australian emission reduction credits. Several mining companies will trigger the Safeguard Mechanism requirements, and the sector will also likely be the target for at least some ensuing regulations.

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These mandates will serve to further incentivise mining companies to explore energy efficiency opportunities.

Beyond managing the growing implications of carbon pricing, renewables and energy efficiency programs can help mining organisations to keep pace with the rapidly changing HS&E landscape in other ways. For instance, they can eliminate particulate emissions and reduce ventilation costs below ground. Plus, renewable installations can outlast the life of the mine by decades and they are much easier to operate than diesel generation plants. This gives mining companies an opportunity to hand over the renewable resource to the community at the end of a project, generating much goodwill and helping the mining sector to retain its social license to operate.



Awareness and integration

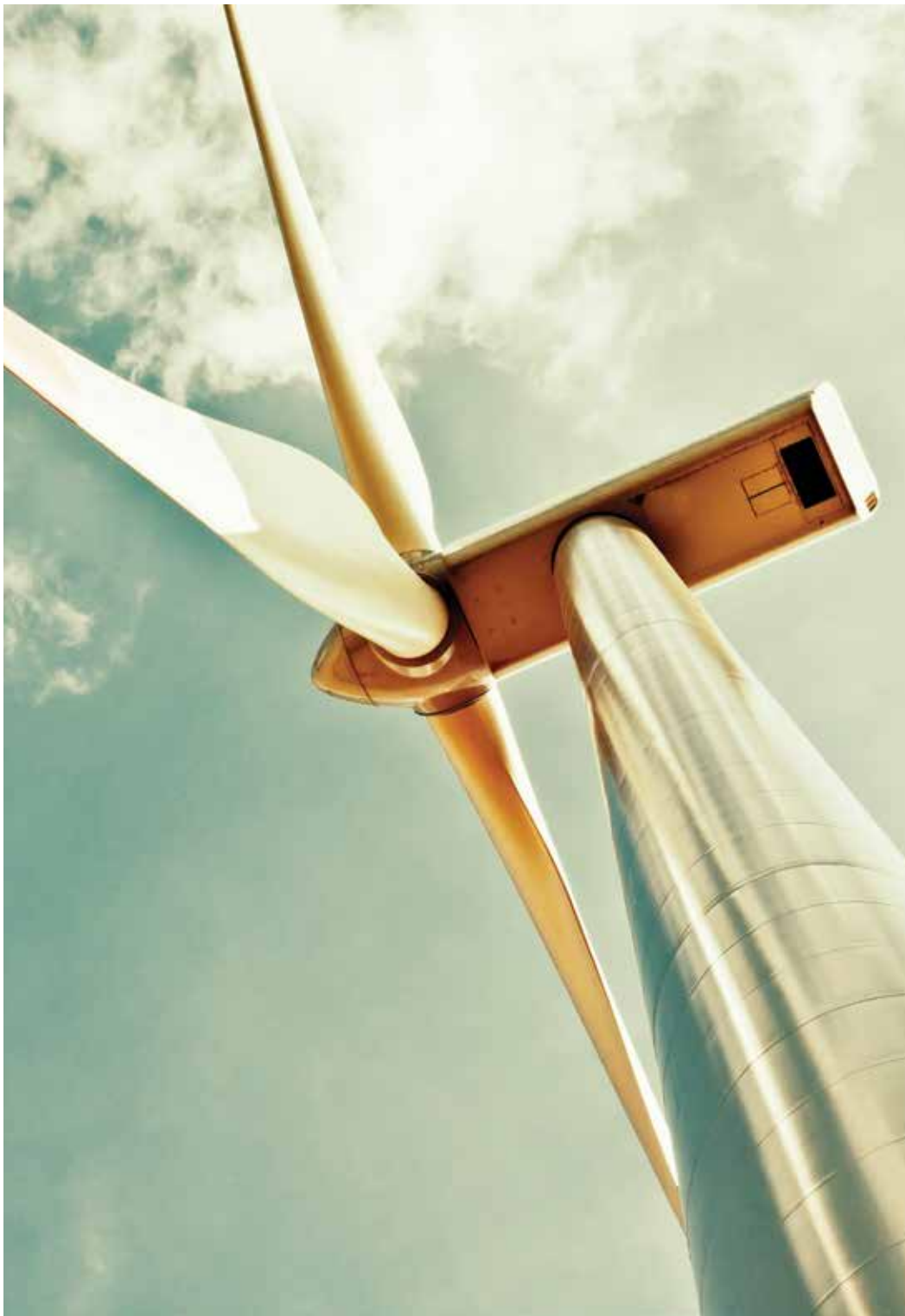
If there are several compelling reasons to focus on energy management, then why aren't more companies aggressively pursuing these opportunities?

Mining companies today generally realise the context of energy has changed. They have endured oil price swings, from roughly US\$40/barrel to US\$140/barrel and back down again, and they are aware of the risks fuel price volatility and energy access constraints pose. Nonetheless, they might not be aware of the availability, feasibility, and cost-competitiveness of new options. Consider the energy-related developments that have occurred in just the past few years:

- Micro-LNG technologies have become available.
- Smart technologies have come on the market, both producing valuable data streams and enabling automation.
- Big data analytics allows for significant optimisation of process variables to drive down energy consumption and improve recoveries.

- Solar and wind are now competitive with coal and natural gas in some regions as a fuel source for electricity generation.
- Utility-scale energy storage mechanisms, ranging from batteries to compressed air to pumped hydro and more, have evolved dramatically and are becoming increasingly practical and cost-effective.

Sorting one's way through it all is particularly difficult when the responsibility for energy procurement and consumption is fragmented across the organisation. There can be a lack of integration between departments within an organisation, where the finance department is traditionally focused on cost reduction and the HS&E or sustainability departments are focused on compliance and maintaining social license to operate. By linking together cross-functional teams focused on energy management opportunities can be identified that not only reduce cost, but can enhance the organisation's overall sustainability profile.



Energy as strategy

With companies running out of ways to take costs out of their operations and with increasing concerns about greenhouse gas emissions, the aforementioned barriers are no longer sufficient to justify the status quo. Mining organisations are being called upon to innovate – and, in our view, there is no more pressing area in which to do so than how they think and act with regard to their energy consumption. In order to drive value across the triple bottom line of financial, environmental, and social performance, and to strengthen their strategic positioning, companies must increasingly approach energy management with a concerted effort. This means managing their energy-related projects as a portfolio, dedicating time and resources to them, and approaching energy management as an integrated corporate initiative.

While it requires a big shift in mindset to drive value across the triple bottom line through energy management, it does not necessarily take a big capital investment. Companies can start small by employing the following principles:

- Begin with measurement processes and a framework**
 Energy management starts with measuring consumption across different sites and fuel types; creating a baseline for energy costs across the entire system, and importantly, having an integrated framework through which actions can be taken. This allows energy management to be developed into a dedicated top-down management discipline. We've observed several Australian mining companies, particularly in the coal sector, have implemented continuous measurement and monitoring regimes by deploying intelligent technologies at the source of fugitive emissions. This type of technology could potentially enable a similar level of rigour around energy consumption data.

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- Use analytics to identify efficiency opportunities**
 Advanced analytics applications now allow investigative teams to interrogate big data in a way that wasn't possible before. With the right approach, mining companies can use analytics and big data to target opportunities to deliver the same or greater amount of higher quality material, with lower emissions, decreased costs, improved productivity, and enhanced safety.
- Question conventional thinking**
 Mining companies have a tendency to approach energy management from the supply side, meaning they automatically look for cheaper, cleaner, and more reliable fuel sources. However, some of the biggest opportunities in energy management lie in adjusting operations to reshape demand. Examples include using an algorithm to control the speed and sequence of material movement so that trucks use the least amount of diesel fuel possible, or shifting energy-intensive practices to the daytime when the sun is shining and when a solar array would be producing electricity at its maximum capacity.
- Enlist the support of leadership to drive an energy transformation**
 Many mining companies spend as much on maintenance as they do on energy, yet the number of people dedicated to reducing the energy footprint is a fraction of what they have dedicated to maintenance. Companies need to put in place the capabilities to optimise the energy footprint, break down silos to share ideas and create a culture of energy awareness. Leadership commitment is essential. If top executives start talking about energy as being important, people throughout the organisation – not just in operations – will start paying attention to it.
- Identify opportunities to optimise the energy asset portfolio**
 A number of companies now offer asset ownership and/or specialised infrastructure support at competitive prices. More and more mining organisations are considering these types of ancillary offerings to gain access to low-cost capital and better manage their investments in electricity generation assets and energy-related infrastructure.

Conclusion

Mining professionals are beginning to acknowledge the benefits that come from managing energy efficiently. This has yet to occur on a wholesale level because mining executives frequently don't know where to start or aren't armed with the right know-how to proceed effectively. While miners don't have to be energy experts, they increasingly need to think about energy more strategically, as it is important not only to the economics of their operations but also to their ability to manage risks in the future.

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