



# Designing mines out of the **energy squeeze**

Gone are the days when mines could design their energy systems based simply on peak requirements.

**N**oddy McGeorge, principal mining engineer, SRK Consulting, believes that a completely new philosophy is now required due to a number of changing variables and conditions mines face today.

"Today's mine energy designs need to address higher risks, better efficiencies and smarter applications," says McGeorge. "This means putting energy decisions in the driving seat of mine planning; this could include altering production plans to meet the needs of load balancing, exploring energy recovery systems, and installing more secure power sources on-site."

He says this requires a detailed understanding of load requirements for each production process on a mine, so that management can estimate variability over time and incorporate these variations in its designs.

"Savings can be valuably found where energy usage is highest," he states. "A good example is in fuel consumption in open-pit operations. About 70% of diesel consumed is used in elevating waste material to be dumped – so any design innovations that reduce the amount or position of waste can help cut the diesel bill."

McGeorge emphasises the need for innovative solutions, as most of the



15%

in energy savings was achieved so far by South African mines, focused on lighter consumption areas, such as water heating and lighting

15% in energy savings so far achieved by South African mines (when Eskom required the mining sector to limit its usage) was focused on lighter consumption areas, such as water heating and lighting.

#### The biggest culprits

Research conducted in the US showed that most energy in open-pit mines was consumed in mill and concentrator operations, followed by waste rock removal and ore excavation. In a typical hard rock underground mine, ventilation accounted for almost 42% of cumulative energy per tonne hoisted, well ahead of hoisting activities, at 13%, and drilling, at 9%. In deep mines with high rock temperatures, cooling is also a significant energy factor.

"A new design philosophy must acknowledge that a mine is its own energy network, and all activities must be planned so that they

42%

of cumulative energy per tonne hoisted was accounted to ventilation, well ahead of hoisting activities at 13%, and drilling at 9%

contribute to balancing this network," he says. "The strategy of load shifting has shown substantial results, with some mines saving up to 25% of their energy usage by shifting loads away from areas of the workplace when not occupied by workers at that time."

A realistic goal for mines is to halve energy consumption without impacting productivity, McGeorge notes – a challenge that could be met by using benchmarking and proper power management. The benchmark approach considers possible energy savings in each mining process – from extraction and materials handling to beneficiation and processing – and across a range of mineral commodities. Consumption targets can then be compared between four categories:

**"A good example is in fuel consumption in open-pit operations. About 70% of diesel consumed is used in elevating waste material to be dumped."**

Noddy McGeorge, principal mining engineer, SRK Consulting

25%

savings in energy usage shown by some mines by shifting loads away from areas of the workplace when not occupied by workers at that time

current usage, best practice usage, practical minimum usage, and theoretical minimum usage.

"Technology and automation are strong components of the modern design philosophy, allowing for real-time monitoring and controlling of energy infrastructure. It should be remembered, however, that increased use of technology will raise energy consumption – so it must be more productive. Also, applying new technology to an old mine design is possible, but is unlikely to achieve optimal results," McGeorge concludes. **35**



**1 600 EXPERTS, OVER 700 CLIENTS,  
40 YEARS OF RELIABLE PARTNERSHIPS**



PARTNERSHIPS IN PRACTICE

With manufacturing facilities in India, South Africa, Chile & Australia and a sales & distribution network spanning 16 countries, Tega has earned the trust of clients in 72 countries as reliable partners in the areas of wear, separation and conveyance. Trailblazing engineering expertise and cutting-edge R&D ensure that Tega's solutions reduce downtime and enhance efficiency.

Corporate Office:  
2 Uranium Road, Vulcania, Brakpan, 1541  
Ph +27 11 421 9916/7  
info@tegaindustries.co.za | www.tegaindustries.co.za

