



Powering Sustainable Progress, Everywhere, All the time: Introducing Microgrid Solutions

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Akram Elhenawy, Global Mining Key Accounts Manager for the electric power division of Caterpillar, believes that the mining industry in Africa is increasingly ready for renewable solutions. As storage solutions improve, he's convinced that mines will look to trusted providers for a total integrated solution that can guarantee service for the next 20 years – and beyond.

Q How would you describe the market for hybrid solutions for remote mines in Africa in terms of current opportunities and barriers?

A Accessing affordable water and energy has increasingly become a challenge. Government reports estimate that millions of people in Africa are living without any power at all. This is forcing mining companies to look at new energy solutions, especially since Africa has numerous energy resource options from oil and natural gas to solar and wind power.

Today, remote mines in Africa are using diesel generator sets as the core of the system, providing firm, uninterrupted power to run the customers' businesses however the price for diesel fluctuates, and there are difficulties with logistics and security as well as operational and maintenance costs. These issues are making renewables look like a very good financial choice for many big mining companies. In

addition, there's a dramatic decline in the cost of renewable energy, especially solar and wind.

We've seen significant investment in wind and solar in countries like Chile, where mining companies have been investing in renewables to reduce energy and fuel transportation costs while improving transmission capacity, making these mines generally more competitive.

We believe a similar approach will be adopted in Africa, and this will open more opportunities in the next five years for hybrid power solutions that integrate diesel and PV solar. Wind, biomass, and small hydro will also present good opportunities.

The biggest challenge we see right now is that mining companies are very conservative when it comes to using new technologies or alternate forms of energy. Political instability and health concerns are hurting Africa, on top of other barriers facing the development of renewable energy in the market today.

Q It seems that mining experts are less concerned about the reliability of systems and more focused on the economics. Is that your impression, as well?

A Yes. In recent years, renewable energy technology has matured and concerns about reliability have diminished. We're seeing increased investments, re-



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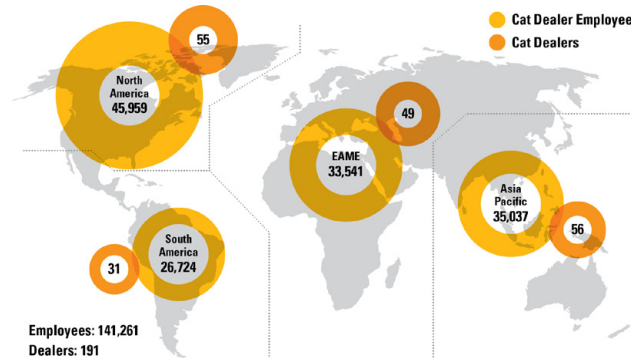
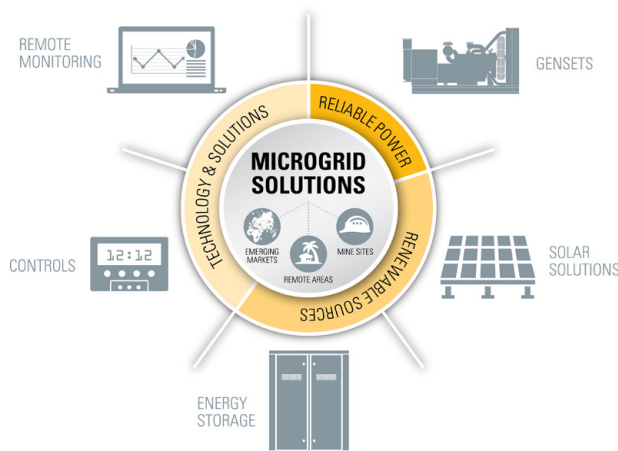
flecting a better understanding of the benefits of integrated microgrid solutions.

Typically, PV and wind lowering fuel consumption in the range of 30-70 percent, but it's limited due to the high cost of energy storage. In the next few years, we expect storage technology to advance, with the price coming down. When mining companies' trust that they can rely on renewable solutions, we'll start seeing a big shift.... In addition, communities want "green power" around them.

Q What do you think needs to happen to truly unlock the potential for partnerships between mining operators and renewable energy providers?

A Several things. The most important is assuring mining companies that you are there long term for operation, maintenance, and support. You have to guarantee the performance and availability of the system throughout the lifetime of the mine.

Providers should help to change the mindset with-

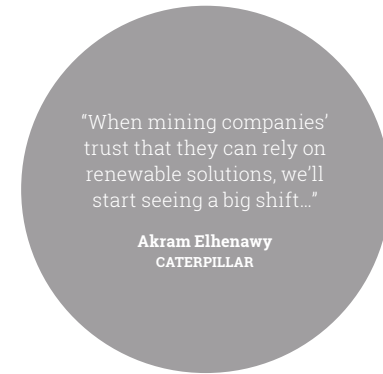


in the mining industry by introducing this technology and educating mining operators about the economic, environmental, and social benefits. They have to work with mining companies to understand the real-life costs of integrated microgrid projects and explore all available options to meet the customer's short and long-term goals.

Finally, providers need to be flexible and adapt to the financial constraints that mining companies face today. They have to provide long-term project financing or introduce the right international power producer to provide a fully financed, risk-wrapped power purchase agreement.

Q Would you give us an update on Caterpillar's approach to hybrid and solar solutions for the global mining sector?

A Caterpillar has been partnered with mining companies for over 40 years, and is now integrating PV solar and energy storage to create a seamlessly controlled microgrid solution with our traditional generator sets and turbines which are at the core of providing firm, uninterrupted power to run our customers' businesses. We are bringing the best of all technologies together. Cat dealers are uniquely positioned to act as a central resource for providing customers with fully integrated sustainable solu-



tions that are reliable and cost-effective with lower emissions.

Q What has been the response from current mining clients when you discuss integrating new energy solutions, including solar?

A The response has been amazing. Our mining customers rely heavily on Caterpillar for much of their equipment on the mine site already, so our ability to integrate these new technologies is just another way we can provide value. The key to all of this is our dealer service network. It's one thing to integrate the technologies and sell a product, it's the ability to service it and keep it running for the next 20 years that differentiates us from our competition.

Q What are you most looking forward to at the Renewables and Mining Summit & Exhibition on July 1-2 in Johannesburg?

A We have participated as a delegate and speaker at previous events in Toronto and Santiago. These events provide excellent opportunities to share knowledge, perspectives, goals and lessons learned. We look forward to introducing our hybrid microgrid solutions and discussing the many possibilities for further cooperation.