

The Power of 3

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Driving the future further

Overview

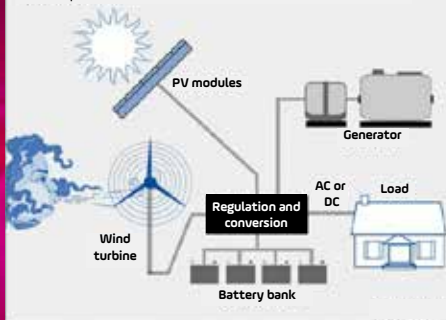
As discussed in issue 8 of *The Power of 3* going off-grid right now remains, for the majority, more a tantalising prospect than a reality. And for the power utilities themselves, in developed countries in particular, past investment in conventional long-life plants and distribution infrastructure is affecting the rate of uptake of renewable sources of energy.

In Australia, for example, power utilities are expected to provide reliable, cost-effective and future-proof services to consumers, but their reliance on coal-fired power stations (29% are more than 40 years old!) and pole-and-wire distribution is putting the country at risk ... and not just in terms of energy security.

Recently, though, it's become possible for energy consumers in remote, off-grid and fringe-of-grid locations to cost-effectively install hybrid power systems. These combine multiple power sources such as wind turbines, solar thermal and solar photovoltaic (PV) technology with lithium-ion battery storage to deliver reliable, non-intermittent electric power.

Hybrid power systems

Combine multiple sources to deliver non-intermittent electric power



Large industries operating in remote locations also face great challenges, with rugged terrain and the tyrannies of distance leading, historically, to complete reliance on diesel-powered generators, which is expensive and polluting.

Going off the grid big time!

Mining needs energy – and needs it clean

Mining is energy intensive, so managing energy use is a business imperative.

The industry – leery not just of increasing fuel costs but also possible measures to put a price on pollution – is keen to explore the use of large-scale renewable energy (solar, wind, geothermal) and battery storage to supply non-intermittent power independent of the grid, thereby reducing both costs and emissions.

Here's where mining is going.

"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."

~ Thomas A. Edison



Atacama 1 solar thermal and solar PV plant.

Also located in the Atacama region are the 100 MW Amanecer Solar CAP, a PV power plant, and the 70 MW Salvador Solar Park, one of the first in the world to supply competitively priced solar energy to the open market without a government subsidy.

Latin America

Atacama 1 and Atacama 2 – Chile

Chile has munificent solar resources and a government committed to both cleaner energy and economic development. Many huge mines there, which are inadequately serviced by the weak local grid, have been hit by soaring fossil fuel costs for power generation. Enter Spanish group Abengoa, which supplies innovative and sustainable technology solutions in the energy and environmental sectors.

Abengoa is responsible for Atacama 1, Latin America's first solar-thermal plant, and a subsequent and similar project, Atacama 2. Both are located in one of the most inaccessible and arid regions in the world.

Atacama 1, which will prevent the emission of more than 800,000 tonnes of carbon dioxide annually, combines a 110-megawatt (MW) solar thermal plant and a 100 MW PV park covering 1,000 hectares. It produces enough power 24 hours a day to meet the demands of both households and industry in the region.

Like Atacama 1, Atacama 2 combines a 110 MW solar thermal plant and a 100 MW PV park that, together, can produce clean, stable energy 24 hours a day. The power generated by the PV park will be injected direct into the grid running through the property, while the solar thermal unit has an energy storage system to generate electricity for 15 hours straight.



Veladero gold mine – Argentina

Barrick Gold's Veladero mine, one of the largest gold mines in Argentina and indeed the world, has no grid connection, so energy comes courtesy of diesel-powered generators alone. However, as in Chile, solar resources there are significant. As a result, Barrick (despite its recent misfortunes in the region) is liaising with world-class solar developers in the hope of offsetting some 30% of the mine's diesel power with solar. If all goes to plan, a solar plant could be installed and fully operational at Veladero by the end of 2018.



Australia

DeGrussa copper-gold mine

In an audacious thumbs-up to large-scale renewable power and battery storage, Sandfire Resources has joined forces with an international consortium to finance, develop, operate and own a state-of-the-art 10.6 MW solar plant at the DeGrussa mine, 900 kilometres north of Perth in Western Australia.

The innovative \$40 million project – which is integrated with DeGrussa’s diesel-fired power station – was successfully commissioned in June of this year.



Spanning 20 hectares and designed to supply around 20% of the mine’s power requirements while reducing emissions by approximately 12,000 tonnes of carbon dioxide a year, it’s now the largest integrated off-grid solar and battery storage facility in the entire country.

Just this month, the DeGrussa mine was deemed ‘Australian Mine of the Year’ in recognition of its outstanding contribution to both hard-rock mining and environmental management. As such, the project may well become an international reference site for the use of renewable energy in mining.

Lakeland Solar and Storage Project

BHP Billiton, the world’s largest miner, anticipates “strong growth in renewable energy capacity [over] the next few decades” – an important consideration given that around 35% of its gas emissions result from the generation of electricity.

With that in mind, and impelled by forecasts that wind and solar energy could soon achieve price parity with rival sources of power, BHP is keen to explore new technologies that could not only reduce its operating emissions but also, in time, be adopted at its remote and off-grid mine sites.

BHP is betting that an ambitious project in Lakeland, a tiny town in far north Queensland, holds the key to such technologies.

Lakeland (population 227), which has a fringe-of-grid connection to the state’s Ergon Energy network, currently boasts a hotel, a café, a roadhouse and a small store. With the advent of the Lakeland Solar and Storage Project, though, that may all be about to change.

BHP has entered into a ‘knowledge sharing’ partnership with ARENA (the Australian Renewable

Energy Agency), Conergy, Origin Energy and Ergon Energy in an Antipodean first: construction of a world leading, large-scale solar plant and battery storage facility connected to a major electricity grid.

Pitched as a first for remote, edge-of-grid technology, and likely to trigger a host of similar projects nationwide, the Lakeland enterprise will comprise a 13 MW solar PV installation and grid-scale battery storage to supply solar power after sundown and during times of peak demand.

Says Ivor Frischknecht, CEO of ARENA, the project is “the first in the world to test a concept known as ‘islanding’ from the main electricity grid,” with the local town powered entirely by solar and batteries for several hours during test periods.

Conergy Australia, part of the German-based Conergy Global group, which bills itself as “one of the world’s largest downstream solar companies, specialising in the design, finance, build and operation of high-performance solar systems for utility-scale power and businesses,” will construct and run the project.



To infinity and beyond?

As both off-grid power generation and storage capacity blossom, and as the trend extends into fringe-of-grid installations, innovative technology is set to overtake long established grid infrastructure and provide clean, reliable and economical energy for all. Power generation and storage nodes will bloom within existing grid systems, thereby improving efficiency, reducing cost and allowing consumers to become the power generators and traders of the future. The grid as we know it won’t disappear; rather, it will undergo a transformation that heralds a remarkable energy revolution.



And finally...

For those blessed with deep pockets, refined aesthetic sensibilities and a burning desire for sustainability, Tesla has come up with the perfect alternative to conventional solar panel roofing: [solar shingles](#).

“The key is to make solar look good,” proclaimed Tesla CEO Elon Musk. “We want you to call your neighbours over and say, ‘Check out this sweet roof.’”

Which [Perth-based company](#) is helping to facilitate the imminent energy revolution?

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