

THE FUTURE LOOKS BRIGHT



"Microgrid technologies deliver an innovative, cost-effective way to incorporate renewable energy sources into traditional power generation."

Ron Hall, Hybrid Microgrid Segment Manager

Five reasons why microgrid technology could fuel the future of Australia's energy networks.

Renewable energy is the cheapest new power generation that can be built today.

And it is rapidly dropping below that of traditional fossil fuels – large-scale solar now costs almost half of what it did a few years ago¹. Coupled with rapid advances in energy storage technology, these costs are also dropping relative to the price of fuel, meaning attention is now moving towards microgrid technology that includes renewable energy sources as a possible alternative to complement Australia's vast electricity network infrastructure.

Accounting for around 80 per cent of Australia's electricity consumption, the National Electricity Market is the longest geographically connected power system in the world². Australia's Chief Scientist Alan Finkel recently handed down his review into its future security including the recommendation to mandate energy retailers to provide a certain amount of their electricity from low-emissions generators – something that microgrid applications support. In fact, integrating renewable power with smart energy storage and conventional diesel or gas-fuelled power generation is a welcome innovation for ensuring power security and there are plenty of other benefits too.

1. Microgrids are independently functioning forms of distributed energy generation

This means that cheap sources of non-conventional and intermittent energy sources can be enabled by the introduction of advanced controls and energy storage systems. These systems can be configured to operate independent of a grid or to assist to stabilise the grid during some periods of instability. This provides an altogether more reliable and de-centralised grid that has a higher tolerance to failure.

2. Operating costs are cheaper compared to conventional power generation

Improvements in the costs and capabilities of photovoltaic (PV) systems, energy storage and telematics; coupled with advances in technology and communications integrated into hybrid microgrids are proven to reduce operating expenses all while optimising system reliability, efficiency and flexibility³. Recent studies conducted by the University of California and the Technical University of Munich show that cost of energy could get as low as US\$100 per kilowatt/hour (KWh) by as early as 2019 – down from \$10,000 KWh in the 1990s⁴. This sudden and significant drop in storage costs has made investment and research into other types of storage mediums difficult to justify because lithium-ion storage costs are forecast to drop even further as manufacturing capacity increases. New technologies such as metal-air, advanced lead acid and flow batteries will struggle to keep pace with the large-scale investment that is being sunk into lithium-ion production.

3. Microgrids can deliver grid stability and energy security

During outages of high energy demand or natural disasters, the frequency response of microgrids is immediate. From floods to bushfires, Australia is highly vulnerable during periods of natural disaster. Large areas of the country been battered in recent years – and its placing extra pressure on our power networks. For example, South Australia's 1.7 million residents were left without power following severe storms in September 2016. When three elements of critical transmission infrastructure were destroyed, the power system protected itself by shutting down. Scenarios like this adversely affect residents and businesses alike across Australia and are becoming more frequent. And microgrids provide a solution – New York City adopted a microgrid model after major blackouts sustained during Superstorm Sandy⁵ while Western Australia's main grid operator has also flagged a new model including microgrids⁶. This is also the vision and strategy that the South Australian state government is moving towards to prevent this type of disaster happening again.

4. Microgrids provide value to prime power diesel and gas customers

Cost-effective electric power has long been a challenge for communities and industrial or commercial installations without access to a strong utility grid. Microgrids integrate renewable energy with generator sets and suit a broad range of applications including telco towers, industrial facilities, mining installations and remote communities. And they reduce fuel expenses, lower utility bills, offset carbon emissions, and reduce the total cost of ownership while increasing energy efficiency – even in the most challenging environments.

5. Digital controls and smaller-scale storage enable consistent voltage and frequency

For example, in the event of a voltage dip, the energy storage can rapidly feed energy back into the system to provide stability. The Cat[®] Bi-Directional Power Inverter (BDP) uses a digital droop control that reacts within 100 milliseconds and can overload to 256 per cent for a short duration. This enables the BDP to support generator sets in accepting block loads without fluctuations in frequency, making it possible to deploy renewable resources in proportions far greater than a utility grid could support – up to and exceeding total system demand⁷. It also enables the generation of fault currents straight from the inverter to help activate protection systems and operate a safe grid (a feature unique to the Cat[®] BDP).

Australia is well-placed to be at the forefront of change

The South Australian (and other) state government's visions of high penetration renewables and on-grid energy storage was recently referred to as "ideology and idiocy in equal measure" by the Prime Minister⁸, yet it is in fact the technology of the future. I encourage network operators, business and community leaders to consider and embrace renewable energy on its merit and evidence. Australia can lead the world in this innovative and crucial arena and we have the ability to demonstrate how forward thinking and innovative we are as a society.

Cat[®] Hybrid Microgrid systems deliver reliable, cost-effective and sustainable energy solutions

A market leader, Cat[®] Hybrid Microgrid systems add photovoltaic solar modules, state-of-the-art energy storage and advanced monitoring and control systems to their traditional line of reliable power generation equipment from generator sets to uninterruptible power supplies. The major components are available as factory-built, factory-tested, containerised modules that can be shipped to the site and installed with plug-and-play simplicity. This minimises on-site construction work and shortens lead times. The result is reliable, cost-effective and sustainable energy⁹.

Ron Hall is the Hybrid Microgrid Segment Manager for Energy Power Systems Australia (EPSA).

EPSA is proud to be the exclusive Australian distributor of the full range of the Cat[®] Hybrid Microgrid systems from 10 kW–100 MW – a fully customisable and modular hybrid power solution. EPSA is the only fully integrated service provider of hybrid systems in Australia offering purpose-built products, a turnkey solution and project services, Cat[®] Finance purchase options, service agreements and a Cat[®] warranty.

Media enquiries media@energypower.com.au

Sales enquires sales@energypower.com.au

1. Clean Energy Council, [Clean Energy Australia Report 2016](#) 2. Australian Government, Department of the Environment and Energy, [Independent Review into the Future Security of the National Electricity Market](#) released 9 June 2017 3. F Saury, C Tomlinson, [Hybrid Microgrids: The Time is Now](#), Caterpillar North America, February 2016 4. G Parkinson, [Why Australian battery storage costs may fall 40% in two years](#), 20 June 2016, viewed 28 August 2017 5. C Roberts, No More Blackouts: [How New York is Protecting The Power Grid](#), Inside Energy 11 January 2016, viewed 28 August 2017 6. J Gifford, [W.A. plans Australia's biggest solar+storage micro-grid in Onslow](#), Renew Economy, 3 October 2016, viewed 28 August 2017 7. Saury, Tomlinson *ibid.* 8. N Harmsen, [Prime Minister attacks South Australia's renewable energy policy at state Liberal Party's AGM](#), ABC News 14 August 2017, viewed 28 August 2017 9. Saury, Tomlinson *ibid.*