



## Eaton inaugurates Wadeville microgrid

Global power management company, Eaton, recently inaugurated a new microgrid at its Wadeville site in Gauteng, South Africa, which includes the first deployment in Africa of Eaton's energy storage system, xStorage. The microgrid is geared towards enabling the site to become self-sufficient from an energy consumption perspective, relieving pressure on the national electricity grid and associated electrical infrastructure. *Glynnis Koch reports.*



Eaton's chairman and CEO, Craig Arnold, cuts the ribbon on the new microgrid at its Wadeville site, accompanied by: Frank Campbell (to his left), Jeff Krakowiak (to his right) and Seydou Kane (far right).

"Today's opening of the Wadeville microgrid system is an important step for Eaton in South Africa. This installation is a demonstration of our commitment to develop sustainable access to energy in the region," said Seydou Kane, managing director of Eaton Africa. "This microgrid system will enable a more intelligent and cost-effective operation of our facility and serves as a concrete case for the application of this technology in both commercial and industrial facilities."

A 200 kW<sub>p</sub> rooftop solar photovoltaic system has been installed on the roof of the company's Wadeville facility, which supplies power for direct use on sunny days with any excess used to charge the xStorage system. The microgrid is also connected to an Eskom supply and to a backup generator to give a 375 kVA maximum capacity that meets the facilities total demand.

Demonstrating the system during the launch, Eaton's Africa Nico Archer set a 50 kW limit from the utility. The rooftop solar system provided up to 180 kW, with the second-use lithium ion batteries in the xStorage system automatically making up the balance of the prevailing 280 kW load. "The battery storage system can be recharged from the Eskom grid during low tariff periods or directly from the solar panels when they are generating more power than required," explained Archer.

Eaton, a leader in electrical energy for

buildings and inverter, UPS and power electronic technology, has joined forces with Nissan, a proven, high volume manufacturer of reliable Li-ion batteries, to develop the xStorage system, which is based on the use of new or second-life Li-ion electric vehicle batteries from Nissan EVs. The xStorage system combines several aspects of energy storage and power delivery into one system. This functionality includes multiple energy inputs – such as solar and the grid – battery storage using second-life or new Nissan Leaf batteries, and UPS capabilities for clean, balanced power delivery. xStorage stores electrical energy so that it can be used on-demand to power businesses or to participate in demand response programmes, by selling energy back to the grid, for example.

Replacement of the Li-ion batteries in an EV is recommended when its remaining capacity is below 80% of its new capacity. At that point the battery will be 'retired' from

vehicle use. Nissan also now offers an eight years warranty for its batteries against capacity loss below 70%, the only EV manufacture to do so. The use of second-life lithium-ion batteries from Nissan expands the useful life of electric vehicle batteries, reducing the need to use additional resources from the planet to produce new batteries.

With storage capacity from 21 kWh with five battery packs in series, to several MWh made up of 10 battery 42 kWh racks, Eaton Nissan xStorage systems using 4.2 kWh second-life batteries come with a five-year warranty for daily full charge and discharge cycles, while if new 6.0 kWh batteries are used on the same full cycle, they are warranted for 10 years.

Microgrids such as this can increase resilience, provide higher levels of energy independence, support grid stability and reduce energy costs by up to 40%. A similar sized microgrid could provide energy for 230 community homes. In Africa, where millions are still without modern energy services, microgrid technology is increasingly being considered as a solution to address energy poverty. Ageing infrastructure and grid reliability continue to be issues across the region and improving grid reliability will improve business continuity, minimise business losses and improve economic growth.

According to World Bank Group Enterprise Surveys, on average, African manufacturing enterprises experience power outages lasting



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5.7 hours on 56 days per year. These outages result in firms losing an average of 6.0% of sales revenues, but losses can be as high as 20% where back-up generation is limited. As a result, universities, hospitals, corporations and local communities are now considering microgrids as a way to increase power reliability and availability to meet their critical demand.

Using Eaton's expertise in power systems engineering, circuit protection and engineering services, customers can increase energy resilience and sustainability while reducing

energy-related costs and minimising losses resulting from downtime due to power outages. "We believe we should not only have a role to help deliver access to reliable, sustainable energy, but that we should be demonstrating the benefits that our technology brings by using it ourselves," said Kane.

The Wadeville facility produces power management solutions for the industrial and commercial sectors. Eaton's market-leading energy storage systems for utilities, independent power producers and power



Eaton Africa's Nico Archer demonstrates the xStorage system with its second-use lithium ion batteries automatically making up the balance of the prevailing load.

system operators mitigate the investment needed and the charges and emissions resulting from, peak demand infrastructure. The widespread deployment of systems enabling peak capacity, flexible generation and grid services, coupled with the easy consumption of renewable energy, helps a smarter grid and customers meet environmental targets. □

## Why Microgrids matter: a macro view

### 1: What are microgrids?

Microgrids are stand-alone power generating, distribution and storage systems that can be operated independently or connected to the primary utility grid. They provide a reliable, efficient solution to unexpected power loss, very effectively balancing variations in energy demand, and they can be used to optimise energy usage for more reliable power, reduced operating costs and lower carbon emissions.

### 2: Rethinking power in a post-Sandy World

In 2012, Superstorm Sandy hit Houston, Texas, leaving 7.9-million businesses and people across 15 states stranded for days, even weeks, without power. A few of the storm's many legacies are new regulations, building codes and strategic long-term planning focused on improving the ways public and private energy systems work.

### 3: Keeping up with grid modernisation

When you consider the new digital economy, population growth and the rise of cities, it is no surprise that over the past two decades, electrical demand has increased. Yet the power grid has been slow to keep up. Universities, hospitals, corporations and local communities are considering microgrids as a way to increase power reliability to meet their critical demand.

### 4: Ensuring energy security, as well as surety

With the rise of smart grid technology and the industrial Internet, utilities will soon be as potentially susceptible to cyber attack as any computer network. In fact, according to the Brookings Institute, a recent congressional survey of the industry revealed that many utilities report being 'subject to daily, frequent or constant cyber attacks'.

### 5: Resiliency is quickly becoming a must

Across the country, numerous publicly funded initiatives – along with increasing regulation – are focusing on improving resiliency to ensure that critical facilities and infrastructure are available and functional both during and after disturbances.

### 6: Generating revenue along with power

One of the benefits of microgrid energy systems is that their owners are able to effectively manage their onsite generation assets to meet their needs and, if needed, they can then sell excess power back to the utility or use it to reduce demand charges. That means microgrids can enable additional sources of revenue.

### 7: Renewables are becoming the standard

California recently increased its historic 33% by 2020 renewable portfolio standard policy to require that utilities obtain 50% of their electricity from renewables by 2030. Microgrids incorporate renewable energy sources with effective energy storage technology to compensate for the intermittent nature of renewables and help achieve clean energy goals.

### 8: Proven to handle some serious mega-wattage

In one of the first utility-scale microgrid demonstration projects in the US, Eaton helped PGE, as part of a US Department of Energy research effort, to build a 5.0 MW lithium-ion battery and inverter system capable of storing 1.25 MWh of energy.

### 9: Modularity and scalability are key

To build more flexible and cost-effective energy systems, it is critical to adopt a modular, scalable approach, which is an integral part of Eaton's Power Xpert Energy Optimizer controller. This allows microgrid operators to integrate existing generating assets today while planning for new assets tomorrow – and being able to adapt to changing needs over time.

### 10: Optimising microgrids for over a decade

With one of the largest and most experienced teams of power system engineers, field technicians and customer support engineers, Eaton has been able leverage proven technology to deploy microgrid projects with many customers, including utilities and the US Department of Defence.

[Eaton.com/microgrid](http://Eaton.com/microgrid)

### Seydou Kane – Managing director for Africa – Eaton Electrical Sector

Seydou Kane is responsible for leading Eaton's Electrical Sector team throughout Africa and driving Eaton's ambitious growth strategy for Africa. Seydou has more than 15 years' experience in management, sales and strategic marketing in four continents.

Previously, Kane held several key management positions including Western Africa cluster leader & managing director, senior account manager, growth leader – Africa, marketing manager and internal consulting and strategy at Du Pont over the past nine years across South Africa, Nigeria and Switzerland. □