



ABOUT THE COMPANY

Vodafone is one of the world's largest telecommunications companies providing a wide range of services including voice, messaging and data across mobile and fixed networks.

Case Summary

Location: New Zealand

Vertiv Solution:

- Hybrid Energy Storage System (HESS)

The Challenge:

The global telco industry has the incredible challenge of bringing connectivity to remote locations where there is no grid power or other reliable sources of energy.

The depth of this challenge depends on both the rural landscape and the amount and type of infrastructure that is being invested in rural regions. Australia, for example, has made progress under the National Broadband Network (NBN), but has also encountered challenges from the sheer size of the rural areas it is attempting to connect, as well as divided opinions on what mix of technologies should be used.

Across the water in New Zealand, there has been greater success under the Government-led Rural Broadband Initiative (RBI). Under the initiative Vodafone helped deliver 154 new towers and a further 387 tower upgrades with the programme deliver on time and within budget. The RBI programme has meant 300,000 rural homes and businesses are now within reach of high speed wireless broadband.

On some sites the traditional solution of laying or connecting power cables is not feasible. This has led to the installation of alternative power sources, such as generators. Where generators are in use, they come with their own set of challenges. Firstly, you really need two generators for effective production and redundancy, which means two sets of maintenance schedules and expensive diesel delivery costs to remote locations.

VODAFONE NEW ZEALAND

A Vertiv Case Study

Diesel deliveries can be hampered by poor weather conditions and often require specialist vehicles such as four-wheel drive tankers. Maintenance schedules can be costly as generator contractors need longer travelling time to get to these difficult sites.

To ensure it could deliver on its RBI commitments, Vodafone began the process of examining 'off grid' solutions for some of the most challenging sites to get power to.

"We take great responsibility in our role to deliver broadband to the entire country," said Tony Baird, Technology Director at Vodafone NZ. "Diesel generators to support rural telecommunications infrastructure are an essential part of that. However, the significant logistics costs, as well as potential air and noise pollution these generators can cause, present challenges."

One of the ways Vodafone has addressed these challenges is through a best-in-class green energy cell site in the rural Kuaeranga Valley on the north island of New Zealand, fitted with Vertiv's **Hybrid Energy Storage System (HESS)**.

The Solution

Working with Vertiv, Vodafone NZ and the NZ Government has improved mobile coverage and high-speed wireless broadband for thousands of locals and visitors in the region.

This was done through a reliable and cost-effective enclosure that could provide off grid continuous power, reduce fossil fuel consumption, provide lower maintenance costs and ensure enhanced reliability.

The solution is a rugged IP55 outdoor enclosure that can withstand the harsh NZ climate. It contains zinc-bromine module (ZBM) 10kWatt batteries, Vertiv's newest generation of rectifiers, solar and wind converters and associated electrical protection devices.

The system is designed so that wind, solar and batteries make up the primary energy sources and the generator is only used as a back-up energy source. All four energy sources are interconnected and remotely monitored and controlled using Vertiv's SiteWeb solution, which provides a real-time single pane of glass dashboard for energy harvested and stored, availability.

The Benefits

For the communities in the Valley, the benefits are clear. They have access to fast and reliable broadband, with minimal disruption from the diesel generator. Connectivity is one of the most important areas to encourage business and economic development in rural areas, which are fast being left behind by urbanised areas. This solution from Vodafone is helping to bridge that gap in New Zealand.

Moreover, connectivity increases safety for the region's communities. It's easy to take for granted access to emergencies when help is needed, but rural areas are at risk of black spots. This solution means citizens and visitors alike can more easily reach out for help when it's really needed, which could mean the difference between life and death.

Solution benefits include the innovative ZBM batteries, which were chosen for their intelligent management, remote monitoring and recharging capabilities. High temperature ratings and low environmental emissions also make this an attractive alternative to its valve-regulated lead-acid (VRLA) counterparts.

The batteries can also tolerate high temperatures up to 50 degrees Celsius without any active cooling. 100 per cent depth-of-discharge makes this technology ideal for unstable grids and renewable energy sources. Unlike traditional battery technologies, inherent depth-of-discharge characteristics prevent battery damage from prolonged outages.

Using natural energy such as solar and wind means Vodafone NZ can leverage multiple energy sources to top up the batteries and power the customer load without reliance on the grid. The energy production for typical NZ sites has optimal solar radiation and wind energy. With at least 4kWh/m²/day solar radiation and 6m/s wind speeds, this makes for positive energy and cost value as the solution uses just 6-12kWh solar and 1-4kWh wind.

Despite its minimal use, the generator still plays a critical role. *"Using a hybrid model means a mix of natural energy sources that gives us the ability to provide our customers with an always-on broadband network"* said Tony Baird, Technology Director at Vodafone NZ.

Savings on maintenance costs are also achieved due to a reduced load on the generator and fewer running hours.

The cost of the fuel is not everything – you need to consider the cost to transport it to the site. Some locations require four return trips for a tanker to refuel the generator.

Another unique feature of the solution is smart monitoring and control. All four energy sources are linked and monitored via internet-connected devices through Vertiv's SiteWeb system. This smart technology provides a real-time dashboard recording every component of the solution including run times, fuel levels, oil pressure, solar power, solar voltages, wind power and wind voltages. Load values are automatically translated to give Vodafone insight into how the system is running for servicing and fuel needs. In addition, the customer can set up reports for its tenants, meaning more accurate invoicing.

Vertiv's service team can seamlessly integrate this solution into its existing 'kit bag'. All service technicians are trained to effectively maintain the monitoring equipment. The ability to check fuel levels and service schedules means that fuel deliveries and maintenance servicing can be executed in one visit, removing the need for separate trips.

Summary

This solution has enabled smart connectivity for the Kauaeranga Valley. Using Vertiv's energy optimisation expertise has meant a significant reduction in expensive diesel run time coupled with efficient energy storage.

"We do what we can to reduce our environmental impact," said Tony Baird, Technology Director at Vodafone NZ. "This solution is testament to that and is part of our wider journey towards the efficient rollout of broadband connectivity throughout New Zealand."

"Devising and deploying this solution was surprisingly simple due to the knowledge of our people and the significant advances in renewable energy sources and battery technology," added Cal Lahteenmaa, Technical Director at Vertiv. "Our engineers leveraged global resources around the world to develop best-in-breed technologies that could integrate seamlessly with our equipment and monitoring design and provide an optimum experience for Vodafone."

This solution has been field and lab tested for other industry applications and could help deliver the incredible connectivity results elsewhere in New Zealand, as well as other areas in Asia Pacific and around the world.

"As IoT becomes a reality, these solutions will become even more vital to rural communities," said Robert Linsdell, managing director Australia and New Zealand, Vertiv. "In agriculture, for example, farmers are already leveraging IoT and new technologies such as cloud-based analytics and precision agriculture to improve productivity and achieve greater yields. To make this work in the long-term, you need the right infrastructure in place to support it."



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