

## BUILDING A VIRTUAL POWER PLANT

**As the UK's leading demand response aggregator, KiWi Power is passionate about driving innovation in technology to create efficiencies, generate commercial opportunities and promote a green agenda.**

**A key player in the UK energy market since 2009, KiWi Power was the ideal choice for a pioneering energy storage project, employing lithium-ion battery technology from GS Yuasa in conjunction with a Riello UPS device.**

The project, funded by Innovate UK and led by KiWi Power along with energy storage consultant Swanbarton Ltd, saw the creation of a 'Virtual Power Plant' to support KiWi Power's 40-strong London office.

The plant works by using power generated from lithium-ion UPS batteries at peak times, instead of using power from energy system operators and is being used to demonstrate how battery power in uninterruptible power sources can be harnessed to help reduce pressure on the UK's power grid.

The UK has more than 4GW of stored power in UPS units and, with electricity demand set to double by 2050, harnessing that power could become crucial in tackling the nation's energy trilemma.

### Leading technology

Riello's UPS technology lent itself perfectly to the KiWi Power installation, according to Peter Stevenson, senior technical co-ordinator at GS Yuasa. He says, "This is the first time our batteries have been used in a demand response scenario in the UK so it was essential that we partnered with a UPS manufacturer of unquestionable quality, to guarantee the success of the project."

"A Riello 20kVA MultiSentry UPS was selected for KiWi's system, as it supports power ranging from 5-12kW and has the capability to work with our deep cycling batteries."

To enable virtual power plant operating modes for KiWi Power, additional commands were programmed into the UPS firmware.

The commands incorporated a 'discharge' mode, where the office load is removed from the mains supply and supported by the battery; a 'hold' mode, where the office load is supplied from the mains with the battery remaining in a static state of charge; and a 'charge' mode, where the office load is supplied from mains while the battery is recharged at a programmable rate.



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In the event of a mains failure, the normal UPS mode is restored immediately, to support the office load.

The choice of operating mode is made by a Micro Grid Storage Manager (MGSM) developed by Swanbarton. This collects information on the National Grid status, battery state, local load and aggregated load conditions.

## Easy installation

Thanks to the high energy density of GS Yuasa's lithium ion batteries, a 25kWh system could be conveniently mounted in a 19inch rack, housed in a third-floor office at KiWi Power.

Peter Stevenson says, "The installation went very smoothly and, given the compact nature of the system, we were able to fit it in place without reconfiguring the office space. Our teams worked together efficiently to turn the installation around within a short space of time, ensuring minimum disruption for KiWi Power. The most challenging part of the project was changing the firmware inside the UPS but this was also done in a very proficient manner."



## Making a difference

Since installation, the system has been operating seamlessly to vary the demand on KiWi Power's office in a way which is transparent to office operations. By using Riello's highly-developed UPS hardware, KiWi Power and Swanbarton have been able to focus on the key commercial aspects of how to capture the rapidly growing revenue opportunities for energy storage.

The project has demonstrated that, with the right equipment in place, a UPS can become a vital source for energy trading as well as an

insurance policy against power failure. By helping to spread demand across a variety of sources it can also help to keep the cost of electricity down for businesses.

"As a business focused on evolving the energy landscape, we need to be leading the way when it comes to our own demand response mechanisms. Riello UPS, GS Yuasa and Swanbarton have enabled us to reap multiple benefits from battery storage technology and to set an example to other businesses."

**Mircea Bucur, KiWi Power.**