ZCell energy storage

“The hybrid energy storage system in my home, which contains a ZCell zinc-bromine flow battery and a lithium-ion battery, serves as a model that could well scale into a renewable energy storage solution for micro-grids and embedded networks, virtual power plants, state-wide grids and the national grid.”

ZCell customer Jeff Knowles

Jeff Knowles ZCell benefits

Renewable energy advocate Jeff Knowles has successfully deployed a hybrid energy storage system, including a Redflow ZCell zinc-bromine flow battery and an LG lithium-ion battery at his home in the Queanbeyan suburb of Jerrabomberra, near Canberra. By using a SwitchDin droplet to orchestrate the respective benefits of these two very different battery chemistries, Jeff’s system provides a model for the hybrid energy storage network that he expects to develop in Australia during coming decades.

PROJECT OVERVIEW

- Location: Queanbeyan, New South Wales
- Storage: ZCell 10 kWh zinc-bromine flow battery and LG 10 kWh lithium-ion battery
- Inverters: Selectronic SP Pro 482 inverter and SolarEdge SE7300 inverter
- Solar: 26 x Jinko SolarEdge-optimised 270-watt panels
- ZCell delivers daily deep cycling without reducing expected battery life
- ZCell provides 100 per cent depth of discharge without damaging the battery
- ZCell “marathon” qualities complement the “sprint” characteristics of a lithium battery
- ZCell-lithium hybrid energy storage system serves as a model for the “future grid”.

RESIDENTIAL
CASE STUDY

QUEANBEYAN
NEW SOUTH WALES

Canberra house models hybrid grid with Redflow

Faced with losing a generous solar feed-in tariff in December 2016, Jeff Knowles installed an energy storage system that lets him use energy from his home's solar panels rather than sell it at a low rate.

Not one to do things by halves, Jeff, a former president of the Australian Solar Energy Society in Canberra, used this investment to deepen his experience of various energy storage technologies.

Jeff said he had decided from the start to create a hybrid energy storage system. "While I wanted about 20 kilowatt-hours (kWh) of storage in the house, I did not want to deploy more than 10kWh of any single battery chemistry," he said.

"I wanted to model the idea that the two chemistries of lithium batteries and zinc-bromine flow batteries could work together to solve the winter spike problem I had in my home. While our 15-year-old home is reasonably sustainable, it still requires heating during the winter due to a good deal of single-glazing and being situated in Queanbeyan, NSW, where winter temperatures can get down to minus six degrees Celsius."

Jeff started the project in early 2017 by replacing his old 5.4 kilowatt peak (kWp) photovoltaic system with a 7 kWp system, comprising 26 Jinko 270-watt solar panels and a SolarEdge SE7300 inverter. He then added a 10 kWh LG RESU HV10 lithium-ion battery.

Having first learned of Redflow's zinc-bromine flow battery technology in 2012 and seen it at a Melbourne trade show in 2016, Jeff also placed an order for a 10 kWh ZCell zinc-bromine flow battery, coupled with an Australian-made Selectronic SP Pro 482 inverter-charger.

This was the first residential installation of a ZCell battery with the Selectronic SP Pro inverter. The ZCell system also included the recently developed CANBus interface for Redflow's Battery Management System (BMS), which uses industry-standard protocols to provide a 'plug and play' interface between the Redflow ZCell battery and a CANBus-compatible inverter such as the SP Pro.

To "join the dots" between the ZCell system and the lithium battery system, Jeff installed a SwitchDin Droplet module into the communications box.

Jeff said the SwitchDin Droplet acted as a "Fat Controller" that could orchestrate the two batteries to work as an integrated system. "Although the two separate systems were operating in an excellent manner, the problem was that neither system knew the other was there," he said.

"Developed by Newcastle company SwitchDin, the Droplet coordinates the storage and delivery of energy from the two distinct battery technologies. In a nutshell, it controls the complete system to prioritise charging and discharging the 'marathon' ZCell battery.

"On the discharge cycle, the ZCell flow battery is discharged first due to its propensity for deep and frequent cycling while holding the 'sprinter' lithium battery in reserve for cold overcast Canberra days. This, in turn, minimises discharge cycles for the lithium battery, thereby maximising its life, which is diminished as a function of discharge cycle frequency and depth.

"Deployment of a single ZCell with a lithium battery at my home in Queanbeyan proves it can be done, implemented as a hybrid battery system under the control of an advanced IOT (Internet of Things) system controller, the SwitchDin Droplet. This controller can monitor and control the entire aggregate energy system and implements a holistic strategy for the efficient operation of the site.

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To learn more about Redflow ZCell zinc-bromine flow batteries, visit www.redflow.com.

zcell

About Redflow

Redflow Limited, a publicly-listed Australian company (ASX: RFX), produces small 10kWh zinc-bromine flow batteries that tolerate daily hard work in harsh conditions. Marketed as ZCell and ZBM2, Redflow batteries are designed for high cycle-rate, long time-base stationary energy storage applications in the residential, commercial & industrial and telecommunications sectors, and are scalable from a single battery installation through to grid-scale deployments. Redflow batteries are sold, installed and maintained by an international network of energy system integrators. Redflow's smart, self-protecting batteries offer unique advantages including secure remote management, 100 per cent daily depth of discharge, tolerance of high ambient temperatures, a simple recycling path, no propensity for thermal runaway and sustained energy delivery throughout their operating life.

www.redflow.com **sustainable energy storage**