An electrifying possibility

Has VRB Power Systems found a better way to store bulk electricity?

By Anne Papmehl


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One of the big problems with energy is storage. On a small scale, we do reasonably well with batteries for our laptops, flashlights, radios and cellphones. But what about great big industrial-sized batteries for electricity storage in commercial sites or utilities?

The best they've come up with are oversized lead acid batteries which are costly, unreliable and polluting.

Because electricity is hard to store, our electrical grid is one big just-in-time inventory system. But that doesn't make it very economical or reliable.

Like a business with no inventory, the only way we can get the grid to work is to balance consumption with supply. If you don't, you can get a domino effect of power failures throughout.

"Imagine how differently Aug. 14, 2003, might have unfolded if electricity could have been injected into the grid at strategic locations," said Jason Makansi, executive director of the Energy Storage Council. I say, imagine the investment potential for such an innovation!

If the technology behind Vancouver-based **VRB Power Systems Inc.** (VRB-TSX, $0.68, 604-697-8820, *www.vrbpower.com*) gains market acceptance, we might get both: a cheap and reliable energy storage system, plus a powerhouse of a stock.

VRB produces a device called the vanadium redox battery-energy storage system (VRB-ESS). It can store electricity in bulk — as in multi-megawatt hours — for hours or even days at a time.

The stored energy can then be delivered on demand and can take energy input from any source: grid, hydro, diesel generator and even green sources like solar and wind.

Apart from doing large-scale energy storage, the VRB system has a number of Earth-friendly qualities: it doesn't use toxic substances the way lead acid batteries do. The electrolyte that stores the energy is a solution of vanadium mixed with diluted sulphuric acid and is considered safe. Unlike lead acid systems, the VRB electrolyte can be reused indefinitely.

It does very well on the efficiency and cost side, too. Whereas lead acid batteries have a 50 per cent full-cycle efficiency rate, the VRB-ESS has 80 to 85 per cent. Its charge to discharge ratio is 1:1. Lead acid batteries have a charge to discharge ratio of 5:1, meaning for every hour of discharge you get out of your battery, you need five hours to charge it up.

The device takes up about 75 per cent less space and costs between $350 and $700 per kilowatt hour (kWh), compared to $1,550/-kWh for lead acid batteries.

Stored energy can be profitable in many different applications. Utilities, for example, need to be able to meet peak periods. If they are delivering electricity on a just-in-time basis, they require enormous infrastructure.

If they can store 20 to 30 per cent of that electricity, they can reduce their infrastructure requirements by the same amount, as well as buy and store electricity overnight when the infrastructure is not so heavily used. The energy can then be fed into the grid during high-demand periods.

Peak times

Similarly, commercial sites also need cheap and reliable power for peak operating times. Using stored energy, they can buy electricity during non-peak periods and store it during the day, again saving money and ensuring enough supply for peak periods.

Another application for stored energy is backup power. For example, cellphone towers and telephone switching systems need backup power to retain service if the grid shuts down. They currently use heavy, hulking lead acid batteries, which are expensive, need on-going servicing and pollute. If these batteries were replaced with an energy storage device, the sites could work better, more cheaply and with less maintenance.

Finally, energy storage can help to make wind and solar energy more profitable and dependable.

For example, if the wind turbine only spins at night when people are sleeping, the energy produced is wasted. Similarly, if the sun isn't shining when people need the energy, the energy source isn't working. Again, an energy storage system can capture this energy for release when needed.

With global energy demand increasing, the market size for this technology is understandably large, estimated at US$2.5 billion per year. In Europe, where there are more incentives for green energy production, this market is estimated to be around $7 billion over the next 10 years.

Remote areas

There is also a sizable market for large-scale energy storage in remote areas that depend on diesel generators, wind or solar power — estimated at upwards of $800 million over the next 10 years.

"It's just over the last couple of years, given the rolling blackouts and soaring energy costs, that it's become apparent that stored energy is needed," says Vince Sorace, president and director of VRB.

"The applicable market for energy storage is merging at the same time the energy storage devices costs have come down, so we think that we are now at that focal point where it makes economic sense on both fronts for the industry to be adopting energy storage."

How might last year's blackout have unfolded with VRB technology in place?

"First of all, if you put up energy storage in any form strategically throughout the grid and these fluctuations occur, you have maximum amounts of power that can stabilize or restabilize the situation instantaneously," Mr. Sorace says.

"Second, you've got multi-megawatt hours of backup power so you can curtail some of the devastating effects of blackouts, plus you can get the grid back working faster because the stored supply helps balance load with generation."

Because VRB is the only company in the world to have succeeded in bulk energy storage, with first-to-market status, it should be free of competitive threats in the near term. Longer term, the company is already speaking of plans to develop an improvement chain and try to continuously reduce prices and increase efficiencies, ensuring it maintains a leading position.

Currently in transition from test-stage installations to full industrial commercialization, the company has two completed commercial installations which are successful: one in Moab, Utah, through PacifiCorp, and Hydro Tasmania in Australia.

Bear in mind that it may take a few years for this company and its stock to hit their stride. If the possibilities of this technology appeal to your investment taste, buy cautiously for now, hold and keep a watchful eye. But don't be surprised if this eventually turns in an electrifying performance.

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