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# New battery technology breathes life into renewable energy sources

An Australian invention looks set to create one of the world's biggest renewable energy breakthroughs in the past decade.

It's a quantum leap in technology development for the storing of renewable energy from sources such as wind generation and solar power. The energy is stored when generated and then delivered to the grid during peak demand times.

The technology revolves around the development of a new battery invented by Professor Maria Skyllas-Kazacos and her team at the University of NSW. The technology known as the Vanadium Bromide Redox Flow Battery is a major advance on other flow batteries.

"We are very excited about the latest developments with the new Vanadium Bromide Redox Flow Cell and the possibility of commercialising this new technology in Australia" said Professor Skyllas-Kazacos. "A series of new patents has been filed through the University of NSW's commercial arm Unisearch and for the last two years we have been looking for the right partner to join us in the commercialisation of this new energy storage system."

Unlike conventional lead acid, nickel cadmium and similar batteries which can only be charged and discharged a limited number of times, the Vanadium Bromide Redox Flow battery can be cycled tens of thousands of times without affecting performance as well as being able to be scaled to very large sizes.

The new generation battery will be funded by Victoria's Centre for Energy and Greenhouse Technologies (CEGT) in partnership with Magnam Technologies Pty Ltd, a company set up by Professor Skyllas-Kazacos in 2003 to develop low cost stack technology for the Vanadium Bromide Redox Flow Cell.

The CEGT announced today that it will invest up to $1 million in V-Fuel Pty Ltd, the entity formed to commercialise the technology, with initial funding targeting the development and demonstration of a 5 kilowatt prototype version of the battery.

According to the Managing Director of CEGT, Jan Dekker, the battery has the potential to be significantly superior to current vanadium redox batteries due to its higher potential energy density (ie. energy stored per litre of electrolyte) and is expected to achieve 80 per cent efficiency in storing and releasing the electricity produced.

Just as with the original Vanadium Redox Battery (VRB), a vanadium solution is used in both half-cells, so any problems of cross contamination are eliminated. In this case, however, a solution of vanadium bromide is used and electron exchange

between the half cells is being significantly improved through developments in cell design, materials and membranes.

The company also hopes to test the battery at a large commercial scale to demonstrate its renewable energy applications, with the CEGT supporting site selection in Victoria.

Mr Dekker said that a large scale, effective and efficient energy storage technology is critical to improve the performance and viability of renewable energy generation.

“Renewable energy sources such as solar, wind and tidal suffer from scheduling mismatches when the demand for energy is high and the energy source of sun, wind or tide is not available.”

“The vanadium bromide redox battery would allow electricity generated from renewable energy sources to be stored, so it can be injected into the transmission grid when needed.

“Quite simply this means for energy sources such as solar and wind power that even if the sun is not shining and the wind is not blowing stored renewable energy can be made available to meet peak demands.

The breakthrough of the new battery technology will also reduce the size of current batteries needed to store and release a given amount of energy, he continued.

“Successful commercialisation of battery storage technologies requires greater energy density, that is, the energy that can be stored and released per battery. The Vanadium Bromide redox battery is targeted to achieve twice the energy density currently being delivered,” he said.

Mr Dekker said that because of this, the applications for the battery and the way that renewable energy can be stored and used when needed was almost endless.

In keeping with this, the applications for the battery could also extend to domestic installations, transport vehicles, back up supply for emergency applications and industry, as well as mobile units, so that power could be made available when needed.

“Remote area power supply system requirements can benefit significantly by directing a mix of renewable and off peak fossil fuel generation sources into the new battery for storage and subsequent use,” he added.

He also said that the Australian Vanadium Bromide Redox Battery represented an opportunity to develop and market a revolutionary Australian technology worldwide.

“With the worldwide growth in renewable energy generation, the demand for electricity in remote regions and by developing nations, and the security of supply for critical installations the innovation now under development will certainly attract significant overseas interest,” he said.

“It is an exciting project with business opportunities and practical applications for renewable energy around the world,’’ Mr Dekker said.

CEGT is a private company established as an initiative of the Victorian Government to invest in the development and demonstration of new sustainable energy and greenhouse gas reduction technologies.

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