

The Vanadium Redox Flow Battery (VFB) was invented by Skyllas-Kazacos and co-workers at UNSW in the 1980s. It uses two vanadium solutions to store energy in separate reservoirs. These are pumped through a series of cell stacks where power is generated.



The VFB is currently manufactured commercially by companies in Japan, China, USA, UK and Germany. A 200 MW/800 MWh VRB is currently being installed in Dalian, China.

More information

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Vanadium Redox Flow Battery

Chemical Engineering and Mechanical Engineering

Competitive advantage

Comparison with Li-ion Batteries

- Lower cost and longer cycle life.
- No thermal issues.
- Up to 200,000 cycles already demonstrated in commercial wind system.
- Lower risk than Li-ion – no emissions or fire hazards.

Recent research projects

- Membrane and electrode treatment and modification for high power density stacks.
- Modelling and simulation studies for stack optimisation and thermal behaviour.
- Monitoring systems and battery management system development.

Successful applications

- VRB licensed by UNSW to Mitsubishi Chemical Industries and Sumitomo Electric Power Corporation in 1990s and collaborative projects undertaken over a 5-year period to optimise the VRB for commercialisation and manufacture.
- Technology transfer to Chinese company and training programs provided in 2013-14
- Recent ARC and US Office of Naval Research grants for distributed energy storage and novel Vanadium/Oxygen Redox Fuel Cell projects.

Facilities and infrastructure

- 30 kW/130 kWh commercial VRB system in Tyree Building for energy storage and micro-grid research.
- Dedicated computational and experimental laboratories.
- Advanced manufacturing facilities



5 MW/10 MWh VRB - Rongke Power - China

Our experts

- E/Professor Maria Skyllas-Kazacos,
- Professor Jie Bao
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