

# 100MW-Class Vanadium Flow Batteries for Renewable Integration in China and Australia

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# China's New Energy Storage Plan

- Calls for multiple 100MW-class **vanadium flow batteries**
- Emphasizes renewable integration (China installed 53GW of solar and 17.2GW of wind in 2017), and Peaker Plant replacements (most regulation is currently done with coal-fired plants)

## Key vanadium flow battery developments in China



October 11, 2017, China released its first national-level guiding-policy document covering energy storage. The document, "Guiding Opinions on Promoting Energy Storage Technology and Industry Development"

# Australia's Renewable Energy Pipeline is Huge

- AEMO estimate of 1GW storage for the regulation FCAS market
- Utility-scale solar pipeline >27 GW; with 2.1 GW of co-located storage
- Potential for 50% renewable energy by 2030, BUT depends on NEG

## Key storage developments in Australia

### South Australia

- Hornsdale Power Reserve  
100MW / 129MWh
- Port Augusta 50MW  
200MWh flow battery



### Queensland 400

- 400MW of renewables
- 100MW of storage

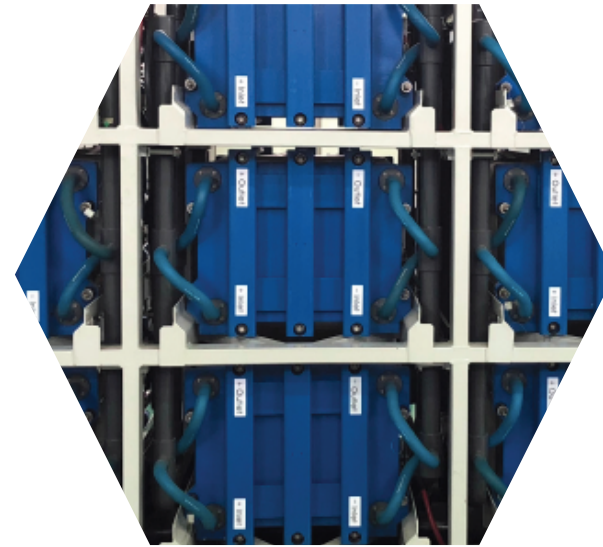
### Victoria

- State Tender for two 20MW batteries total of 100MWh

# “Digital Energy” is the Future



PV



+

Storage

150MW PV at 6.0kWh/m<sup>2</sup>/day solar resource:

- 275,000 MWh/year output
- Lifecycle Cost of Energy (LCOE) US \$29/MWh over 25 years

30MW 180MWh VRB (6-hours energy) to firm PV:

- 1 cycle per day; 75% efficiency
- Lifecycle Cost of Storage (LCOS) US \$75/MWh over 25 years

**25-year Lifecycle Cost of Energy (LCOE)**

**US \$46/MWh**

**emissions-free, resilient energy**