

ADVERTISING FEATURE

Vanadium producers



The Australian Vanadium Project is located 740 kilometres north-east of Perth.

A battery of reasons to back exploration

Port Augusta might be best known for its tuna fishing industry, but this month it was revealed as the location for helping spearhead a new energy storage industry for Australia.

The South Australian coastal city will have Australia's largest-ever vanadium redox-flow battery (VRFB), a base-load 50MW storage facility to complement an identically sized solar energy plant also being built in Port Augusta to provide secure renewable energy reserves for its residents. The battery will be able to store 200MWh of energy, providing four hours of power when used at maximum capacity.

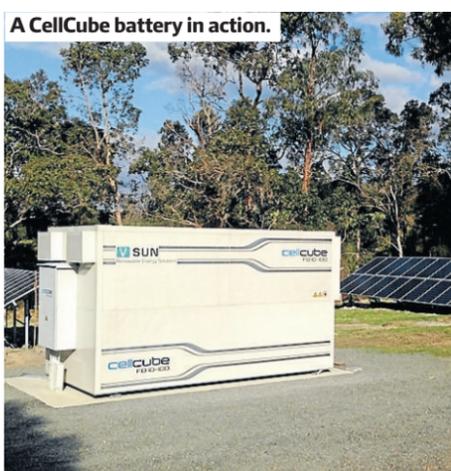
Globally, vanadium redox-flow batteries are becoming increasingly popular. California just flicked the switch on its first grid-connected VRFB, and they are becoming increasingly commonplace in China.

Originally invented by Professor Maria Skyllas-Kazacos at the University of New South Wales, the VRFB is based on redox fuel cell technology created by NASA in the 1970s. VRFBs can store large amounts of energy and will maintain storage quality over time without deterioration.

International conglomerates CellCube and Pangea Energy will undertake the new Port Augusta VRFB storage project.

"From the beginning, we had always kept the vanadium redox-flow technology in mind," said Luis Chiang Lin, CEO of Pangea, in reference to the Port Augusta project. "Australia has massive vanadium resources, and the exploration of vanadium is pretty simple, cheap and does not have the impact on nature and labour conditions such as cobalt or other rare earths in the lithium industry."

While vanadium is abundant in the earth's crust, it is not often found in economic quantities and qualities. Australia's most abundant source of high-quality vanadium ores (some call it the Vanadium Triangle) is centred near the town of



A CellCube battery in action.



"We really see the opportunity for Western Australia to build a new battery storage industry on the back of the abundant vanadium reserves." Vincent Algar, above

Meekatharra in Western Australia, where the race is on to establish the first new vanadium mine in Australia. The WA-based Australian Vanadium Project is aiming to claim this title.

Vanadium, traditionally, has been used to strengthen steel, and China's increasingly high standards for rebar steel quality now limit the use of inferior steel. This drove up the price of vanadium dramatically in 2018. Vanadium pentoxide [V₂O₅] is used in VRFBs, and ferrovandium [FeV] is used in the steel industry.

In more recent times, the expected new demand for VRFBs for commercial energy storage has been behind another round of

optimism for boosting vanadium demand and prices.

Respected mining industry analysts Roskill estimate a dramatic increase in demand "for VRFB markets" could translate to 31,000 tons annually by 2025 – a 3100 per cent increase over a decade.

Most of the world's supply of vanadium comes from Largo Resources in Brazil, Bushveld Minerals in South Africa and mines in Russia and China. Russian and Chinese production is used mainly as a by-product of steel-making.

"Considering the current supply and demand, we should see a very strong market for vanadium

over the next three to four years," said Paulo Misk, chief operating officer and president of Largo Resources.

Not surprisingly, the rise in the vanadium price in recent years has seen a flurry of activity in the exploration space in Australia. The Australian Vanadium Project, located 740 kilometres north-east of Perth and 100 per cent-owned by Australian Vanadium Ltd (AVL), is a high-grade deposit that can be processed using traditional methods used by other successful global producers.

The ASX-listed company's pre-feasibility study (PFS), released in December 2018, showed the project to be economically viable, with operating costs in the lower quartile and comparable with producing global mines.

AVL's managing director, Vincent Algar, said completing the PFS for the project means the company has "taken a major step towards bringing our world-class project into production", which he says is on track for the end of 2021.

"Announcing a maiden ore reserve is a key milestone and further embeds the project's low-risk mineral resource and strong economic potential," he said.

Capex costs for the AVL project are significant (approximately \$US350million), but typical for this type of project. Algar sees initial interest coming from funds in the UK and Europe, with an appetite for vanadium projects, followed by institutional investors in Australia attracted by the long-mine life.

"We really see the opportunity for Western Australia to build a new battery storage industry on the back of the abundant vanadium reserves," Algar said. "There can be a move away from the dig and sell mentality and value-add by embracing the technology and research skills that are available. We can build a new green industry for renewable energy based on vanadium alongside its role in the steel market."

Developing The Australian Vanadium Project in Western Australia

AUSTRALIAN VANADIUM LIMITED

AVL's pre-feasibility study has been completed and shows strong economic fundamentals. The company's definitive feasibility study is being progressed by AVL's team of experts.

- Globally significant project with high-grade Resources and Reserves
- Vertically integrated with exposure to the steel market and energy storage markets – AVL's subsidiary VSUN Energy is focused on uptake of the vanadium redox flow battery
- Pilot scale processing is currently underway
- Ongoing studies focused on de-risking the project and improving valuation



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