

ADVERTISING FEATURE

## Vanadium projects



Paul Burton is chief executive of TNG Limited, which is advancing plans for its Mount Peake vanadium-titanium-iron project in the Northern Territory.

# Poised for a 'green' battery metals boom

Amid the intensifying global push to reduce carbon emissions, vanadium-based batteries are emerging as an integral part of the solution for providing reliable utility-scale renewable power.

Since their invention in the late 1970s, lithium-ion batteries have become integral to most electronic devices and in large-scale form they're also driving the electric vehicle (EV) revolution.

But the technology still has its drawbacks with performance and reliability shortcomings. Recent images of large-scale lithium-ion batteries bursting into flames – including at a facility near Geelong that took three days to extinguish – also highlight unresolved safety issues.

A homegrown solution, vanadium redox flow batteries (VRFBs) offer a potentially superior energy storage method.

Developed by the University of NSW in the 1980s, VRFBs use a liquid vanadium-based electrolyte to store the energy in tanks separated from the battery.

The electrolytes are pumped through a membrane, where an electrochemical reaction causes the electricity to be stored or discharged.

Testing to date suggests a 20-year-plus battery performance across 35,000 cycles, with no performance degradation.

"Effectively, the vanadium never runs out in the battery," says TNG Limited chief executive Paul Burton. "The electrolyte will probably outlast the battery casing and the vanadium can be reused at the end of it."

Growing VRFB adoption will create soaring demand for vanadium, a soft ductile metal produced mainly as a byproduct of magnetite

processing. Currently about 85 per cent of vanadium is used as an additive to harden steel, for applications such as high-efficiency engines.

A vanadium shortage is looming if VRFBs are even only modestly adopted.

Commodities analyst Roskill predicts global renewables generation of 160 gigawatt hours by 2030. On its mid-case scenario of VRFBs accounting for 3 GWh of this output, the vanadium required would amount to 14,600 tonnes – almost three-quarters of last year's primary supply.

The VRFB evolution makes a compelling backdrop for ASX-listed TNG, which is advancing plans for its Mount Peake vanadium-titanium-iron project in the Northern Territory.

"As far as I'm aware, we are the most advanced new vanadium project that can produce high-grade vanadium suitable for batteries," Burton says.

TNG discovered the Mount Peake deposit – 230 kilometres north of Alice Springs – in 2008.

TNG's late-stage scoping work envisages an open-cut operation that would produce 700,000 tonnes of concentrate and 6000 tonnes of vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) annually over a 37-year mine life.

Mount Peake would also produce a further 500,000 tonnes a year of 64 per cent grade iron ore as well as 100,000 tonnes of titanium dioxide (used in paint making).

Running more than two kilometres and close to surface, the deposit contains a resource of 160 million tonnes (41 million tonnes proven and probable) grading 0.28 per cent V<sub>2</sub>O<sub>5</sub>, 5.3 per cent titanium dioxide and 23.5 per cent iron.

"This represents one of the world's largest and

**"We are the most advanced new vanadium project that can produce high-grade vanadium suitable for batteries."**

Paul Burton

well-defined vanadium ore deposits with extra iron and titanium metal credits," says research house Corporate Connect.

The key to TNG's success is its patented process called TIVAN, which allows for vanadium to be refined to the 99.6 per cent purity level required for VRFBs.

Burton says traditional processing usually involves a heat-based process to extract the vanadium, with the titanium and iron disposed of as slag. "It's a high-energy process with high CO<sub>2</sub> emissions," he says.

"Our process is hydrometallurgical. We take the concentrate and rather than putting it through heat, it's dissolved in acid. We then use a patented process to extract the vanadium and iron ore and the acid is recycled."

He says the process can recover more than 90 per cent of the vanadium, compared with about 70 per cent with the heat-driven process.

TNG recently decided to forge ahead with an integrated mining and processing operation at Mount Peake, rather than in Darwin as planned.

This was made possible after the key impediments of water and gas availability were overcome.

Ahead of a final investment decision expected next year, TNG has appointed KPMG Corporate Finance to advise on funding options. German bank KfW IPEX-Bank has been mandated to raise up to \$US600 million (\$780 million) of debt funding.

In 2019, the entire project was costed at \$US870 million (\$1.2 billion).

Based on current vanadium prices, the integrated project is ascribed a net present value of \$2.8 billion, with more than 80 per cent of the value derived from the vanadium and titanium output.

Meanwhile, TNG is pondering the viability of a green hydrogen export project in a development agreement with Malaysia's AGV Energy & Technology Sdn Bhd.

The mooted facility, on TNG's land at Darwin's Middle Arm, would deploy AGV's HySustain technique that produces hydrogen from water and renewable energy.

"The company is determined to have a green footprint," Burton says.

"This could become a strong business in its own right, although we do intend to have green options at Mount Peake."

Naturally, this includes the use of VRFBs.

Meanwhile, Corporate Connect values TNG at 32c a share for a market capitalisation of \$415 million – a sharp increment on their current sub-10c value. The firm notes that with a long-life mine and a lower carbon footprint than its competitors, Mount Peake is well placed at a time when sustainable operations are attracting sizeable capital from ethical debt and equity funds.

# TNG

## BUILDING A GLOBAL STRATEGIC METALS COMPANY

Developing the world-class Mount Peake Vanadium-Titanium-Iron Project in the Northern Territory

Three high-purity products for growing global markets

Vertically integrated business plan with downstream processing in Australia

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