Experts

Expert guide: Why vanadium may be the next lithium or cobalt

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When it comes to batteries, all eyes are on lithium and cobalt stocks — but expert Gavin Wendt says there's plenty of opportunity in Vanadium.

Why Vanadium?

The price rise of lithium has been spectacular and is directly correlated with the expansion of renewable energy over recent years, especially wind and solar. One of the largest issues with wind and solar energy sources is the need to store and release the electrical energy produced. Lithium fulfils this storage role in its use in lithium-ion batteries.

Vanadium however is an energy option that I believe we should be watching more closely, as it is used in a promising storage technology known as vanadium redox flow batteries, which will boost overall demand for vanadium.

Flow batteries use liquid energy sources to generate electricity.

Where is supply of Vanadium coming from?

Vanadium is produced as a by-product of steel-smelter slag and also mined in two different types of mineral deposits — carbon-rich deposits and shales, as well as magnetite (iron oxide) deposits alongside titanium.

Vanadium's main use is as an additive in high-strength steel, which accounts for about 92 per cent of the global demand of about 100,000 tonnes of contained vanadium (about 180,000t V2O5 equivalent).

Vanadium is used in the creation of metal alloys that withstand extreme conditions, such as those used in jet engines.

Around 5 per cent of vanadium is used in catalysts and chemical applications.

How do vanadium redox flow batteries stack up against lithium batteries?

Lithium-ion batteries have taken the lion's share of the energy storage market so far. However technological advances in flow batteries are both bringing down costs and improving their safety and environmental profile.

Compared to lithium-ion batteries, vanadium redox flow batteries (VRB) are non-flammable, environmentally friendly, have estimated life-spans in excess of 10,000 cycles and maintain 90 per cent of their capacity over 20 years, thereby lowering the total cost of ownership.

By comparison, getting 1000 cycles of use out of a lithium-ion battery with full depth of discharge would be ambitious.

VRBs are ideal for "grid-constrained" solar and wind-farms that struggle to sell their electricity at times of peak production and find other forms of storage uneconomical.

VRBs boast a longer continuous discharge run time (6-10 hours versus 2-5 hours) than lithium-ion batteries. The downside however is their relatively lower round-trip efficiency (measured by power out over power in) of 70 per cent compared to 85 per cent with lithium batteries.

From a cost perspective, Tesla's current battery costs are estimated to be about $150 to $200 per kilowatt-hour — well below the industry average pack costs of $350 per kilowatt-hour — and could reach less than $100 per kilowatt-hour soon as Gigafactory production ramps up.

By comparison, the VRB cost is slightly behind the curve at $300 to $500/kWh.

However these costs are half of what they were three years ago and are set to come down further.

VRB can be stacked up to increase storage capacities, whereas lithium-ion storage capacities are somewhat boxed-in by initial design. Unit cost for large-scale VRB goes down, whereas it goes up for lithium-ion batteries.

This means on a large-scale deployment, VRB is already likely competitive with lithium-ion batteries today.

The cost of energy storage is, roughly, the up-front capital cost of the storage device, divided by the number of cycles it can be used for.

If a battery costs $100 per kwh and can be used 1000 times before it has degraded unacceptably, then the cost is one tenth of a dollar (10 cents) per cycle. This compares with the cost of base-load power generation from wholesale natural gas electricity from a new plant, which costs roughly 7 cents per kwh (not including the cost of carbon emitted).

Which ASX-listed vanadium plays are you watching?

There are three junior opportunities available to ASX investors that I believe are currently worth following: TNG Limited (ASX: TNG), Australian Vanadium (ASX: AVL) and King River Copper (ASX: KRC) — in descending order of market capitalisation.

These three companies are quite distinct in terms of their project advancement.

TNG is the most advanced having completed a definitive feasibility study on its large Mt Peake vanadium deposit in the Northern Territory.

AVL is in the process of enhancing the resource base at its Gabanintha deposit in Western Australia.

While KRC is looking at a scoping study on its Speewah project in Western Australia.

Gavin Wendt has been involved in the Australian share market for the past 20 years as a resource analyst. He specialises in researching and evaluating mining and energy companies.

After many years as a broking resources analyst with Intersuisse, Gavin helped establish the Fat Prophets Mining Report in 2005, writing and producing the report until he established MineLife in 2010. MineLife's core reader group comprises sophisticated investors, finance industry professionals, resource industry executives, retail investors and self-funded retirees.

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