Vanadium stealing some of lithium's limelight?

Vanadium is still primarily consumed in the ever-growing vanadium steel alloy market, but a creeping demand may create additional offtake as alternative battery technologies begin to steal a little of that lithium-limelight. To this end, Largo Resources Ltd. (TSX:LGO | OTCQB:LGORF) ("Largo"), a mid-tier mining development company is well placed to benefit from the vanadium story.

The company is primarily focused on the production of vanadium at its Maracás Menchen Mine in Brazil. At this stage there are no operating primary vanadium mines in North America and only a handful of vanadium deposits. As such, we would recommend keeping a watchful eye on Largo's Maracás mine's development.

Lithium may own the market for portable devices, but off-grid storage will require much larger and sturdier systems. Doubling the size of a Li-ion system doubles the price; with a vanadium-redox flow battery, however, you just increase the size of the tank. The result being that the price per kilowatt hour actually decreases with scale. Therefore, as we approach the problem of larger units for homes and industry, bigger becomes better. Given that Largo, wholly owns the highest-grade vanadium deposit in the world, this is indeed exciting times.

Redox flow batteries (RFBs) are just beginning to come to market, but have already caused quite the stir amongst enthusiasts due to their (theoretical) capacity to operate for 5,000 charge cycles or more (In some cases up to 10,000 cycles or more). An RFB at heart is essentially two fluid-filled tanks separated by a membrane; the idea is to pump a solution of metal ions dissolved in an electrolyte through an electrochemical cell, in which another liquid awaits. The two

liquids exchange ions to create an electric current harnessed by the nearby cell-stack, all without the risk of thermal runaway reactions that plague lithium units.

The advantages for entering the $27 billion off-grid energy market are immediately apparent. Aside from the membrane, almost the entire system consists of tanks and pumps, which means you have the potential for an extremely low maintenance, long-lifespan piece of equipment that can be scaled up with a few relatively simple tweaks by any competent engineer. In addition, flow batteries can be left idle for any length of time and still be called into action quickly when needed.

There are many chemistries that work for RFBs, including iron/chromium, zinc/bromide, and vanadium. However, what makes vanadium-based RFBs unique is that as vanadium can exist in several states, the redox flow batteries can house vanadium in both tanks. The use of one element across both tanks means that VRBs can overcome cross-contamination degradation, an ongoing bug-bear with other RFB chemistries that use multiple elements.

The fact that the liquid can be replaced means that refurbishing the unit is vastly preferable to installing a new one. Read that again. No need to manufacture a new unit after a couple of years. Just add more vanadium.

Vanadium is currently primarily used as an alloy to strengthen steel and reduce its weight. This market alone is demanding increasingly stronger and lighter products for advanced applications, and the growth in the use of vanadium is expected to continue over both the medium and long-term. As the technology is still being developed, it would be impossible at this stage to state the quantities of raw material required, suffice to say, the larger the scale, the more vanadium.