

Today's Notes:

1. Rocky Mountain Vanadium

1. Rocky Mountain (RKY TSXV) (Chris Berry (MBA))

THE MOST IMPORTANT METAL YOU'VE NEVER HEARD OF AND ONE NAME YOU NEED TO KNOW IN THIS SPACE

In the wake of recent Chinese announcements restricting export quotas on rare earth elements (REEs), one is tempted to think "here we go again." While all these recent moves were predictable to anyone who follows the REE space closely, quite a bit of shareholder wealth has been created by numerous rare earth companies. We think there is more to come in the future based on the supply/demand fundamentals and geopolitics we've written about. This has caused us to think about other metals that are equally important for clean energy applications but that have not received the same amount of press.

Make no mistake, we're still bullish on select REE and lithium plays as well as the market for the metals in general, but this begs the question: what is the "next" story the market wants to discount after REEs? What are the metals with supply/demand fundamentals that are either out of whack (or are forecast to be so) and are critical to industry?

We're convinced that next story that satisfies these conditions will be VANADIUM (#23 on the periodic table; chemical symbol "V"). Vanadium is typically produced as a byproduct of the mining of other metals such as uranium or iron ore. The metal has numerous uses as vanadium pentoxide (V₂O₅) and ferrovanadium. It has three primary uses that we will focus on below that they offer the biggest commercial returns for vanadium producers.

THE THREE PRIMARY USES OF VANADIUM

The predominant use of vanadium is as an alloy in the strengthening of steel. Also known as ferrovanadium, 85% of produced vanadium is used in this endeavor. As emerging markets continue their infrastructure build out, it appears that there will be steady demand for vanadium. The open question is whether or not there is ample supply of vanadium to ensure this global infrastructure build out. There are substitutes for vanadium such as niobium, but only with V₂O₅ at a higher price from its current \$7/lb (as of Dec. 1, 2010).



At left is a picture of Vanadium Pentoxide (V₂O₅), the precursor to ferrovanadium which is a low cost alloy for strengthening steel. 85% of vanadium mined is used for this purpose.

Additional uses of vanadium position the metal as a clean tech stalwart and we also think these applications make vanadium a “critical” and “strategic” metal going forward. These new applications provide significant growth potential for vanadium as well as a hedge against a decline in global steel demand.

A second use for vanadium revolves around its use in the lithium battery market. We have written extensively on the lithium space and how lithium-ion (LiCoO_2) batteries are the critical component of any hybrid (HEV), plug-in hybrid (PHEV), and full electric vehicle (EV) as well as cell phones and laptop computers. The chemistry of the lithium battery is continuing to advance, but research is emerging that vanadium, when combined with lithium ($\text{Li}_3\text{V}_2(\text{PO}_4)_3$), provides higher voltage at a lower cost (4.8 volts versus 3.7 volts from LiCoO_2), and is much safer than lithium cobalt batteries. The anodes of these batteries provide a longer and stronger charge life and have potential to overcome one of the EV skeptic’s main objections, “range anxiety.” In addition batteries with vanadium/lithium anodes can be recharged much more quickly.

The rate of acceptance for EVs is anyone’s guess at this point (and we’re more confident that acceptance will take hold in Asia before North America), but what is clear is that lithium/vanadium batteries appear to be a superior economic solution to the current lithium/cobalt battery. Automotive companies Subaru (see their g4e battery below) and BYD are currently the front-runners in lithium/vanadium battery technology and are planning on launching EVs with this battery chemistry.



Vanadium Lithium-ion battery in the Subaru g4e. A fast charge to 80% capacity can be done in 15 minutes. The car is reported to have a 200 km range.

Thirdly, we believe that vanadium demand will increase based on the demand for the vanadium redox batteries (VRB). These batteries are typically very large, scalable, and aid in grid-level energy storage. The leveling of energy demand across the grid is the goal when using VRBs. One of the knocks against solar and wind energy is the difficulty in storing energy when the sun sets or when the wind stops blowing. VRBs can help address this problem by providing a stable and consistent supply of energy during both peak and off-peak times in both heavily and sparsely populated areas.

SUPPLY AND DEMAND

[According to the USGS](#), estimated global vanadium production in 2009 was 54,000 tonnes. This supply came from China (20,000 t), South Africa (19,000 t), and Russia (14,000 t) with 1,000 tonnes coming from “other countries.” In our research we could find no examples of vanadium currently being mined in North America – a fact that lends credibility to our view of vanadium as a strategic metal for the United States.

Three companies are responsible for the bulk of global vanadium supply currently. Russia’s Evraz Group (EVR:LSE) claims to provide one third of the world’s vanadium supply - roughly 26,700 tonnes of vanadium-metal equivalent. Panzhihua New Steel and Vanadium (000629: SZSE)

produces about 9,000 tonnes per year as a by-product of steel production. Finally, Xstrata produces both V₂O₅ and ferrovanadium from its Rhovan operation in South Africa (10,000 tonnes and 6,000 tonnes respectively). The company has stated plans to expand capacity, but no such statements have been forthcoming from either Evraz or Panzhihua. This leads us to believe that there is significant “room” in the vanadium space for new players.

The bulk of vanadium demand depends on growth of the steel industry – particularly in developing economies as they build out their infrastructure. [India forecasts](#) that it will become the third largest consumer of steel in the world in 2011. Demand will rise by 13.6% to 68 million tonnes. India is also the third largest producer of steel behind China and Japan. Steel demand in China is also set to increase, by 3.5%. China is currently the largest producer and consumer of steel in the world. The global growth in steel demand in 2011 is forecast to be 5.3% for a total of 1.34 billion tonnes. Both the Chinese and Japanese manufacturers are mandating stronger rebar in construction, which will be favorable for future vanadium demand.

Additionally, with electric vehicle demand forecast to increase – primarily in Asia (China is forecast to have 500,000 EVs on its roads by 2015) and to a lesser extent in Europe and North America – this should keep upward pressure on vanadium pricing as lithium/vanadium battery chemistry offers clear cost and power advantages over lithium/cobalt batteries.

Finally, the VRB market should grow in concert with clean energy growth (think solar and wind) as the need for grid-level storage becomes a necessity to make clean energy an economic reality. There is also the possibility that current power producers could make use of VRBs to allay significant capital expenditures typically associated with updating the electricity grid. What is important to remember here is that as VRBs are truly “large” – some have compared these batteries to the size of a trailer. As such, a significant amount of vanadium will be required to satisfy a given MWh demand of electricity. Dr. John Hykaway, of Byron Capital, suggests that 24 MWh of storage would require 242 tonnes of vanadium metal – not enough to alter the demand fundamentals of the market, but if VRBs take hold on a mass scale, this could have an appreciable effect on the price of vanadium.

This all points to a favorable investment climate in coming years for those invested in vanadium producers and explorers.

WHERE TO PLACE YOUR VANADIUM DISCOVERY INVESTMENTS?

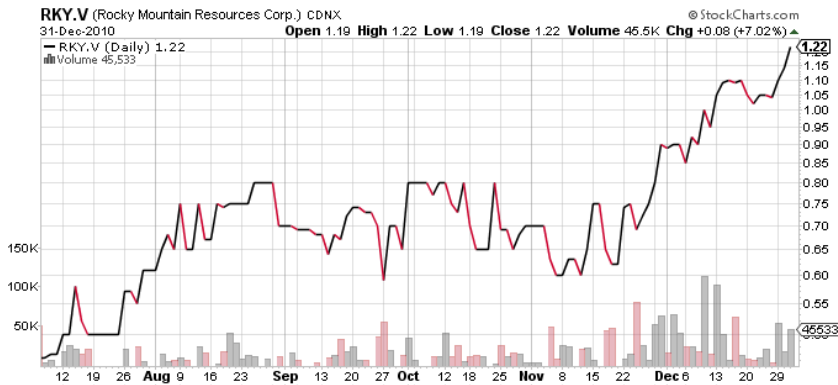
If one thing is clear from our research on the vanadium market, it's that there are a number of variables difficult to quantify, all of which could positively impact supply/demand dynamics. If steel demand holds and EV and VRB demand increases, as many forecast, there will be “room at the Discovery Investing vanadium table” for those companies involved in mining and exploring for vanadium.

One company we've come across which fits very nicely into our Discovery Investing Ten Point Grid is [Rocky Mountain Resources \(RKY: TSX-V\)](#).¹ RKY is a Vancouver-based junior, only \$28 million market cap, focused on the development of two vanadium properties in Nevada about 27 miles south of the town of Eureka.

¹ The company's shareholders have recently voted to change the company name to American Vanadium Corp to better reflect the company's mission. The name change and new ticker (AVC) should take effect in January 2011. For simplicity's sake we'll refer to the company by its current ticker, RKY, as the name and ticker change isn't yet official.

Here are the company's vital stats (as of 1/3/2011):

Recent Price	CDN \$1.22
Shares Outstanding	19.9 M
Fully Diluted	22.6 M
Market Capitalization	CDN \$27,572,000
Cash	CDN \$3.5M
Debt	None
Management/Insider Ownership	60%



We recently spoke with CEO Bill Radvak to get a sense of the company's plans and while they are aggressive, we're confident after hearing his vision that they are certainly achievable. The company plans to be producing 14,000,000 lbs. V₂O₅ per year by late 2012 and also has designs on entering the battery business. Being involved in two businesses allows command of a strategic supply chain and margin capture along these value chains. It also provides a natural hedge should one of the industries (steel or battery) experience a slowdown.

RKY's focus is on their Gibellini property in Nevada which they own 100%. This property has an NI 43-101 report (click here to view the entire report) which features these resources:

Category	Tons (MM)	Grade V ₂ O ₅ (%)	Pounds V ₂ O ₅
Indicated	18	0.339	122 million
Inferred	2.8	0.282	16 million

To get a sense of the value of this deposit, the company completed a side-by-side comparison with gold. This is similar to looking at another base or precious metal deposit and deriving an "Au Equivalent". Gibellini translates to an Au Equivalent of 850,000 oz Au at an average grade of 1.42 g/t. With expansion at Gibellini this could translate to 2.5 million oz of gold. This analysis provides the reader unfamiliar with vanadium a frame of reference as to the value of the Gibellini vanadium deposit.

Finally, RKY has completed a scoping study (click [here](#) to view the report) which indicated extremely favorable economics associated with the project.

The highlights of the Gibellini project:

- Targeting production in late 2012 of 14,000,000 lb/year of V₂O₅.
- Open pit, heap leachable (with sulfuric acid)
- Strip ratio of 0.2.
- Deposit is roughly half a mile long (2,500 feet) and roughly 200 feet deep.
- Located in Nevada, one of the most favorable mining jurisdictions in the world.
- Operating cost of \$2.96/lb. (V is currently at \$7/lb.). This low operating cost is KEY and one of the major reasons we like RKY. In our experience, the lowest-cost producer always wins no matter what the industry.
- Cap Ex of ~ \$90,000,000. This is very low when compared to RKY's peers.
- Despite the fact that vanadium is typically produced as a byproduct of uranium, there is little to no uranium in the Gibellini deposit. This bodes well for metallurgical testing which is underway and can help increase recovery rates – currently at 72%.

While there is much more to discuss about RKY, we'll pause for now. To be clear, we like this company based on three Discovery Investing factors:

- The potential for supply/demand imbalance in the vanadium market in the near-term.
- The company's low cost of planned production.
- The company's plan to be in the steel business by producing V₂O₅ as well as the battery business which offers a natural hedge should one of these industries experience a disruption in their growth.

There is much more to discuss about RKY (geological setting, other properties they own in Nevada) and we will be writing more in the coming weeks.

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