Strategy Metals Bulletin (53)

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Aims to update investors on developments in the world of strategy metals – crucial inputs to industry, defense and technology innovation

This week's bulletin is covers my interpretation and selective thoughts on two presentations given at the Hong Kong REE Conference, namely those of Molycorp and Roskill.

Molycorp strategies

Molycorp, together with Lynas prime contender to become a major near term non-Chinese producer of rare earths (REE), has a practice of being very vocal in the press whilst managing to leave the world in confusion as to what was actually meant. Molycorp's presentation in Hong Kong more or less followed this tradition. Two topics that came up in the presentation are highlighted here, namely the status of their mine-to-magnet strategy, and an elaboration of what Molycorp calls a heavy REE (HREE) strategy.

Mine-to-magnet strategy

Molycorp's business strategy envisages complete control over their supply chain from ore to the production of high performance magnets, their so called mine-to-magnet strategy. Historically, Molycorp was capable of extracting the light REE (LREE), separating them into purified oxides, and in some instances manufacturing them into metals & alloys. Now, in a rare earth world driven by magnets, Molycorp is going the extra mile to capture the final and most value added stage in the chain, namely the production of high performance magnets. Sintered NdFeB magnets, currently the most powerful magnets, are applied in hybrid vehicles and generators in wind turbines. They contain neodymium, iron and boron, as well as small quantities of dysprosium to improve their operating temperature.

Molycorp conveniently colours the steps in the supply chain that they proclaim are already under their control in blue, and if the joint venture with Daido Steel and Mitsubishi announced yesterday takes off, they will be in a position to colour the final green chain blue as well. Moving up the chain, the manufacturing of magnet alloys is done at the Tolleson facility, recently acquired from Santoku America. However, there is a slight chink in the chain which doesn't get a lot of air-time.

Earlier this year, Molycorp purchased the Silmet separation plant in Estonia. Silmet has historically been fed by loparite concentrate from the Russian Kola Peninsula, and is therefore exclusively focused on producing separated oxides and metals for the light REE and other metals such as tantalum and niobium. Just recently, Molycorp proudly proclaimed that neodymium metals can now be produced by Silmet. However, what it

doesn't do is produce separated or purified dysprosium or dysprosium compounds & metals, a key ingredient for making magnetic powders. And as we move further up the chain, the chink is paralleled on the extraction side. Despite the Molycorp presentation containing a figure proclaiming the pending production of dysprosium, no production has officially been recorded in the recent past at Mt Pass (although a solvent extraction circuit was designed). Perhaps the figure relates to future production from their recently 'rediscovered' HREE deposits, but I would expect it will be at least another 5 years before HREE concentrate comes pouring from the leach tank there. So dysprosium as yet is the missing link for Molycorp.

HREE strategy - reduction

The second topic of note in Molycorp's presentation was their HREE strategy. This contained two interesting aspects. The first was their aim to reduce the application of HREE in technologies, and more specifically to help development of a dysprosium-free permanent magnet technology. We have just seen that Molycorp's prime business strategy is to establish a complete non-Chinese supply chain for permanent magnets, which by their nature contain HREE and will probably do so for a long while. According to my neighbour at the conference (a representative from JLMAG Rare-Earth co. - a magnet maker from China), engineering dysprosium out of high performance permanent magnets requires at least 10 years of development. So, after announcing plans to develop four 're-discovered' HREE deposits, Molycorp is embarking on a HREE strategy of doing away with the REE absolutely essential for their mine-to-magnet strategy. I must confess I found this confusing.

HREE strategy - tolling

The second interesting element regarding Molycorp's HREE strategy was their intention of developing what I interpreted to be universal mineral cracking technologies for providing tolling services to juniors. The idea is to become a centre for industry where the separation of rare elements from the minerals they are contained in (so-called 'cracking') forms a financial or expertise hurdle for juniors with a promising deposit. This practice is quite common in the copper and gold industries. For those of us not well versed in the complexity of this phase in the processing of rare earths, we must consider that every deposit on earth requires a tailor-made flow sheet for separating rare earths from the encapsuling minerals. As the ANSTO representative showed us at the conference, every flow sheet needs to be tested extensively on bench and pilot scales before advancing towards production. Development is sequential and necessarily time-consuming, with no possible short-cuts. Thus, providing this as a service to juniors would be an incredible asset to the sector, but given the required level of 'uniqueness' of each flow sheet, I question whether this phase in the processing is amenable to outsourcing or tolling at all. The comments from Lynas in this regard, were a little bit more realistic, saying that they may consider providing tolling services for separation and purification of REO, but only after the juniors themselves have gone through the laborious process of cracking.

Roskill demand forecasts

On day two of the conference, Suzanne Shaw of Roskill looked at developments in green technologies and their effects on demand of rare earth elements moving forward to 2015. The technologies discussed were magnets for consumer electronics, automobiles and

wind turbines, the usage of REE in nickel metal hydride (NiMH) batteries, their application in phosphors, and their use in auto catalysts.

Magnets, as we have seen, are the high-value drivers of the REE industry, and because of the fears of availability of supply for the rare dysprosium and their price rise, alloy producers have been looking at ways of coping with the issue. As Yu Danbo from GRIREM Advanced Materials determined in his presentation, the NdFeB magnet cannot be replaced as the strongest magnet within the next 10-20 years, and manufacturers have not found ways of outright engineering dysprosium out of these magnets. Hence, the current focus is on efficiencies, and reduction of dysprosium in magnets from 5-8% to 2-4% is currently being achieved. Besides reduction, substitution of NdFeB with SmCo is a strategy that is also being applied in China, largely as a result of the high price of neodymium. This is taking place despite the fact that samarium is in short supply, and any replacement away from NdFeB magnets at this point is going backwards on the path of technology evolution. Roskill foresees a growth of 11-13% in this sector by 2015.

Turning to electric vehicles (EV) and hybrid vehicles (HEV), the presentor forecasts a conservative uptake of HEV vehicles, probably as a consequence of the current market conditions combined with innovations in the efficiencies of standard internal combustion engines. Also, the current line of NiMH batteries (containing lanthanum) is quickly being eclipsed in HEVs by the more energy dense and powerful Li-ion technologies. Growth of the NiMH technology will amount to 10-15% until 2015, and decline beyond that, impacting the application of lanthanum.

REE application in phospors (lighting and colours in displays) is largely irreplaceable. Both Rhodia and Mitsui have embarked on recycling innovations for extracting REE from the more commoditized fluorescent lamps. In the long term, Roskill foresees a decline in this sector by virtue of technology gradually moving from incandescents towards LEDs. Roskill foresees a 7-8% growth of REE demand in this sector by 2015.

Auto makers are finding ways to reduce the use cerium in catalytic convertors, but regulations are getting stricter in reducing CO2 emissions, offsetting the decline, and keeping a steady 6-7% growth for the sector.

In all, Roskill foresees rare earths growing from 125,000 tons in 2011 to roughly 170,000 tons in 2015, which despite recent doubts in various media concerning the long-term viability of the REE sector, is a very solid demand base.

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