

RARE EARTH: WHY SUBSTITUTE? RECYCLE!

China's decision in 2010 to limit production and exportation of the rare earth metals on which a number of industries rely set off alarm bells among the country's trading partners. This was particularly true for the chemicals industry. The President of Rhodia Group's Rare Earth Systems took time to comment on the current situation with ParisTech Review in Spring 2011.

Without rare earths (*) we would have no iPod, no plasma screens, and no LCD. Production of hybrid vehicles as well as electric vehicles would grind to a halt; forget about energy-saving light bulbs. Rare earths enjoy wide use in a range of technological and industrial activities such as with the petroleum cracking catalysts needed to refine oil into gasoline; laser guidance systems for use in military applications; radiology; automotive catalysis for the control of gasoline vehicles emissions and elimination of diesel particles; polishing materials and phosphors for flat panel displays; and in particular with terbium, use in fluorescent lamps and LED. New applications are being created as we speak such as with the use of yttrium in superconductors or gadolinium for magnetic refrigeration while electric motors have come to rely on permanent neodymium magnets.

ParisTech Review: Difficulties in procurement of adequate supplies of rare earths has threatened to put the brakes on the growth of many industrial groups, particularly in the chemicals sector. Since 2010 when the Chinese authorities placed restrictions on production and exports the situation has deteriorated. Speculation over the possibility that exports of some rare earths may come to a complete halt by 2014-15 has increased anxiety. Has the situation stabilized or do we need to worry about a hardening of restrictions?

Du Hua: As of this spring the situation remains volatile and elevated prices suggest that problems with supply will linger. Month to month observations confirm this tendency. Worldwide, annual production is around 127,000 tonnes, and China accounts for 95% of the total. The enormous deposits at Baiyan Obo in the Inner Mongolia province provide an explanation for the importance of China but in actual fact rare earths are found in abundance throughout the world. In July of 2010, authorities made the decision to tighten export quotas and naturally there have been significant repercussions across the global value chain. Chinese enterprises have also been hard hit by the scramble for resources and have had to cope with increasing scarcity along with sharp increases in price.

Is there a danger that price volatility in the market for rare earths could undermine your competitiveness in the specialty chemicals sector? How do you plan on facing this challenge?

Because we are specialized we occupy a particularly strategic role for our clients. If we look at the example of cerium oxide, essential to the production of catalyst technology capable of reducing the harmful effects of emission from diesel and gasoline engines, we observe that prices have increased tenfold since July 2010. It would be unimaginable to simply halt production on the assembly lines of vehicle manufacturers worldwide on the sole basis of a price spike in the market for rare earths. So far we have succeeded in negotiating agreements to share the increased costs with our partners. Cerium oxide is not just used in diesel engines, but also represents one of the most effective powders we know for polishing glass and can additionally be incorporated into the walls of self-cleaning ovens. In other words, we can't live without it.

You acknowledge a ten times price increase but what if this number was increased to 100? Does a cutoff point exist, beyond which the sector no longer makes economic sense in the eyes of you or your clients?

Recent price volatility may appear out of control but let's not forget this is a relatively recent trend in the market for rare earths. Eventually, the market will correct itself. A number of mines are slated to become operational in the near future worldwide as a result of recent activity. In Western Australia, a mine operated by Lynas Corporation is ramping up for production in the fourth quarter of 2011. In California's Mojave desert Molycorp Minerals is in the process of restarting production, which ceased in 2002. Operations will resume after a thorough refit of its Mountain Pass mine to comply with environmental standards and the current timetable indicates this could happen as early as 2012 with the capability to produce 20,000 tonnes per year. The good news is that clearly rare earth minerals are not nearly as rare as many believe and are in fact widespread throughout the globe. What is rare, are deposits where conditions promote relatively easy access and where exploitation is economically viable. As a result of soaring prices however the combination is found more regularly than was previously the case.

Is it too early to predict the demise of the Chinese monopoly?

China currently controls 95% of the market for rare earth minerals but would be more than willing to offload some of the burden to others. Previous economic policy is partly to blame as for many years the market was distorted by Beijing's decision to set prices so low that competition from other parts of the world no longer made economic sense. The authorities have since revised their assessment and see no future in the previous policy. In fact, China possesses a mere 30% of global reserves and the current disequilibrium, which traces its roots to policy decisions made in 1985 when the United States still controlled about half of global production, has become unsustainable. The risk is that China could find itself in the unfamiliar position of

importing certain rare earth metals within 20 to 30 years if changes are not made. Policymakers in Beijing are sensitive to the risk which explains the recent decision to slash exports. China's increasing concerns over sustainability provide a second motivation as the country understands, perhaps better than anyone else, the environmental devastation that results through the acid separation techniques and other industrial processes necessary for production. The result: contamination of huge swathes of land and soil that is for all intents and purposes, dead.

For a specialty chemicals group such as Rhodia does there not exist a desire to possess your own production capacities in rare earth metals? Could this be a way for you to cushion against price volatility and indeed use it to your advantage?

No, as we already occupy a very specific role in the rare earths value chain. Operating mines is a radically different proposition. Our goal is only to guarantee rare earth supplies adequate for Rhodia to continue to formulate the high-technology materials our clients demand, particularly in two areas that have become a priority for us, automotive catalysis and phosphors for low-energy lamps, as in these niche markets we have become a serious international player.

Growing restrictions on access have created anxiety as substitutions for rare earths are themselves extremely scarce or are less than satisfying. It is common knowledge that praseodymium can be used in place of neodymium or that permanent neodymium magnets can be substituted with ferrite ones but what happens when no adequate substitution can be made ?

Rhodia has largely sidestepped the issue of substitution and is taking a somewhat novel approach. Rather than invest ourselves in the search for substitutions we have created a rare earth recycling program which uses low-energy lamps at the end of their working life. It's our way of attesting to the importance of this resource. It is a team effort in partnership with recycling experts and our clients. Across five continents the quantity of lamps should be considerable and we expect the project to bear considerable fruit. After significant investments we have plans to launch the first phase of this project in the second quarter of 2011.

Will recycling allow you to withstand China's new insistence on stricter quotas?

Quotas will have a significant impact on all our activities but the intensity will vary according to the rare earth element concerned. Of the 17 known rare earth elements we can make a division between two categories: those deemed heavy or light. Light elements are actually fairly widespread and it is really only with the heavy elements that we are facing significant challenges. They are indeed considerably more "rare" under current conditions, and China does enjoy a real monopoly. The situation provides us with an even greater incentive to develop our recycling program as low-energy lamps at the end of their working life contain significant quantities of heavy elements, particularly terbium.

Can everything be recycled ?

Right now we are concentrating on discarded phosphors but the perspectives for reusing other rare earths by recycling magnets or polishing products are also promising.

Recycling allows the recapture of certain rare earths but not all. There are certain barriers that show no signs of lifting.

In those industries and applications where we have an interest the recycling of rare earths is indeed possible and we will continue along our current path in order to cover a growing proportion of our needs. For the rest we will continue to rely on mining operations.

You are committed to recycling despite the fact that a growing number of your competitors are choosing to following the path of substitution. Are you sure of making the right decision?

It is true, a significant number of our competitors are placing their faith in their ability to create solutions based on the substitution of rare earths. My reaction is to invite observers to examine two positive results related to our recycling program. On one hand, pressure on resources will be alleviated, and on the other we will have a better ability to control our own destiny in terms of performance guarantees made to our clients as we are already in possession of the required rare earths. This makes our production less dependent on mined resources without sacrificing in any way the quality of the finished product. As a solution, our path is decidedly less radical than substitution but in economic terms seems rather more efficient.

You have no concerns about being almost alone in making this decision?

Patience! Our initiative is very recent and prior to 2010 there existed little incentive to conserve or recycle rare earths. For the markets in which we are active the competition has so far chosen to largely ignore our recycling initiative and follow a divergent and more conventional path based for the most part on the cultivation of new suppliers.

But why turn your back on substitution?

The logic of substitution means that if it is successful dependence on the target resource would be eliminated while with recycling, it must be admitted, the reduction is only partial. Yet why invest so heavily in eliminating a particular rare earth from the value chain when it exists in abundance and has already demonstrated exceptional results? Why not work on conservation? Nobody really knows whether the unique qualities of rare earths can really be duplicated. Substitution represents a significant gamble in terms of science and technology. Convincing results are noticeably lacking. Nothing we have seen so far would suggest that an elimination of rare earths from production while maintaining current quality standards is indeed possible.

There has been an animated discussion around “peak oil” and the idea that the majority of the world’s crude is already being exploited and will continue to diminish until supplies are completely exhausted. Are you preparing yourself for a similar process with rare earths?

Frankly, no. If we step back from the volatility of the current climate and take a longer view the picture is considerably altered by plans worldwide to inaugurate new mines and exploit new deposits. It is clear that, even if some of the projects are unable to live up to expectations, we could see a reversal of the current situation and supply could begin to outstrip demand as early as 2015.

Source : <http://www.paristechreview.com/2011/05/16/rare-earth-why-substitute-recycle/>