

China has been paying a high price in environmental terms in exploiting its resources



# Rare earths: the politics and policy

As with many controversial subjects in the minerals world, the questions surrounding rare earth elements (REE) have commercial as well as policy-making implications when addressing such key issues as geology, finance, processing, environment, market forces and recycling.

The need for policies on REE in both China and the rest of the world stems from an imperfect market, which cannot, or will not, address resource preservation, health and safety issues and environmental protection.

As the demand for REE has grown in the past 10 years with their increased use in new and established products such as permanent magnets, lasers, mobile phones, tablet devices

and weapons defence applications, questions of security of supply, national safety and technological supremacy have become increasingly significant.

International public policies regarding rare earths have centred around the basic question: “What are the Chinese trying to do?” *Vasili Nicoletopoulos* discusses Chinese concerns and policies and investigates just how smartly the rest of the world is reacting

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## Chinese policies: a history

China cut REE export quotas by 40% on 11 August 2010, with Japanese buyers claiming in the following September that China had banned all REE exports to Japan in retaliation to a fishing

vessel being captured, although China’s Trade Ministry denied there was such an embargo.

However, China has introduced several measures concerning REE since 2010, including the following:

- Cut (and recently, categorise) export quotas;
- No new mining licences until 2015;
- Consolidate the number of REE companies;
- Co-ordinate pricing;

- Withdraw VAT rebate on exports;
- Impose tougher environment, health and safety regulations;
- Increase taxation for Chinese producers;
- Cut down illegal REE production and exports;
- Assist in research and development;
- Stockpile strategic reserves.

In March 2012, the Chinese Ministry accepted an organisation plan submitted by Baotou Iron & Steel Group Co., which proposed increasing state control of REE by clamping down on illegal mining via a new invoicing system and the formation of the China North Rare Earths (Group) Hi-Tech Co. The latter would mainly mine and process light rare earth resources in north China in conjunction with Gansu Rare Earth Group and consolidate several companies in Sichuan, Jiangxi and Shandong provinces.

It was proposed that it would have its own invoicing system as of June 2012, run along similar lines to systems established in the salt and tobacco industries. This state-owned initiative would include all Chinese REE chains of reserve, mining, smelting and sales; identity assertion; and provide an online system for all companies in a bid to prevent illegal companies obtaining REE resources.

China announced on 1 June that it was introducing a specialised VAT invoice system for REE producers, in a further attempt to curb excessive illegal mining and production, while also addressing the problems of over production.

According to *China Daily* reports, when prices fall to a certain level, enterprises will be required to purchase and reserve REE and when prices rise to a set price, they will then be required to sell.

However, some sources have questioned this move, with concerns that the invoice system will only be effective in regulating legal enterprises, with market analysts Platts highlighting this was just 'a first step'. "VAT permits will cover REE companies in Sichuan and Inner Mongolia in an attempt to regulate overproduction, a first step to control overcapacity, illegal mining, and resource draining in the RE industry," it reported.

Chinese policies were best summarised at the 2nd EU-China Raw Materials Working Group in Beijing on 30 March 2012 during a Ministry of Industry and Information Technology (MIIT) presentation on China's REE industry. There, it listed China's policy enforcement and the status of those initiatives as follows:

- Unified REE administrative organisations were set up at both central governmental and provincial levels;
- 11 REE planning protection zones were

established to enforce the protective mining policy;

- More than 600 cases of illegal exploration and mining were penalised - an important first move to curb illegal mining;
- 89 REE mines and smelting enterprises, which had environmental problems, or were producing without planning, or were overproducing, were ordered to halt activities and bring production up to required standards;
- A list of the first 15 REE enterprises that complied with environmental protection requirements were announced, while a group of companies with heavy pollution or safety risks were ordered to stop operations and reorganise production. Environmental protection was also strengthened;
- Eight REE smuggling cases were reported, with 769 tonnes of REE seized by authorities;
- A series of industrial standards were formulated and published, while initiatives on the elimination of old technologies and facilities were enforced;
- The China Rare Earth Association [CREA] was established. One of the first actions of CREA was to announce at the beginning of June this year that a reward of RMB50,000 (\$7,855) will be awarded for any information on illegal REE activity including mining, smelting, separation, processing and smuggling;
- On 20 June 2012, China's Information Office of the State Council announced the publication of its white paper, entitled "Situation and policies of China's rare earth industry" with detailed information on the current situation of China's rare earth industry, together with development targets, plans for the resource conservation, environmental protection, technological advancement and international trade policies.

### Interpretation of the Chinese actions

China is far from being the only country controlling its natural resources: other emerging economies pursue industrial development strategies by trade, taxation and investment instruments to reserve a resource base for its exclusive use via export taxes, quotas, subsidies. In May, Japan was considering filing a complaint with the WTO over Indonesia's export restrictions of 14 crude mineral ores and a 20% tax on all other mineral exports (*see p.7*).

Chinese REE policies should be seen in the context of the country openly changing from an export-led economy to a domestic, consumption-led model. China may even start importing REE to meet local demand, according to mining officials, with domestic

demand increasing 200% year-on-year between 2010-2011. Furthermore, China is now aggressively investing outside its borders.

China's main REE concerns are rising costs, power shortages, problems of health and safety, ensuring environmental preservation, satisfying local demand, and safeguarding technological supremacy and national security. These factors all indicate China will retain, and even strengthen, its export quota in the coming years.

Chinese opinion is that it has long been exporting REE at very low prices at the expense of domestic consumption, while also causing local environmental damage. It also believes that most of its recent policies have not favoured domestic producers.

China's REE industry suffered a significant set back as recently as May 2012 when Inner Mongolia-based Baotou Steel Rare-Earth Hi-Tech Co. Ltd failed an obligatory second environmental assessment, which could ultimately force the company to stop exporting. Analyst Jack Lifton was quoted as saying: "We effectively told them in the past that we wanted them to produce our REE in order to save money. That has been accomplished. Now, we are saying why did you do this to us?"

Aside from these new policies and actions, political debate continues in China about which way its economy will go in the coming years. And while that debate remains unresolved, no one can predict how this may affect REE.

### Other developments

Quota cuts apply only to raw minerals, not to processed forms, such as magnets. This can be seen as a strategy to develop Chinese domestic manufacturing industry (Chinese-owned or otherwise) and promoting a policy of trading 'resources for technology'.

In 2011, buyers of China's REE did not use up the available export quotas and, in most cases, no buyer has been prevented from acquiring the metals they needed if they were prepared to pay the price. But illegal mining and smuggling makes official production and export figures difficult to gauge and they tend to err on the low side. Actual figures will be considerably higher.

China sees demand for REE exceeding local supplies as early as 2015, particularly as some of the more toxic and highly polluting producers will have had their activities curbed by then.

It is an irony that accompanies almost every China sanctions story, but dismantling Chinese duty and quota barriers would push down global prices and, perhaps, curtail Western REE investments.

As the Chinese government has noted, only half of its 2011 REE export quota was

subscribed, implying that there are limits to the pent-up global demand, which will keep prices up to a level beneficial to Molycorp Inc. and Australian REE miner Lynas Corp.'s investments.

Also, the Chinese government has openly welcomed development of new REE sources overseas in order to relieve pressure on Chinese suppliers serving the export market rather than domestic users.

For example, Lynas' CEO is a China resource insider with close ties to the Chinese establishment, a connection which many believed would see China Non-Ferrous Metals Mining Group fund Lynas' expansion but for Australian government opposition, although the process technology for the Lynas processing plant in Malaysia is supplied by China.

Meanwhile, at Mountain Pass, California, Molycorp's chairman told reporters: "It has been surprising, the Chinese are extremely supportive of us starting this mine, they have told us they don't want to be the world's sole supplier... They are concerned they are going to consume everything they produce internally and they won't have excess production to export."

A continuing worry for China, despite some Western cynicism that this is only a convenient argument for the World Trade Organisation (WTO), are the environment, health and safety issues. At the previously mentioned 30 March 2012 event in Beijing, a session on Problems of China's Rare Earths Industry, provided slides and photographs carrying the following

dramatic captions: 'It has severely damaged the ecological environment of China, which leads to soil erosion and water pollution. The crop yields reduce sharply or even have no harvest'; 'REE exploitation caused a large area of landslides in one of mining sites in northern part'; 'River channel sedimentation caused by exploitation in one of Jiangxi's mine'; 'Illegal exploitation caused the tragedy of nine deaths'; 'Production halts because of the hidden hazard of severe mudslide disaster'; 'Landslide caused by destructive exploitation'; 'Humble [sic] REE production workshop and facilities, large amount of dust and waste gas emission'.

In a similar vein, *China Daily* of 10 April, ran an analysis comparing revenue with environmental cost: "China has been paying a hard price exploiting its REE resources," it wrote. "It is said that a year's gold is sold at the price of cabbage. Jiangxi province, rich in REE in China, earned 32.9bn yuan (\$4.89bn) from this industry last year, but it has to spend 38bn yuan to tackle the environmental pollution in Ganzhou, one city in the province, according to an *Economic Information* report. The way to get REE materials is devastating to nature and the damage is irreversible. It used to be described as the 'remove mountain campaign' in Ganzhou, *Economic Information* reported. A traditional process to get this mineral will eradicate trees and grass first and peel off topsoil of the earth. What is more, the waste water coming from the chemical reaction is full of ammonia nitrogen and heavy metals, which are extremely harmful to people's health and the nature."

Such environmental issues are not unknown in the West. Waste rock and tailings generated during the processing of raw ores often contain metals such as arsenic, copper and lead. Additionally, the management of radioactive wastes has become a key issue for the REE industry, while there are also many types of acids, caustics, organic solvents and petroleum products used to purify the raw ore into the metal oxide forms needed for technological components.

In summary, the Chinese feelings were starkly expressed during the 30 March 2012 event: "China has made its great contributions to the development of the world's REE industry, and at the same time, [paid a] heavy cost in resources waste and grave environment damage. It will be unbearable [to follow] current production pattern[s]."

### How has the rest of the world reacted?

Chinese REE export policies, the consolidation of REE companies, the imposition - and enforcement? - of tougher environment, health and safety standards and the clampdown on illegal mining and smuggling, have significant international consequences.

At this point, a distinction has to be made between the political and commercial actions of the rest of the world. A further distinction could be between REE consumers and producers in the 'West' - meaning the US, the EU, Japan, Canada, Australia, and South Korea - a country that sourced 78% of its REE imports from China in 2011 - and developing countries, which are mostly REE producers (and processors) including Afghanistan, Brazil, India, Kazakhstan, Malaysia, and South Africa.

Security of supply remains the main concern of the advanced rest of the world. REE use in defence applications is an issue in the US, but not in the EU, where there is no common defence policy, while energy independence is important to both the US and the EU. However, the Association of German Wind Turbines may have put this in some context by stating, "None of our members use magnets with neodymium, and only 5% of wind turbines in Germany are concerned [by REE]".

However, the view of consumers in the rest of the world do not always coincide with those of producers in that region.

Cleaning up the notoriously dirty REE business in China is laudable, but the latest regulations [see below] are probably aimed more at attempting to curb chronic REE overproduction in Sichuan and Inner Mongolia, which have recently led to an implosion in export prices. The net effect should be to the benefit of new projects in the rest of the world.

A number of studies emerging at the end of 2011 and the beginning of 2012 can be seen to



China has supplied technology for Lynas' project in Malaysia



Chinese facilities for REE production are relatively backward

reflect the mood of public opinion in the rest of the world. This includes titles such as ‘China Cutting REE Production to 70% by 2015’; ‘Grim Supply, Price Scenario Push REE Manufacturers to Scour New Options’; ‘REE Metals Scarcity: A ‘Ticking Time Bomb’ for the World?’ by PwC; and ‘Five REE Elements in “Critical” Supply’ by the US Energy Dept. Other articles, which carried headings such as ‘Chinese [low] trade figures raise the alarm for global economy’, while conferences billed debates such as “Critical Raw Materials”, “Criteria of Critical vs. Essential Raw Materials”, seem to leave no doubt on where concerns lie.

Western analysts have also pointed out that Chinese policies are by no means limited to REE. China has transformed from an exporter of cheap raw materials to higher prices and increased value-added products during the past 25 years. Also, it was announced in March 2012 that the government is seeking to control the phosphate industry by buying out small companies.

Chinese REE policies can also be interpreted as a political move to encourage foreign companies to open processing facilities inside the country. This is already taking place with the office equipment and magnet sectors for example, with participating including companies such as Rhodia, Hewlett-Packard and Neo Materials.

According to some reports, non-Chinese users of the country’s REE face costs that can easily be more than 50% higher than those paid by domestic industry, although metals and minerals research company Roskill noted at the IM21 Conference in Hungary this March that domestic prices are also increasing.

Baotou, the world’s largest REE producer, announced a 2011 net profit of \$555m, more than four times that of 2010, with “the company attributing gains to favourable national policy”, according to *China Daily*.

The universal underlying criticism of China’s two-tier system is not so much the cost

disadvantage to non-local purchasers, more, it is that China can be seen as using its temporary REE monopoly as bait to entice or compel downstream processors and fabricators to establish themselves in China in order to gain access to raw materials at preferential pricing.

Promoting a ‘whole-industry chain’ is considered as a further step towards the monopolisation of the industry by downstream companies in China. Many such companies suggest that a better way to run the system would be for it to only cover the upstream industry, leaving the downstream consumer sector untouched, thereby avoiding what they believe would result in “chaos” to the whole industry.

### Rest of the world commercial actions

Aside from political initiatives, some commercial activities are also relevant. Many non-Chinese REE companies, such as Molycorp Inc., Lynas Corp. and Sweden’s Tasman Metals Ltd (100% owner of the Norra Karr project), are implementing new projects.

Less advanced projects range from Germany developing an REE mine, to North Korea reporting 20m tonnes of REE reserves. It should be noted that China is abundant in heavy rare earths, while many projects outside China are prominently in light rare earths. The time it takes to get to first production is also a crucial consideration.

As for downstream investments, Molycorp Inc. has acquired Stilmets and Canadian-based Neo Material Technologies Inc., while Hitachi Metals, possibly the world’s largest producer of REE magnets, announced it would invest \$25m to set up a neodymium magnet production line in North Carolina to serve the electric vehicle and hybrid vehicle market. The plant was slated as Hitachi’s first overseas Nd magnet investment, implying that a previously announced plan to put 20% of its production in South China is, perhaps, on hold.

Any considerations of commercial actions have to recognise that many Western companies indirectly depend on Chinese illegal mining and smuggling. It is estimated that illegal production accounts for 15% of the supply of light rare earths in the world and 50% of heavy rare earths. Approximately 20% of Japan’s REE imports from China are believed to be via illegal sources.

Finally, this April saw the so-called ‘Chatham House meeting’ held in London, UK, to institute a purchasing code to protect countries reliant on imports of critical minerals. The main item discussed here was the establishment of a code of conduct for buyers and sellers of REE, “in order to reduce the risk of being held to ransom by China”.

The proposed purchasing code states that no buyer should have a supply reliance on one country in excess of 40%. The code would, in essence, “force diversification”, the meeting heard, and ensure the extreme REE situation will not happen with other raw materials.

### Public policies

When it comes to official policies, Japan, the world’s largest REE importer, stands to lose more from Chinese supply bottlenecks than any other nation and has established lists of critical materials.

Beyond a \$700m government war chest to fund the strengthening of the domestic supply chain, Japan engaged in a flurry of REE-related activity in setting up a REE magnet recycling operation in Vietnam, inking an agreement with Kazakhstan and touting the discovery of a trove of REE on the Pacific seabed. Japan will also provide \$65m in subsidies for projects that reduce the need for REE as it attempts to cut its reliance on imports by reducing the consumption of magnetic products that use dysprosium and neodymium, improving recycling and developing new technologies.

In May this year, Japan and India signed a REE deal aimed at reducing their dependency on Chinese metals. On 30 April, US President Obama met with Japanese Prime Minister Noda to discuss the development of a joint critical minerals and development project – an alliance between the two countries where new technology used in the production and recycling of REE will be shared.

Other policies worldwide include:

- The EU and the US have established criticality lists, with REE featuring prominently. The EU has launched further Critical Raw Materials initiatives, including in research and development;
- Strategic stockpiles are being considered in Japan, South Korea and the EU;
- India is to establish a national organisation for REE exploration and stockpile;
- In March 2012, Western Australia imposed a new 2.5% royalty charge on REE mining;

- Governments are backing outsourcing efforts: Japan, South Korea, France, and recently Germany with Kazakhstan. This means that in addition to pressuring the Chinese to relax export restrictions, there are efforts to stimulate supply outside China, some with state guarantees;
- Russia is to resume production of REE metals;
- The 'Chatham House meeting' also called for a National Rare Earths Centre of Excellence in the UK and US in an attempt to rebuild the knowledge base. Germany has already started similar programmes with the universities based in Freiburg and Aachen;
- Greenland's government, which had originally established a moratorium for exploration of radioactive elements such as uranium and thorium, now allows this activity, on a case-by-case basis. This is expected to also include REE exploration;
- Lastly, even though this cannot be considered a 'policy' *stricto sensu*, tolerating smuggling out of China has been a standard attitude in the rest of the world.

### US policies and concerns

In early October 2010, the House of Representatives passed the Rare Earths and Critical Materials Revitalisation Act, to re-establish the US as a leading producer of REE and to make it self-sufficient. Kathy Dahlkemper, Author of the Bill said: "We need to act now to begin the process of creating our own supply of REE materials so the US is never dependent on China for crucial components for our national security."

An obvious concern for the US government is the risk to its defence programme as a result of a possible REE supply disruption. In November 2011, the National Center for Policy Analysis held a conference on Rare Earths And National Security, in Washington, DC, while the internet hosts a number of hard-line comments such as: "Natural resources and REE materials in geopolitical and intelligence terms [are] the successor for the jihad and cyber challenges and threats", even asking readers to join a particular LinkedIn group.

Lisa Murkowski, Senator of Alaska, announced that the answer to once again creating an independent market is to increase US development of REE mines and refineries. She has introduced legislation that she claims allows the designation of REE sites as "critical to US strategic interest". "[T]he president wants to sue the Chinese for something that we could – and should – be producing for ourselves," Murkowski said. "All he has to do is look north to Alaska, which has already identified roughly 70 REE sites". She has also, with the support of many within the REE sector, criticised the current government



Drilling begins at Sweden's Tasman Metals Ltd's Norra Kärr in December 2009

for not paying enough attention to her Energy and Natural Resources committee in the past year.

Other US initiatives include P.L. 111-393, the Ike Skelton National Defense Authorization Act for FY2011, Section 343 and S. 3454, the DOD Report Responding to Section 843, H.R. 2011, "National Strategic and Critical Minerals Policy Act" and others. Those most directly addressing REE are H.R. 1314, 'Resource Assessment of Rare Earths Act of 2011', and H.R. 1388, 112th Congress, 1st Session, April 6, 2011 by Mr. Coffman of Colorado et al, "To re-establish a competitive domestic REE minerals production industry; a domestic REE processing, refining, purification and metals production industry; a domestic rare earths metals alloying industry; and a domestic REE-based magnet production industry and supply chain in the Defense Logistics Agency of the Department of Defense."

However, despite these moves, on March 13 2012, Senator Murkowski deplored that "... although in the Senate alone, 24 different Senators supporting legislation to address some aspect of this problem, those efforts have ... gone nowhere. Not one bill on this topic has been reported from a Senate committee – even when the votes are likely there to do so".

Rather, it is President Obama's international initiatives which have made the headlines. In

addition to the Obama-Noda agreement, Obama's Announcement on the Joint World Trade Organisation Dispute Resolution Case Against China has set in motion a WTO complaint.

### The OECD report of 22 March 2012

The OECD Working Party of the Trade Committee has issued a report titled 'Measures Restricting the Export of Industrial Raw Materials: Analysis of the Data of the OECD Inventory'. The Working Party of the Trade Committee decided to build a factual inventory of border and domestic measures that restrict the exportation of industrial raw materials, as part of a larger effort of OECD to take stock of such measures in the raw materials sector. The main preliminary findings are:

- Export measures are pervasive in the minerals and metals sector;
- Export measures are also relatively common in the iron and steel sector and for certain materials needed for the production of steel;
- Inventory data for 52 countries with entries for minerals and metals show that, from 2009 to 2010, the use of export measures increased. In 2010, the total list of commodities affected by export measures included six additional commodities and the total number of countries applying measures in 2010 rose by four;
- Non-automatic export licensing, export

taxes and export prohibitions were the leading measures used to regulate the exportation of waste and scrap of metals. Export licensing and export taxes were the primary instruments by which governments regulated the export of unprocessed and semi-processed minerals and metals.

Countries also made use of other measures.

### WTO activity

The US, the EU and Mexico lodged a complaint regarding a 'first wave' of minerals, including fluorspar, bauxite and coking coal. China objected, mostly on environmental and resource preservation grounds, but in January 2012 the WTO decision was upheld.

On March 2012, a 'second wave' complaint was lodged by the EU, the US and Japan (which had previously never filed a complaint against China with the WTO), with respect to "various forms of REE, tungsten and molybdenum". The complainants alleged specifically the following actions by China are not in line with current WTO trade provisions:

- The imposition of export duties;
- The imposition of export quotas and other quantitative restrictions;
- The imposition of other restrictions, such as the right to export based on licences, prior export experience, minimum capital requirements, and "other conditions that appear to treat foreign invested entities differently from domestic entities";
- The maintenance of minimum export prices, through the examination and approval of contracts and offered prices, and through the administration and collection of the export duties, "in a manner that is not uniform, impartial, reasonable, or transparent";
- The imposition and administration of restrictions through unpublished measures.

For perspective, it should be remembered that beyond the 97% figure of China's monopolistic share of current REE production, China only accounts for around 30% of world REE reserves, begging the question of how vital the WTO complaint is to the protection of Western interests.

China now has a number of WTO-consistent options: it could either integrate REE companies so they would not be forced to export REE but only finished products, or treat local sales the same as exports, that is, limit production instead of exports.

The latter scenario is exactly what China did when it introduced the previously mentioned specialised value-added tax invoice system for REE producers in a bid to curb the excessive illegal mining and production of the metals.

Another WTO-consistent option could be for China to decide to resolve its export-related embarrassment by following through on

previously mooted plans to build a major government REE stockpile of up to 200,000 tonnes on the grounds of national security, thereby substituting *de facto* rationing for the export quota system.

In this context, it is useful to remember the assessment of Clyde Prestowitz, director of US President Reagan's strike force against unfair trade: "In this globalised world, two different games are being played, one suggested by WTO formal rules, the other a silent mercantilism played by countries that use subsidies and domestic regulations to exploit ambiguities in the formal WTO rules – or that simply ignore them," he said.

Surprisingly, however, China has been recently reported to having cancelled the export licence system for bauxite, an article belonging to the 'first wave' discussed above. The next round of licences for 2013 have reportedly been abolished. The possibility exists that permission to export bauxite will only be granted if the relevant company controls its own mine.

Analysts have also questioned how consistent the Chatham purchasing code is with WTO rules "to protect countries reliant on imports of any critical minerals, [with] no buyer to have a supply reliance on one country in excess of 40%".

### Conclusions

REE are a very complicated subject, partly because of the variety of metals and their applications, and especially because of the uniqueness and strategic importance of a lot of these uses. The problem is one of supply chain, not just of mineral exports, with many steps between mine and end use – as many as seven in the case of office equipment.

China is, and will remain, dominant in REE, especially in heavy rare earths, not only because of its deposits, but also due to Western downstream processing and consumer-goods production inside China. Ironically, another factor in favour of production in China is public opposition in the rest of the world, with investment bank Dahlman Rose wondering whether "REE projects could be shelved on rising costs and overheads of establishing and operating REE mines and plants".

Environmental considerations, both chemical and radioactivity, are as important in the rest of the world as they are in China itself.

On the commercial front, our opinion is that now that REE export quotas are separated into lights, mediums and heavies, it will become more evident where the real demand is and how tight the export quotas really are.

Overall, we share the opinion in an *Financial Times* article titled 'The overstated fear for RE', which stated that, "The US, the EU and Japan are justified in bringing case

against Beijing's REE export controls to the WTO. But they need not crow quite so much about it. Geostrategic panic about China's dominance in REE is exaggerated."

Interestingly, roughly the same opinion is expressed by the US Department of Defense, but not the Department of Energy. We believe that the 'rare' in rare earths is due not to geological factors but to commercial ones, which are partly created by policies.

Where the rest of the world is reacting at its smartest is in cooperating with China, in developing mines outside China and working on reducing/recycling/substituting. As was said at the China-EU meeting: "China and the EU are highly complementary in the REE industry. Through collaborative development of REE and relative industries, good cooperation relationship is built not only between governments, but also among enterprises."

Our opinion is that the rest of the world should collaborate with China, not clash.

### Looking into the future

Six issues will always be crucial for future projects, whether in China or in the rest of the world: scarcity of heavy rare earths; technology and environment; pricing based on supply and demand; logistics; finance; and politics.

In the next few years, the REE supply problem could be alleviated internationally if there is oversupply of REE from new projects; if economising and substitution of REE will grow (recycling less so); or if there is a severe slowdown of the Chinese or world economies.

Tight supply, the current status quo, will be maintained if permitting problems, mostly environment, health and safety-related, become the norm; if the WTO is slow and ineffective in reacting against China; and if new REE uses are developed.

Either way, assuming the speculation/bubble aspect that is inherent in the REE market does not burst, it cannot be discounted that China will become a net importer of REE, which could be by 2015 according to Molycorp Inc. predictions made in March 2011. China and Japan will be then competing for the same REE resources...and the West will have the potential to squeeze China on the supply of another raw material.

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*A full set of references can be obtained on request*