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Rare Earth Metals in Central Asia and Mongolia: A Promising but Paradoxical Agenda

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On March 13, 2012, the United States, the European Union, and Japan lodged a complaint with the World Trade Organization (WTO) against Beijing due to its supposedly unfair practices concerning the export of rare earth metals. China, which on its own represents 95% of world production, has imposed severe restrictions on rare earths exports over recent years. It authorizes the sale abroad of a mere 25% of its production as compared with 75% only a few years ago.[1] Chinese exports have thus gone from 65,600 tons of rare earths in 2005 to 39,800 in 2010. Beijing has justified this decision by the necessity to apply further legal restrictions to this industry, in particular due to its environmental consequences. The Chinese decision, however, conceals other more strategic interests: in its last five-year plan, Beijing projected the notable development of high-tech industries with high added value,

Key Points

- Japan, Germany, South Korea and the United States are eyeing Kazakhstan, Kyrgyzstan, and Mongolia in the hopes of circumventing China's growing economic pull in the rare earths arena.

- Kazakhstan officially announced its intention to increase the production of rare earth ore to 1,500 tons per year, and works closely with the Federation of German Industries.

- Several Japanese and South Korean companies have shown interest in Kyrgyz rare earths.

- If the exploitation of rare earths appears as a new financial Eldorado for those countries that have them, it raises many environmental issues.

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necessitating an increased need for rare earth metals.[2] Consumer countries, mainly Japan, South Korea, the United States and Germany, are thus looking for alternative partners, and have been eyeing Kazakhstan, Kyrgyzstan, and Mongolia. For these three countries, this global conjuncture is at once an economic opportunity to boost state revenues, and a strategic opportunity, as producing rare earths could give them unprecedented visibility on the international arena.

The world race for rare earths

The 17 metals defined as rare earths are essential to the production of several technological applications such as televisions, mobile phones, and PC monitors, as well as for the manufacturing of green energy products (low energy bulbs, wind turbines, hybrid car production). In addition, they are key components for the defense industry: according to the US Department of Defense, rare earths are used in the production of a number of missiles including the Tomahawk cruise missile, as well as radar surveillance systems, Abrams M1A1 Tanks, F15 Fighter Jets, and night vision material.[3] The rare earths market has literally skyrocketed over recent years, going from US$500 million in 2003 to 1.5-2 billion in 2010, when world demand was 136,100 tons but global production was only 133,600 tons, with the difference being filled by above ground stocks or inventories.[4] Global demand is set to grow considerably: it could reach between 185,000 and 210,000 tons in 2015, leading to a strong price increases, while they have already risen more than 300% in price between 2008 and the end of 2010.[5] According to some sources, prices for rare earths could multiply by two or three over the next twenty years.[6]

China has 36% of world reserves of rare metals but almost totally dominates the world market because it was the first to understand their importance in the 1980s, and did not balk at developing exploitation, despite the fact that it is particularly polluting. In terms of reserves, it is followed by the republics of the former Soviet Union (22%), the United States (13%) and Australia, with the last fifth of the reserves being distributed among Canada, Greenland, Malaysia, Brazil, South Africa, and the countries of Southeast Asia.[7] The so-called rare earths are more abundant than gold or silver, or even than copper or lead, in the earth's crust: according to the U.S. Institute of Geological Studies, world reserves are estimated at about 114 million tons, or 800 years of assured consumption at current rates. However, though abundant, they are often too dispersed to enable conventional economic exploitation.[8] Most deposits do not contain the whole set of 17 metals, and generally have only the most common and not the rarest ones such as radioactive promethium. Moreover, as rare earths are the sub-products of mining resources, obtaining the pure product that is necessary for industrial applications is a lengthy process that voraciously consumes resources and pollutes.[9]

Rare earths are thus an international strategic issue. China's decisions have caused the relevant industries in Japan (one of the largest importers in the world), South Korea, Europe, and the United States to consider alternative products and suppliers. The search for new, economically viable deposits covers the entire globe from Greenland and South Africa to the CIS countries and North America. India plans to take stock of the value of its reserves but they do not appear to be very significant.

With the second largest explored rare earth reserves in the world, maybe the first in terms of potential reserves, Russia could challenge China's monopoly. Moscow was not planning to develop rare earth mines until 2030, but international pressure, especially from Japanese firms, has become more insistent. The Russian Federation has two main deposits: the Lovozersk mine, in the Murmansk region, has an estimated 80 million tons of ore reserves that can be surface-mined. It could produce a wide range of rare earths, especially the very uncommon eudialyte (a primary rare mineral carrying heavy rare earths), but for now focuses only on magnesium production. The Tomtor deposit in Yakutia-Sakha has an exceptional 12-percent level of rare earth content in its ore. Its proven reserves amount to 150 million tons and the possible reserves come close to exceeding all the rest of the world's reserves combined. The apatite ore of the Kola Peninsula, today used to produce phosphorus fertilizers, could also contain rare earths.

Kazakhstan

Faced with the increase in world demand, in 2012 Kazakhstan officially announced its intention to increase the production of rare earth ore to 1,500 tons per year, and more than double its production of beryllium by 2014. Its resources are located, among other places, on the Kundybay site close to Kustanay in the north of the country, which contains yttrium – a rare earth element. The Soviet infrastructure, which might have contributed to the extraction of rare earths, is today closed or obsolete, but as the world's largest uranium producer, the country has the technical capacity to extract them from its uranium ore at a reasonable cost. The authorities have nonetheless largely looked to foreign investors.[10] At present three-quarters of Kazakh ores are exported to Russia and 20 percent to China. Other international players therefore must act quickly in order to prevent more of Kazakhstan's reserves from going to Beijing. The main interested parties are Germany and Japan.

In April 2011, Kazakhstan's state-owned nuclear company Kazatomprom announced it would invest US$800 million to develop rare-earth metal mining through partnerships with Rosatom, Toshiba, and Sumitomo. Toshiba and Kazatomprom announced the creation of KT Rare Metal Company, 51% being owned by Kazatomprom, 49% by Toshiba.[11] In April 2012, Sumitomo, the third largest Japanese commercial company, Japan Oil, Gas and Metals National Corporation, and Kazatomprom signed a new agreement for the exploitation of rare earths and a technology transfer to Kazakhstan. Within this purview, Kazatomprom and Sumitomo created the Summit Atom Rare Earth Company (SARECO), based in Ust-Kamenogorsk 51% of which is owned by Kazatomprom and 49% by Sumitomo.[12] The objective of this joint venture, in the first place, is to conduct a feasibility study for the production of rare earths. The project then foresees the construction of a mining and treatment complex, a hydro-metallurgic plant to produce collective ore concentrates, as well as a chemical plant to separate the rare earths into individual metal oxides. [13] Both countries anticipate the construction of a factory at Stepnogorsk using the technology of the Shin-setsu Chemical Corporation, set up to export 30 tons of rare metals from the end of 2012, and probably an increased quantity of 50 tons for 2013.[14]

The Federation of German Industries (BDI) also hopes to gain access to Kazakh rare earths in order to secure its supply and limit its dependency on China. In February 2012, Angela Merkel and Nursultan Nazarbayev agreed a strategic partnership worth a total of €3 billion, which guarantees German companies the right to explore and exploit Kazakh rare earths and other raw materials in exchange for technological investments. France and Kazakhstan have also increased their cooperation in this domain. During Nazarbayev's visit to Paris in September 2011, the Bureau of Geological and Mining Research (BRGM) concluded a strategic partnership agreement with Kazatomprom for the purpose of identifying production opportunities and creating a Franco-Kazakh laboratory for rare earths to develop new extraction technologies.[15]

Again in 2011, the Russian atomic energy agency Rosatom, by way of its subsidiary in charge of uranium extraction, Atomredmetzoloto, stated it wanted to invest US$500 million in the development of rare earths in Kazakhstan in partnership with Kazatomprom.[16]

Kyrgyzstan

Kyrgyzstan has twenty rare earth sites, located in the Issyk-Kul, Talas, Chu, Jalalabad and Osh regions.[17] The majority of them, however, require additional geological studies. The main site now under exploitation is that of Kutesay-2, in the Chu region, which produced 80% of Soviet rare earths (about 750 tons per year after recovery losses), most of which were headed for the Soviet nuclear program between the 1960s and the Union's collapse. In 2009, Stans Energy Corporation, listed in Toronto, acquired a license to exploit this mine for twenty years. In 2011, it announced the purchase of the Heavy Rare Earth Element Processing Complex situated close by,[18] and an investment of US$5.5 million for buying the factory's railway terminal, situated about 21 miles from the mine, the aim being to boost exports to China.[19] Stans also intends to increase

its production to 2,000 tons per year; the mine is particularly interesting as it contains the five most profitable rare earth metals (neodymium, europium, terbium, dysprosium, and yttrium).

Kyrgyzstan suffers, however, from its image as an unstable country with a legal framework that is too uncertain for foreign investment and subject to the political hazards of the moment. This limits Bishkek's ability to attract the necessary funds. Thus, several Japanese companies have shown interest in the rare earths but are hesitating on further involvement. An agreement has been signed with Tokyo, according the terms of which the Geology Institute of the Academy of Sciences of Kyrgyzstan has committed to draw up a report on the available resources of rare earths for the Japanese.[20] The report is due to be delivered sometime in the second half of 2012. South Korea, which is heavily reliant on rare earths for its production of high technology, has also shown interest in the Kyrgyz sites and has launched a prospection program. [21] The visit by Posco holding's representatives to Kyrgyzstan in May 2012 confirmed South Korean interest.[22]

Mongolia

Mongolia has about 17% of the world reserves of rare earths, with approximately 60 deposits situated in six provinces (Altay, Umnugobi, North Mongolian Hentii, Hangay, Southeast Mongolian, and South Mongolian).[23] Four deposits are of particular importance, especially that of Mushgia Khudag in the province of Umnugobi, which reportedly has reserves comparable to those of Bayan-Obo in China's Inner Mongolia, or 200 million tons of rare earth oxide ore. Currently, most of the exploitation licenses for this mine are held by one of the biggest Mongolian private companies, Mongol Gazar LLC. It will nonetheless be several years before any real production of rare earths begins in Mongolia, since there is still no legal framework to regulate exploitation.

Mongolia hopes to point up its image as an alternative exporter to China and to attract the attention of Japan and Germany. In October 2011, Berlin signed an important agreement with Ulaanbaatar, perceived as a sign of Germany's will to challenge Chinese domination. The Australian company Black Ridge Mining also signed an agreement that vouchsafes it 80% of the interests in rare earth projects situated in the Tuv province in Central Mongolia. Situated near a railway linking up to the Trans-Siberian, they are assured the possibility of an easy and cheap export on the world market.[24]

Tajikistan

Despite its limited reserves, Tajikistan is trying to take advantage of the current conjuncture. Dushanbe would like to be seen as a contender and has indicated that the former Vostokredmet mining complex near Khudjand in the northern region could potentially participate in this world race for rare earths. Operational since 2011, the Kazakh-Tajik Private Equity Fund set up by the Kazakhstani Samruk-Kazyna Sovereign Welfare Fund intends to finance, among others, investments in Tajik rare earths. The Russian-based Converse Group also plans to start production of recycled vanadium at Vostokredmet. However, the global conditions for extracting minerals in Tajikistan seem too complex to be financially viable, at least for now, and the Tajik authorities have been slow in providing a secure legal framework for foreign investment in the mineral industry.

The environmental costs of rare earths

If the exploitation of rare earths appears as a new financial Eldorado for those countries that have them, it raises many environmental issues. Not least of all is the paradox that rare earths serve to produce green technologies, yet their extraction is harmful to the environment. Extraction requires the digging and moving vast amounts of the earth's crust; moreover, pollution comes during the three stages required for processing the various elements (processing of minerals, isolation of the group and separation of the elements of the group). Each ton of oxide from rare earths extract produces anywhere from 1,300 to 1,600 cubic meters of excavation waste, which contains radioactive substances, fluorides, sulfides, acids, and heavy metals. Moreover, the waste is generally dumped in natural or artificial reservoirs. In China, the rare earths industry has rendered nearby groundwater unfit for consumption or irrigation. The extraction of rare earths thus implies a public health risk and

requires strict security rules for the protection of miners and local populations.

These environmental issues seem especially important as the countries of Central Asia and Mongolia do not give environmental questions high priority and their extraction industry, dating from Soviet times, already pollutes a lot. Poor states such as Kyrgyzstan, massively in need of financial resources due to the depth of the social and economic crisis, risk developing these kinds of resources without taking necessary precautions. Lastly, the new world race for rare earths happens to reinforce logics of rent-seeking by established elites and does not push the countries to reorient their economies around other sectors that are more innovative than mineral extraction. Only Kazakhstan seems to be able to envision technology transfers enabling it to be not only a producer of raw materials but also a seller of more finished products.

Conclusion

The issues raised by the Chinese strategy of limiting rare earths exports are pushing the main consumer countries and industries to find alternative solutions, which could challenge the importance of these metals in coming decades. Some automobile builders (General Motors, Toyota, and Renault) are studying projects that would enable them to free themselves entirely of their dependency on rare earths, while Hitachi has already designed an electric motor that uses no rare earth metals, and Molycorp has begun to design turbines that use not dysprosium but other, less scarce rare earths.[25]

Despite the global thirst for rare earths, it is unlikely that there will be any rapid changes to affect China's quasi-monopolistic position. The chain of production is long and onerous; it necessitates prior geological studies, and the implementation of environmental rules. In 2012, only two new rare earth mines in the world are set to open: Mount Weld in Australia and Mountain Pass in the United States. Ten years may be necessary before other projects can commence production. China will thus continue to exert all its influence on the rare earths market, due both to its reserves and to the necessary delays involved in the exploitation of new sites. On the other hand, the proceedings opened against it in the framework of the WTO, even if they are decided in favor of the plaintiffs, will take years.

The necessity for those industrialized states most dependent upon rare earths to find new sources of supply opens up several new economic opportunities to Central Asian countries, opportunities that will nevertheless contain substantial risk concerning environmental situations and often dysfunctional logics of development. It is desirable that Kazakhstan, Kyrgyzstan, and Mongolia succeed in finding some balance between the urgency to gain access to a new financial manna, environmental preservation, and their requirements in technology transfers.

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