Centre d'étude des crises et conflits internationaux

The Chinese policy of lithium and REEs mines' purchase

Maria Pulina

Mai 2019
Note d'analyse no. 62

The Chinese policy of lithium and REEs mines' purchase

Maria Pulina

© 2019 Centre d'étude des crises et conflits internationaux

Le CECRI ne prend pas de position institutionnelle sur des questions de politiques publiques. Les opinions exprimées dans la présente publication n'engagent que les auteurs cités nommément.

Direction :
Tanguy Struye de Swielande

Centre d'étude des crises et conflits internationaux
Université catholique de Louvain
Place Montesquieu 1, bte L2.08.07
1348 Louvain-la-Neuve
Belgique
www.cecrilouvain.be

Photo de couverture : prise par Tanguy Struye, juin 2019

A propos de l'auteur.e

Maria Pulina is a master student of the Université Catholique de Louvain (Relations Internationales-Finalité diplomatie et résolution des conflits) and an intern at the CECRI.

Summary

Introduction

Nowadays, China is the world's second-largest economy with $14 trillion, while the US remains firmly in the first position with $20.4 trillion. However, according to the World Bank, China is expected to overcome US dominance really soon, and it is predicted to account for 35.2% of global growth in real GDP by the end of 2019[1].

Analyzing the Chinese economic sector, the Asian country has curiously a quasi-monopoly of two key mining and processing sectors: rare-earth elements (REEs) and lithium. The rise of Beijing in these areas, especially in the rare-earth elements field in which it has a dominant position in the entire supply chain, begins in the 1950s and it is intertwined with security and geopolitical issues. For example, in the light of the recent trade war between the Trump presidency in Washington and the Chinese government under Xi Jinping, US tech companies may be listed as one of the losers of this economic dispute. As a matter of fact, companies such as Apple rely on China both for its assembly factories and for the Chinese rare-earth materials market.[2]

Lithium and REE are employed in numerous key economic sectors, such as new technologies, green economy, weapons, and China is a key player in the global supply of these areas.

The present paper will assess the Chinese policy concerning the acquisition of lithium and REE mines and will try to answer the following research question: *what are the intentions of Beijing in the framework of purchasing lithium and REE mines outside the Chinese territory?*

To answer this question, the present dissertation analyzes the story behind the Chinese lithium and REEs economy, with a large focus on the latter, since REEs are more and more of strategic importance to Beijing. Firstly, the essay- in two distinct subparagraphs- gives a brief presentation of what lithium and rare earth elements are and in what fields are they employed. Secondly, the paper tackles the history of the development of the rare earth industry in China from 1957, when the first Rare Earth Concentrates from the Bautou mines were produced, until the present days. In the third section, this dissertation assesses Chinese progress in the purchase of lithium mines. These two sections are divided into different subsections, which analyze different arguments related to the Chinese policy regarding lithium and REEs. In the fourth and final section, the paper concludes with a summary of all the findings of the previous sections.

[1] Smith, R., 'The world's biggest economies in 2018', *World Economic Forum Official Website*, 18 April 2018, (https://www.weforum.org/agenda/2018/04/the-worlds-biggest-economies-in-2018/).
[2] Ivanova, I., 'Trade War with China could hurt the US business most', *CBS News*, 23 March 2018.

1. *What are they and what is their utility?*

1.1 Lithium

Lithium was originally discovered in 1817 by the Swedish chemist Johan August Arfwedson. It is the lightest metallic element, relatively difficult to find. According to Hao et al., lithium 'naturally appears in compound forms because of its high reactivity. Lithium is found with very low concentrations in natural brines and pegmatites. […] Lithium reserves are mainly distributed in South America, Australia, and China'[3]. Almost 60% of lithium reserves are to be found in South America, especially in Chile, Bolivia, and Argentina, while 4.4 million tonnes of lithium are present in North America between the US and Canada. In China there are 5.4 million tonnes of Lithium, corresponding to 17% of the total worldwide reserve. Moreover, Chile, Argentina, the US and China are the four main lithium carbonate producers, controlling 85% of the world supply. However, half of the Lithium carbonate global market is controlled by two companies: the Greenbushes mine in Australia owned by Talison Lithium (of which 51% is owned by the Chinese Chendu Tianqui) and the American Albemarle, based in Baton Rouge, Louisiana[4].

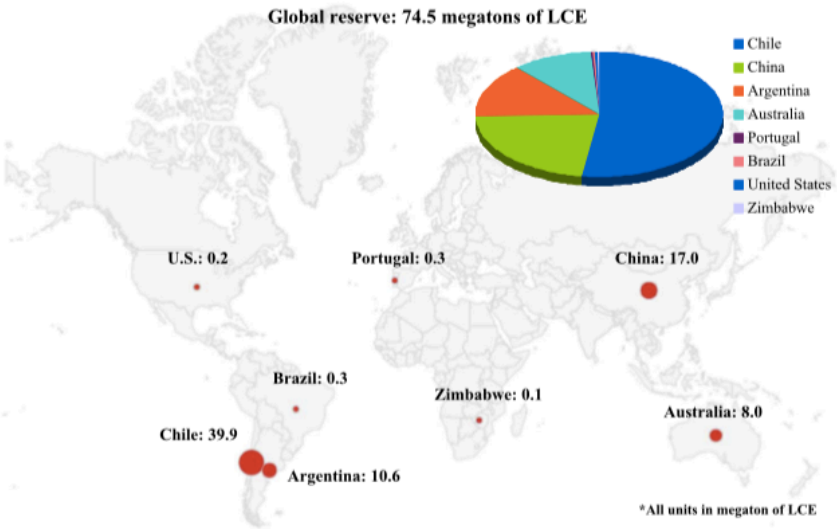


Fig. 1. Global distribution of lithium reserves.

Source: Hao, H. et al., 2017

In China, lithium can be found in two natural sources: pegmatites (course-grained igneous rocks formed by the crystallization of post-magmatic fluids), from which spodumene is one of the principal lithium pegmatites; continental brines are the second natural sources of lithium in China, and while they derived from the leaching of volcanic rocks, they also vary greatly in lithium content due to the extent to which they have been subject to solar

[3] Hao, H., et al., 'Material Flow Analysis of Lithium in China', *Resources Policy* 51, 2017, pp. 100-106.
[4] Siljković, B., Nebojša, D., Rakić, G., 'Environmental and Economic assessments of the effect of critical mineral of green revolution: Lithium', *Mining and Metallurgy Engineering Bor* 1-2, 2017, pp. 103-114.

evaporation[5]. Pegmatites reserves in China are owned by companies such as Sichuan Mineral Industry (480,000 Li in 2008), Sichuan Ni and Co. (between 80,000 and 225,000 tonnes Li), Sterling Group Ventures (134,000 tonnes), and Sichuan Dexin's mine at Jumehun (50,000 tonnes). As far as continental brines are concerned, an initial estimation of 3.3 million tonnes of lithium was quoted in the area of the Qaidam Basin in the Qinghai Province, where the Qinghai Salt Lake Potash Co. is operative. This same company in 2005 already had a reserve of 1.53 million tonnes Li at Zhabuye. Meanwhile, Sterling Group Ventures in 2008 had an estimated reserve of 170,000 tonnes Li at Dangxiongscuo Salt Lake[6]. In China, in addition to these national companies that source domestic deposits, lithium brines and minerals are obtained also from foreign imports, especially from Australia.

Lithium is mainly used in the following areas: in the ceramic glasses production to improve resistance to extreme temperature changes and to lower process melting points; to also lower the melting point of the cryolite bath in primary aluminum production; as a catalyst in the manufacture of synthetic rubber, plastics and pharmaceutical products; as a reduction agent in the synthesis of numerous organic compounds; in lubricants and greases used for working in extreme temperature and change conditions; in air conditioning and dehumidification systems; in the production of both primary and secondary batteries[7]. The importance of the latter economic field (i.e. the production of batteries, especially lithium-ion batteries) is growing year after year since 2001. Between 2001 and 2007 China registered a boom in the use and demand of lithium rechargeable batteries[8].

Moreover, lithium has become a key element in the production of electric vehicles. China has also become the world's largest consumer market for electric vehicles and, thus, for lithium due to the national stricter air quality control regulations[9]. In 2015, China consumption of lithium carbonate accounted for 50% of the global total[10]. The Chinese government supports the electric cars market, especially in big metropolitan areas, and consequently a rise in lithium price was witnessed (from 43.000 yuan/t at the beginning of 2015 to 129,000 yuan/t in late 2015)[11]. Lithium-ion batteries production in Asian countries such as China, South Korea, and Japan is the outcome of long-lasting public and private investments in the sector. As a matter of fact, the biggest share of lithium-ion batteries cell

[5] Evans, R. K., 'An abundance of lithium', *Santiago: World Lithium*, 2008.
[6] *Ibidem.*
[7] Ebensperger, A., Maxwell, P., Moscoso, C., 'The Lithium Industry: its recent evolution and future prospects', *Resource Policy* 30.3, 2005, pp. 218-231.
[8] *Ibidem.*
[9] Hao, H et al., *op. cit.*
[10] *Ibidem.*
[11] *Ibidem*; Martin, G., et al., 'Lithium market research-global supply, future demand and price development', *Energy Storage materials* 6, 2017, pp. 171-179.

manufacturing is located in those countries, and it is owned by industries with large experience in the field[12].

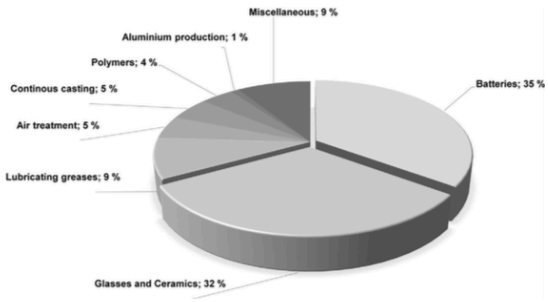


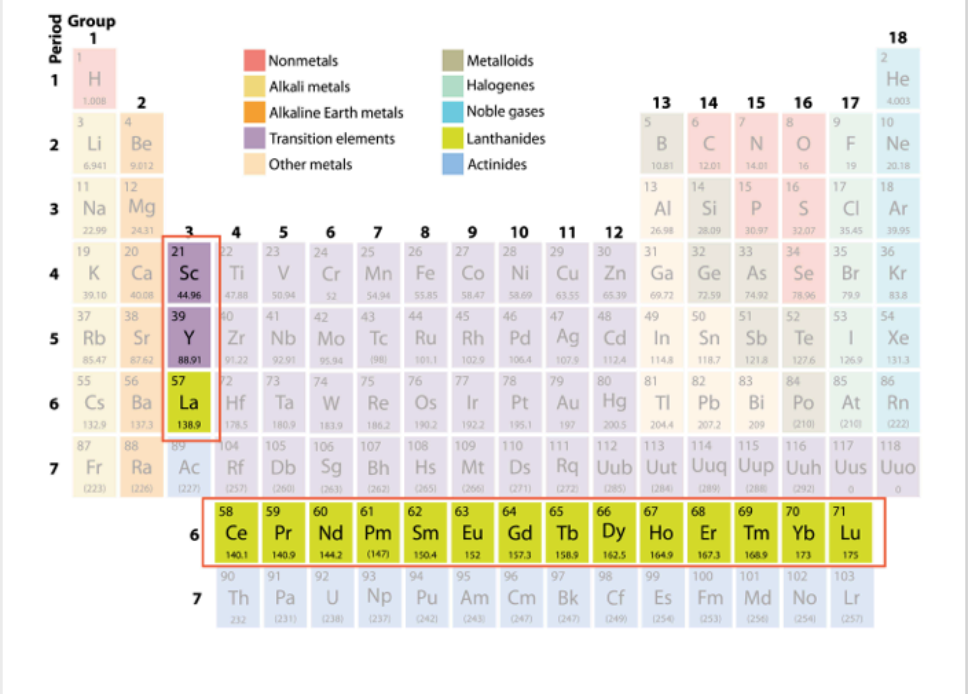
Fig. 3. Application areas of lithium (2015) [5].

Source: B.W.Jaskula, Mineral Commodity Summaries, Lithium, 2016

1.2 Rare-Earth Elements

Rare earth elements are a group of 17 elements, 15 within the chemical group called lanthanides (in the periodic table with atomic numbers 57-71), plus yttrium (atomic number 39) and scandium (atomic number 21). They were discovered in Sweden in the late 1700s, but their use in the commercial sector emerged in the last 60 years. These elements are usually divided into two categories: light REEs (lanthanum, cerium, praseodymium, neodymium, and samarium-atomic numbers 57-62) and heavy REES (atomic numbers 64-71 plus yttrium, atomic number 39). Light REEs are more abundant than heavy ones. However, notwithstanding their scarce presence, heavy REEs have more applications in commercial businesses. Furthermore, while light REEs can be processed in numerous countries around the globe, only China has facilities and staff qualified enough to handle heavy REEs. Notwithstanding the name, REEs are not actually that rare to find. They are rather abundant in the earth's crust, and they are as easy to find as silver, and some of them are even easier to find than copper, gold, platinum, and lead. The problem comes in the isolating process of the elements from the ores in which they are found: this procedure is highly technical, particularly difficult and environmentally harmful. The most abundant rare earth elements are found primarily in bastnaesite and monazite. Bastnaesite typically contains light REEs and a little quantity of the heavy ones, while monazite also contains mostly the light, but the portion of the heavy REEs is two to three times larger than the one in bastnaesite[13].

[12] Chung, D., Elgqvist, E., Santhanagopalan, S., 'Automotive lithium-ion cell manufacturing: Regional cost structures and supply chain considerations', *National Renewable Energy Lab Report*, Golden, CO(US), 2016
[13] Seaman, J., *Rare earths and clean energy: analyzing China's upper hand*, Institut Francais des Relations Internationales, Paris & Brussels, 2010, pp. 40; Hurst, C., *China's rare earth elements industry: What can the west learn?*, Institute for the Analysis of Global Security, Washington DC, 2010; Humphries, M., *Rare earth elements: the global supply chain*, Diane Publishing, 2013.



Source: rareelementsources.com

Natural Rare Earth Elements' deposits can be found in China (37% of the global total), but also in states such as the US, countries of the Former Soviet Republic (now part of the Commonwealth of Independent States, known also as CIS), Australia, India and Brazil. However, the production of REES- i.e. mining, separating processes and refinement- is mainly done in China.

REEs are essential components of numerous technological goods such as hybrid and electric vehicles, mobile telephones, magnets, computers, televisions and energy-efficient lights, but are also of use for catalyst refineries and autocatalytic converters, batteries, glass and glass polishing, permanent magnets for the metallurgic sector, ceramics, phosphors, refrigerators, freezers, and a range of air conditioners. REEs are firstly employed in permanent magnets due to their natural ability to provide a greater magnetic power even at small quantities. Permanent magnets produce their own magnetic fields and provide the ability to make high tech products such as computers or phones smaller. The permanent magnets field is where rare earth elements have key importance, and they are used both in civil and military applications. They are employed in the clean energy field, for example in the automotive and the wind power productions. They are also of big importance in the tech industry for goods such as computers, data storage, iPods and iPhones, plasma and LCD screens. Recently, REEs have become also critical components in defense equipment[14].

As a matter of fact, China has effectively control over the entire global supply chain in REEs, which extends from mining to the production of intermediate products. The Chinese

[14] Seaman, J., *op. cit.*; Mancheri, N., Sundaresan, L., Chandrashekar, S., *Dominating the World. China and the Rare Earth Industry*, National Institute of Advanced Studies 10, 2013, pp. 1-74; Hurst, C., *op. cit.*

government also pushes REEs companies to produce and exports more technologically advanced and finished products. The Ministry of Land and Resource and the Ministry of Environmental Protection regulate and monitor all mining and ore processes, while also controlling companies involved in this field[15]. Additionally, as stated by Koch-Weser, 'although China's domestic ores tend to be inferior and costlier than imported ores, they act as a crucial buffer when prices rise. At present, China is depleting its domestic reserves more rapidly than most mining countries, as illustrated by its share of global production and reserves'[16].

2. History and development of REEs industry in China

2.1 Domestic development of the REEs industry (1957-1992)

As stated in the introduction of the present paper, in 1957 the first mines in the Bautou region became operative, even though iron deposits with REEs have already been discovered in 1927. In the meantime -and until the 1980s- the United States was the global leader in rare earth research and innovation[17]. In China, the one man that made the REEs industry the giant that is today is Xu Guangxian, who is also considered the father of Chinese rare earths chemistry. Xu, after the Korean War broke out, returned to China from the US (where he obtained a chemistry PhD), and was hired as an associate professor at Peking University. After being a victim of the Cultural Revolution and being interned in a labor camp from 1969 until 1972, he returned to work, focusing on the extraction of nuclear materials into RE materials. It was in this period that he became the spokesperson for the Chinese REEs industry and a very vocal personality proposing the Chinese government to build a strategic reserve of REEs[18]. Between the 1960s and the 1980s, Beijing developed a searching program for all key minerals, which of course included also REEs[19]. At the end of the 1980s, China had extensive knowledge of the location and reserves of RE materials in its territory and, under the supervision of the Minister of Land Resources and Planning, expanded its mining operations.

When Deng Xiaoping raised to power in the second half of the 1970s, the Chinese government began to show more interest in the rare earth industry. The extended researches that were operating in that time, and the subsequent mining and exporting activities, played an important role in developing the Chinese national strategy regarding REEs. Under Deng ruling, the Chinese government approved in 1986 the National High Technology Research and Development Program, known also as Program 863. The goals of this program were:

[15] Mancheri, N., et al, *op cit.*
[16] Koch-Weser, I., *Chinese Mining in Latin America: a Review of Recent Findings*, Inter-American Dialogue, 2014.
[17] Seaman, J., *op. cit.*
[18] Hurst, C., *op.cit.*
[19] Mancheri, N., et al, *op. cit.*

'[to] gain a foothold in the world arena; to strive to achieve breakthroughs in key technical fields that concern the national economic lifeline and national security; and to achieve 'leapfrog' development in key high-tech fields in which China enjoys relative advantages or should take strategic positions in order to provide high-tech support to fulfill strategic objectives in the implementation of the third step of China's modernization process'[20].

Under program 863, REEs were used in both military and civilian projects and a total of three REEs research institutes started running. As Chinese productions increased and Beijing began to be a real competitor to US dominance, Deng Xiaoping acknowledges the importance of REEs to China's national strategy. In 1992 he recognized the key role of REEs in a sentence that is well known in the academic community: 'there is oil in the Middle East; there is rare earth in China.' Moreover, China's biggest REEs mines also produce iron rocks, thus providing another revenue stream to help cover the mine's fixed costs. With the engagement of the government under Deng Xiaoping, China made an official commitment to REEs research, producing tens of thousands of registered scientific and technical researchers[21]. With a combination of government support, cheap labor, and low environmental standards, China could produce REES at a lower cost than other economic rivals.

2.2 Abroad purchases of REEs mines and firms

Thanks to this mixture, China progressively surpassed the US as the world's leader in REEs production and commerce[22]. As a matter of fact, environmental regulations had a major impact on the American REEs industry, since the Mountain Pass Mine was closed both for the Chinese competition and for environmental regulatory restrictions[23]. Throughout the 1990s, Beijing's exports REEs grew, causing prices worldwide to massively drop. This weakened the Molycorp company (owner of the American Mountain Pass Mine) and other producers and ultimately made them fail or reduce their production[24]. Chinese competition did not only cost trouble for the US production, but also to Russia, which saw a decline in production from 26 kt of loparite concentrate to around 9 kt in almost ten years[25].

In 1995, two Chinese companies, the Beijing San Huan New Materials High-Tech Inc. and the China National Non-Ferrous Metals Import & Export Corporation, mixed with the American investment firms Sextant Group Inc. in order to purchase Magnequench, a permanent

[20] Ministry of Science & Technology of the PRC, *National High-tech R&D Program (863 Program)*, http://www.most.gov.cn/eng/programmes1/

[21] Gholz, E., 'Rare earth elements and national security', *Council on Foreign Relations- energy report*, 2014.
[22] Seaman, J., *op. cit.*
[23] Zhang, K., Kleit, A. N., Nieto, A., 'An economic strategy for criticality-application to rare earth element Yttrium in new lighting technology and its sustainable availability', *Renewable and Sustainable Energy Reviews* 77, 2017, pp. 899-915.
[24] Hurts, C., *op cit*.
[25] Chakhmouradian, A. K., Wall, F., 'Rare earth elements: minerals, mines, magnets (and more)', *Elements* 8.5, 2012, pp. 333-340.

Magnets factory owned by the General Motors Company. The acquisition was validated by the US government, as long as China agreed to keep the Magnequench factory in the US for at least five years. As this five-years-long period expired in 2002, all assets of Magnequench were moved to China. Two years later, Beijing expanded the Magnequench operations to Singapore and to Thailand in 2006. Moreover, under the Magnequench umbrella, China purchased in 2005 the Canadian REEs company AMR Technologies Inc[26].

In 2005, a Chinese consortium named China National Offshore Oil Corp (CNOOC) made a bid of $18.5 billion to acquire the US Oil company UNOCAL, owner of the Mountain Pass Mine, which is the largest US producer of REEs. CNOOC is one of the three large state-owned Chinese oil companies and it is under the control for 70% of its share of the State-Owned Assets Supervision and Administration Commission of the State Council (SASAC), a special commission of the Chinese government. SASAC is then, on its side, under the State Council. In the end, the US Congress blocked the Chinese acquisition, due to a diffused concern for the US national energy security in the hands of a Chinese group, and the Mountain Pass facilities were purchased by the Chevron Corporation. Later, CNOOC tried twice to acquire Mountain Pass from the American Chevron but failed[27]. According to Cindy Hurst, if the initial Chinese offer were accepted, Beijing would have gained a total monopoly over the world's major REEs resources. However, the Chinese government did not stop its strategic REEs acquisition after this setback.

In 2008 and 2009, China tried to buy a majority stake of two Australian REEs mining companies: Lynas and Arafura Resources (which also operate in another project in Nolan's Bore). The approval process took longer than expected since the Australian government weighted carefully the pros and cons of the deal and its consequences in the global supply chain. In the end, and after some serious difficulties, China holds a minority stake in both companies[28]. Moreover, in 2008 Chinese miners were operatives in more than 60 countries, extracting both ferrous and non-ferrous metals, including REEs. According to Iacob Koch-Weser, 'modes of entry have become more complex, spanning geological prospecting in poor countries and takeovers of large foreign mining companies [such as] in Australia'[29]. As in 2009, China produced a total amount of 120,000 tons of rare earth oxides, equal to 97% of world production.

[26] Mancheri, N., et al., *op cit.;* Hurts, C., *op.cit.*
[27] Seaman, J., *op. cit.*; Mancheri, N., et al., *op. cit*.
[28] Mancheri, N., et al., *op cit.;* Hurts, C., *op.cit.*
[29] Koch-Weser, I., *op. cit.*

2.3 China's REEs quasi-monopoly: implications in both domestic and international markets

This quasi-monopoly then decreased to 86% in 2012[30]; however, in general, and in the last years, the Chinese near-monopoly has not been challenged by the other economic competitors, and it is currently around 90%. Since 2005 the Chinese government has been promoting a deep and long-lasting transformation of the national REEs industry through plans and policies such as the 'Rare Earth Industry Development Plan (2009-2015)' and the 'Several Opinions of the State Council on Promoting the Sustained and Healthy Development of the Rare Earth Industry' in 2011[31]. At the present days, only Chinese businesses have the possibility to manufacture and sell REEs in commercial quantities to the rest of the world and on the national Chinese market.

In 2009 China was the world's leader investor in green economy technologies (especially in wind turbines), and by 2020 it is expected to increase its capacity up to 100 Gw (from the 12 Gw produced in 2008). Beijing is also trying to be the global leader in electric vehicles. The general and long-run goal for the Chinese government is to consolidate its national industry by forming three zones of production (in the Northern, in the Southern, and in the Western part of China) and to reduce the numbers of companies on the territory in order to create more jobs and boost the economic growth in the nation[32].

In order to achieve this result, in 2014 the Chinese government allowed six big state-run groups, mostly through legislation and financing, to take control over every REEs mine and processing company. These companies, who are even licensed to take over small and illegal mining activities, are: China Minmetals, Chinalco, Baotou Steel (China's single largest producer), Xiamen Tungsten, Ganzhou Rare Earths, and Guangdong Guan-sheng Rare Earths[33]. This vertical merge of the national REEs production chain in big REEs companies is made with the sole purpose of mostly export high-value finished products rather than the raw elements themselves[34]. However, China is struggling to promote big industries merging while trying to close down smaller, illegal mines that make its internal market scattered and at a loss. These little private and illegal companies in 2014 accounted for around two-thirds of all overseas mining projects: while Chinese big state-owned industries were attracted to the free trade agreement that the Chinese government made with countries such as Peru or Chile, the small illegal miners preferred to work in neighboring countries or in states with less competition, such as in the Democratic Republic of Congo [35]. On the other side, Beijing is slowly building its national stockpile of REEs and other key elements that could serve an

[30] Wübbeke, J., 'Rare earth elements in China: policies and narratives of reinventing an industry', *Resource Policy* 38.3, 2013, pp. 384-394.
[31] *Ibidem.*
[32] Seaman, J., *op. cit.*
[33] Mancheri, N. A., 'World trade in rare earths, Chinese export restrictions, and implications', *Resources Policy 46*, 2015, pp. 262-271.
[34] Zhang, K., et al., *op. cit.*
[35] Koch-Weser, I., *op. cit.*

increasing demand for high tech and green economy products for several years[36]. China is, therefore, trying not to deplete its reserves quickly. This may have a dramatic impact on the market for REEs.

2.4 Is China strategically using REEs?

Notwithstanding its important achievements in the world's market of rare earth elements, from around 2006 up until 2015 the Chinese government has managed to decrease its exports on REEs for different reasons. One first explanation given by the Chinese government is the environmental impact and harm of separating REEs. As stated in the previous section on REEs (*cf. section 1.2*), the isolating/separation process of the elements from ores is highly technical, particularly difficult and environmentally harmful. Even the mining process causes serious environmental harm, as wastewater contain polluting elements such as acids, alkali, and radioactive materials; but also air emissions are contaminated with fluorine and sulfur[37]. According to Su Bo, MIIT vice-minister (cited by Jost Wübbeke), 'the foreign REES companies shut down all mines that caused environmental pollution; by contrast, China has supplied 90 percent of global demand at the expense of severe pollution to our environment'[38].

The Ministry of Environmental Protection develops and implements plans, laws, and regulations for environmental safety, and it is in charge of the whole organization, control and management process of important environmental issues in the Chinese territory[39]. Additionally, the REEs explorations over the years have contributed to increasing the environmental problem in China. Having said that, between 2011 and 2012 the Minister of Land Resources (MLR) issued various measures to clean up and limit through a threshold the explorations and mining rights within the national borders. As a result, the number of REEs explorations and mining rights decreased[40]. Additionally, in China, there are two kinds of quotas to fight the environmental hazard of the REEs business: one set concerning the mining side (which are the more prominent ones and controlled by the MLR) and the other for the separation and smelting processes.[41] The Chinese government intends to reduce environmental damage by also promoting the use of new, less polluting technologies in large mining and manufacturing companies. However, the high global supply pressure could lead to the opening of new mines with unacceptable environmental standards by small illegal miners outside the national territory.[42]

---

[36] Humphries, M., *op. cit.*
[37] Zhang, K., et al., *op. cit.*
[38] REI, 'Technology guide for the export of NdFeB magnet material and triphosphor phosphor powder', *passes the Ministry of Commerce's review. Rare Earth Information* 289, 2008, pp. 17–18 in Wübbeke, J., *op. cit.*
[39] Mancheri, N., et al., *op. cit.*
[40] Han, A., Jianping, G., and Yaling, L., 'Vertical vs horizontal integration: game analysis for the rare earth industrial integration in China', *Resource Policy* 50, 2016, pp. 149-159.
[41] Mancheri, N., et al., *op. cit.*
[42] Gobbo, L., *Le terre rare : effetti economici del monopolio cinese e ricerca di alternative*, Thesis from the University of Padua, 2011.

A second reason for the decrease in Chinese REEs exports was, according to economic competitors such as the US, Japan and the EU, a strategy to both boost its domestic economic growth and to use it as a weapon against its opponents. This was especially feared in the US and in all those countries that have experienced price volatility in the REEs market[43]. On the Chinese side, this move was perceived as a way to preserve its national REEs reserves. Due to these quotas, the downstream production of finished high-tech products around the world suffered, given also the strong dependency of foreign companies on the Chinese exports[44]. To give a concrete example of the strong dependency on the Chinese REEs industry, the American company Molycorp ships all the rare earth elements extracted in the US to plants based in China. The US is therefore completely dependent on China for the production of REEs materials and high-tech products manufacturing[45]. Additionally, the imposition of REEs exports quotas was believed to encourage foreign producers of REEs high-tech goods to move to China, bringing with them expert knowledge that could give Chinese enterprises an advantage over their economic competitors[46].

Nonetheless, in 2012 those countries that exposed the Chinese quotas strategy in the first place (such as the US) moved to bring a dispute resolution case against Beijing to the World Trade Organization (WTO). According to the Chinese point of view (as previously discussed), those quotas were imposed mainly to reduce the environmental harm of mining and separating rare earth elements from the ores. According to the evidence brought to the dispute resolution, China used its market power to prioritize national REEs firms and suppliers' benefits and used its dominance in the sector to arm-wrestle with neighboring countries over territorial disputes[47].

The most obvious example is definitively the 2010 Chinese REEs embargo against Japan in the light of renewed diplomatic tensions over the Diaoyu/Senkaku Islands. Even though China denied such claims during the WTO dispute settlement, this incident indicated to numerous academics and policymakers the Chinese strategic use of REEs in order to achieve political concessions. As a result of this episode and the subsequent Chinese REEs export restrictions, the average export price sharply increased to $70 per kg in 2011[48]. When the WTO trial started, the Chinese government adjusted its strategy in order to benefit also both US and global REEs companies. In the end, in 2014 the WTO ruled in favor of the US, and China both removed its export restriction and dropped the price of rare earths significantly the year after, fearing significant consequences[49].

[43] Müller, M. A., Schweizer, D., Seiler, V., *op. cit.*
[44] Wübbeke, J., *op. cit.*; Gobbo, L., *op. cit.*
[45] Mancheri, N., et al., *op. cit.*
[46] Seaman, J., *op. cit.*
[47] Müller, M. A., Schweizer, D., Seiler, V., *op. cit.*
[48] Wübbeke, J., *op. cit.*; Mancheri, N. A., *op. cit.*; Buerk, R., 'Japan and China in rare earth dispute', *BBC news (video), 2010 (https://www.bbc.com/news/av/business-11727224/japan-and-china-in-rare-earth-dispute).*
[49] Mancheri, N.A., *op. cit.;* Müller, M. A., Schweizer, D., Seiler, V., *op. cit*

As a result of the price drop, Molycorp Inc. (owner of the Mountain Pass mine) filed for bankruptcy in 2015. In June 2017, Molycorp operations were purchased by MP Mine Operations LLC, an American company put together by Chicago hedge fund JHL Capital Group and New York's QVT Financial LP, and of which the Chinese group Shenghe Resources Holding Co. (allegedly tied to the Chinese government) is a minority shareholder[50].

2.5 Academic views on the Chinese REEs dominion

Overall, scholars generally agree on the fact that, over the last two to three decades, the Chinese government has pursued a rigorous strategy so that it could have under its control the world 'most integrated supply chain for permanent magnets and other products'[51], meaning that REE extracted outside of the Chinese territory would have needed to be exported to China to enter the value chains, especially in the fields of Green economy and High Technology. For Mancheri et al., this design- orchestrated in every decision-making step by the Communist Party of China (CPC)- allows China to force its strength in REEs production as a component of its national grand strategy, making more advanced countries (such as the US) both dependent on Chinese exports and extremely vulnerable[52].

According to John Seaman, China's dominant position in the REEs industry reflects a broader economic agenda that could harm the competitiveness of numerous other foreign companies, especially in fields such as green energy and in strategic defense armaments[53]. Moreover, as Humphries stated, Beijing's purpose is to both build-out and help its national industries and invite foreign investors to join by locating their facilities in the Chinese territory in exchange for access to REEs and other raw materials, as well as access to the developing Chinese market[54]. For scholars such as Mancheri, Sundaresan, and Chandrashekar, China has cleverly used the dynamics of the transition of the REEs industry to build a dominant presence with global strategic aims in most steps of the REEs production chain[55].

The process of mining, separating and smelting waste from the separation activities is in the sole hand of Chinese groups and Sino-foreign ventures. These joint ventures, many of which were already active before 2010, are believed to be used by the Chinese government as a way to convince foreign firms to create downstream production systems (from application to research and development)[56]. The creation of these joint ventures is mainly based on a technology transfer agreement between Beijing and the foreign country. To give a concrete

[50] Brickley, P., 'Mountain Pass Mine Approved for Sale to JHL, QVT, Shenghe', *The Wall Street Journal,* 23 June 2017; Church, S., 'America's Only Rare Earth Mine Is Stuck in a Distressed Debt Dispute', *Bloomberg*, 22 June 2017.
[51] Stegen, K. S., 'Heavy rare earths, permanent magnets, and renewable energies: an imminent crisis', *Energy Policy* 79, 2015, pp. 1-8.
[52] Mancheri, N., et al., *op. cit.*
[53] Seaman, J., *op. cit.*
[54] Humphries, M., *op. cit.*
[55] Mancheri, N., et al., *op. cit.*
[56] Müller, M. A., Schweizer, D., Seiler, V., 'Wealth effects of rare earth prices and China's rare earth elements policy', *Journal of Business Ethics* 138.4, 2016, pp. 627-648.

example of this, it can be mentioned the episode of the blocked agreement between China and the Japanese TDK and Hitachi Metal because the latter refused to share important technologies[57]. In addition to this, China agreed to provide foreign aid, infrastructures and preferential loans to those countries that gave Chinese firms access to their national mineral assets[58]. Furthermore, Japanese magnet producers have always been the target of the Chinese strategy, as Japanese firms own patents for the most advanced magnets used in fields such as electric vehicles. By attracting Japanese companies in China as joint ventures, export quotas may help China surpass Japan in this sector[59].

Moreover, the business of purchasing mines overseas- which begun with the 'Going-Out' strategy of the Chinese 10th Five-year Plan- has become a very profitable one for the Chinese government, since Chinese firms can provide extremely expert staff at all levels of production, from the mining process to the manufacturing of finished REEs products. As stated by Seaman, 'for smaller economies such as South Africa, Canada or even Australia, joint ventures with Chinese companies to develop mines represent less risk than a host of other options because of China's ability to guarantee a market for [REEs]'[60].

Some academics think that the motives behind the purchase of overseas REEs mines lie in security reasons, while others see the Chinese move as a mean to expand its diplomatic influence, specifically in less developed countries such as the African ones. Many of them have called on the 'mercantilist' tactics of the Chinese élite on the ideology that China has to fend for its national interests in the mining business[61]. Furthermore, in several countries in Central Asia and in Africa there have been frequent violent episodes between the Chinese miners and the local inhabitants. As far as the mercantilist concept is concerned, as suggested by professor Tanguy Struye, numerous contracts made by Chinese firms in those countries were complemented 'by the requirement that at least 70% of their tasks were performed by their own employees, usually prisoners or recruits'.[62] Behind these tactics, there is also the Chinese concept of *baoweizhan* (defense war), in which the Chinese state has the duty to defend its natural resources against any possible threats from the West. In this sense, control over natural resources is a decisive factor for succeeding in a possible power struggle in the anarchic international arena[63].

For Koch-Webster, the goal of Chinese miners is to recompense the global power asymmetries by developing a worldwide strategy in China's favor. The rationale behind this

[57] Wübbeke, J., *op. cit.*
[58] Koch-Weser, I., *op. cit.*
[59] Medeiros, C. A., Trebat, N. M., 'Transforming natural resources into industrial advantage: the case of China's rare earths industry', *Brazilian Journal of Political Economy* 37.3, 2017, pp. 504-526.
[60] Seaman, J., *op. cit.*
[61] Koch-Weser, I., *op. cit.*
[62] Struye, T., 'La Chine et le «Soft power»: une manière de défendre l'intérêt national de manière «douce»?', *Note d'analyse pour la Chaire InBev Baillet – Latour Programme «Union Européenne – Chine»,* 2009*,* in Duarte, P., *Pax Sinica : all roads lead to China*, Chiado Books, Portugal, June 2017.
[63] Wübbeke, J., *op. cit.*

mining activities is based on three factors: efficiency, demand, and global supply potential[64]. For the demand and efficiency side- he continues- everything revolves around Beijing ability focus on 'excess capacity in the short run, rebalance the economy in the medium run, and deal with structural constraints on metal intensity in the long run'[65]. As for the supply side, the Chinese government intends to diversify its mineral supply and to grab a monopoly situation on other minerals and elements (such as the REEs), or to use its influence as the world leader of the sector over foreign firms. The Chinese government thus wants to focus on metals that fulfill criteria such as: market control; high likelihood that the metal has continuous high global demand; robust price trends; high value-to-weight ratio; low domestic reserve and high import reliance; potential for economic and geostrategic leverage[66]. However, for China the mining activities are not a major exporting sector, as minerals and processed metals only account for 9 percent of the total exports, compared to 44 percent for finished high-tech products[67].

3. Chinese progresses in the purchase of lithium mines

3.1 The importance of lithium for the Chinese industries

Talking about lithium, in the early 2000s, after the examination of a large brine deposit in Qaidam Basin in China and after the very important discoveries made on the Tibet Plateau, Beijing achieved a technical revolution in processing brines, thus gaining a third lithium source after domestic pegmatite and imported spodumene concentrates[68].

Unsaturated markets for tech devices both in India and China are increasing the global demand for lithium-based products. Up until 1995, the lithium supply was growing slowly but steadily. Between 1995 and 2008 the global production of lithium rose from approximately 40.000 tonnes to almost 140.000 tonnes and it resulted in a sharp fall in trade prices. In the period 2002-2007, the boom of the Chinese economy resulted in a higher demand for lithium and, consequently, in a higher trade price. When the economic crisis hit first the US and later other countries around the world, lithium demand and supply dropped significantly, while prices reached their lowest point. However, for the subsequent five years, the production increased once more by 70%, while the prices rose again up to 6.900 dollars per ton[69].

According to Goldman Sachs, lithium is predicted to become the new gasoline or white oil, since it will become the main resource for electric vehicles in China and in the global market. According to its estimates, Goldman Sachs predicted that lithium use for electric cars will rise to more than 300.000 tonnes by 2025. This for scholars such as Siljković, Nebojša, and

[64] Koch-Weser, I., *op. cit.*
[65] *Ibidem.*
[66] *Ibidem.*
[67] Wübbeke, J., *op. cit.*
[68] Evans, R. K., *op cit.*
[69] Martin, G. et al., *op cit.*

Rakić can be confirmed by the growing prices of lithium per ton, which in China alone grew from $7.000 in 2015 to over $20.000 in March 2016[70].

Moreover, China has the world's second largest reserve of lithium and it has become the leader in the global production of lithium-ion batteries. China's industries have a long-standing tradition of lithium battery production and they also have a strategic position due to the Chinese massive lithium reserves. Moreover, as previously said, lithium-ion batteries production in Asian countries like China is also the result of public and private investments. These major industries have thus a significant advantage when competing in the electric and hybrid vehicles market[71]. Furthermore, Chinese companies may gain an additional advantage, since in China there are domestic content demands and export restraints that may help to lower material costs down[72].

However, the lithium industry in China has always been a very critical issue. Not only it gained importance for its quantity present under the Chinese control, but also finding its sources plays a key role. Dependence on lithium imports (mainly coming from Australia, Chile and Argentina) may jeopardize Beijing's resource security. To give an empirical example of the Chinese dependence from lithium imports, just in 2015 lithium imports reached 86% of the total lithium supplied to Beijing, and it is not predicted to stop, given the continuous rise of domestic demands of both raw material and finished products. Also, the imported lithium ores and brines increased greatly from 2007 to 2015, because of the increase of industrial needs for lithium, and because lithium ores and brine mining in China was still not completely developed[73].

Therefore, for Hao et al., China should really consider establishing lithium reserve, for both strategic economic and environmental reasons[74]. One of the reasons why China has decided to develop the salt lakes (which produce the soluble salt Lithium Chloride) in its territory was to eliminate dependence on Lithium imports[75].

3.2 Going abroad: Chinese purchases of foreign lithium companies and mines

Out of the difficulties linked to the lithium mines explorations in China and to the national import dependence, many Chinese lithium companies began exploring lithium resources overseas in Australia, Latin America, South Central Asia, and Africa.

Companies such as Tianqi Lithium Corp are leaders in the sector. This firm, which is listed on the Shenzhen Stock Exchange, is a primary supplier of lithium products for the worldwide

[70] Siljković, B., Nebojša, D., Rakić, G., *op. cit.*
[71] Chung, D., Elgqvist, E., Santhanagopalan, S., *op. cit*.
[72] *Ibidem.*
[73] Lu, B., Liu, J., Yang, J., 'Substance flow analysis of lithium for sustainable management in mainland China: 2007–2014', *Resources, Conservation and Recycling*, 119, 2017, pp. 109-116.
[74] Hao, H., et al., *op.cit*.
[75] Tahil, W., 'The trouble with lithium, Implications of Future PHEV Production for Lithium Demand', *Martainville: Meridian International Research*, 2007.

demand. The Australian Talison Lithium is, as a matter of fact, controlled by Tianqi, and it makes this Chinese company the possessor of mines and of the world's largest spodumene reserves (Greenbushes lithium mine) in Western Australia[76]. In 2016, China built a $400m lithium plant in Greenbushes, expanding the mine in order to have more than double the amount of the chemical-grade lithium concentrate it produces[77]. In May 2018, Tianqi Lithium also bought a minority stake (24%) of the Chilean Sociedad Química y Minera (SQM) from Canada's Nutrien (TSX:NTR), therefore increasing the China's hold over the market for lithium in Latin America.[78]

A second big Chinese Company worth mentioning in this area is Ganfeng Lithium Co. Ltd. (GFL), established in 2000 and listed on the Shenzhen Stock Exchange since 2010. To solve the problem of domestic lithium scarcity, in January 2017, the Ganfeng Lithium announced a $174 million strategic investment in Lithium Americas (TSE:LAC) in exchange for 19.9% of the outstanding common shares of Lithium Americas pro-forma[79]. Ganfeng also owns 13% of and it is the joint venture partner of International Lithium (CVE:ILC), a Canadian mining company that owns lithium sites in Argentina, Canada and Ireland. At the moment, the two companies are jointly working on developing the Mariana Lithium Brine project in Argentina and the Avalonia Lithium Pegmatite project in Ireland[80]. As of 2017, its wholly owned subsidiary GFL International owned a 43.1 percent stake in Australian mining company RIM[81].

On its side, the Chinese company Huayou Cobalt Co, based in the Zhejiang Province, has recently purchased a 9.49 percent stake in the Australian AVZ Mineral Ltd for $ 10.22 million. The Australian company is engaged in mineral explorations in Africa and has interests in exploration projects prospective in the Democratic Republic of Congo, including a 60% interest in the Manono Project , a lithium-rich pegmatite deposit, and a 100% interest

[76] Lithium Today, *Lithium Supply in China*, (http://lithium.today/lithium-supply-china/); Tianqi lithium official website, *Talison Lithium*, (http://www.tianqilithium.com/en/resinfo.aspx?ContentID=6&t=56)
[77] Ingram, T., 'China to build $400m lithium plant in WA, expand major mine', *Financial Review*, 7 September 2016.
[78] Jamasmie, C., 'China's Tianqi Lithium buys minority stake in SQM for $4.1bn', *mining.com*, 17 May 2018, (http://www.mining.com/chinas-tianqi-lithium-buys-minority-stake-sqm-4-07bn/); Rathi, A., 'One Chinese company now controls most of the metal needed to make the world's advanced batteries', *Quartz,* 30 May 2018; Ng, E., 'China goes all out to secure lithium, cobalt supplies – key to dominating the world electric car market', *South China Morning Post*, 4 June 2018.
[79] Market wired, *Lithium Americas Announces US$174 Million Strategic Investment by Ganfeng Lithium*, 17 January 2017, (http://www.marketwired.com/press-release/lithium-americas-announces-us174-million-strategic-investment-by-ganfeng-lithium-tsx-lac-2188754.htm); Lithium Today, *op. cit.*
[80] International Lithium corp. official website, *Ganfeng Lithium*, (https://www.internationallithium.com/ganfeng-lithium/).
[81] Ganfeng Lithium official website, *Lithium Compound Manufacturers in China-About Gangfeng*, (http://www.ganfenglithium.com/about_en.html).

in the surrounding Manono Extension Project (lithium, tin, tantalum) and in the Katanga Regional Project (lithium, base metals and rare earths)[82].

Finally, China has successfully placed itself at the top of the value-added production chains and can compete with high-level hi-tech products, thus becoming an inspirational model for numerous lithium-rich countries. As Farnsworth stated, even countries such as the Latin American ones may draw on the Chinese experience. He affirmed that 'for example, Bolivia […] should refuse to give Beijing access to its massive deposits of lithium unless the Chinese first agree to joint research and development of the technology needed to build the car batteries for which the lithium is intended. Rather than merely mining, Bolivia might then aspire to become a developer of battery technology'[83].

Since China became a member of the World Trade Organization (WTO) in 2001, Latin America has become an increasingly important trading partner bloc of Beijing. For scholars such as Valle and Holmes, China- in a pure realist view- is pursuing its national interest in Latin America, ensuring the provision of raw mineral and gas materials to boost its economic expansion. In the case of Bolivia, trade is mainly focused on the energy and mining sectors, and especially on lithium extraction[84]. In Bolivia, recent studies conducted on the Uyuni salt flat showed that it possesses around 9,000,000 tons of lithium, almost 43% to 45% of the world's reserves.

These studies caught the attention of China and of other Asian competitors, especially Japan and South Korea. As a matter of fact, in 2011, Bolivia made an agreement with the China Trust Investment Corporation, stating that the latter would be part of the investigation team that the Bolivian government set up to industrialize the resources found in the Uyuni salt flats. Moreover, in 2012, the head of the Mining Corporation of Bolivia (Comibol) announced that the Chinese company Linyi Gelon New Battery Material had purchased an "experimental plant" for the production of ion-lithium[85]. Nonetheless, Japan and South Korea are still the only two countries able to challenge the Chinese hold on the Bolivian lithium industry, since they are also considered to be leaders in the lithium-ion battery markets. However, in comparison with its two competitors, China, in addition to having excellent technological efficiency, has better diplomatic relations with Bolivia[86].

---

[82] AVZ Mineral Limited official website, *Overview*, (https://avzminerals.com.au/overview); Market Screener, *Avz Minerals : Huayou Cobalt Group Increases Shareholding in AVZ*, (https://www.marketscreener.com/AVZ-MINERALS-LTD-10355251/news/Avz-Minerals-Huayou-Cobalt-Group-Increases-Shareholding-in-AVZ-28182191/); Lithium Today, *op. cit.*

[83] Farnsworth, E., 'The new mercantilism: China's emerging role in the Americas', *Current History*, February 2011, pp. 56-61.

[84] Valle, V. M., Holmes, H. C., 'Bolivia's Energy and Mineral Resources Trade and Investments with China: Potential Socioeconomic and Environmental Effects of Lithium Extraction', *Latin American Policy* 4.1, 2013, pp. 93-122.

[85] Valle, V. M., Holmes, H. C., *op. cit.;* Chazan, Y., 'China Rushes to Dominate Global Supply of Lithium', *The Diplomat*, 23 February 2019.

[86] Valle, V. M., Holmes, H. C., *op. cit.*

As for the South-Central Asia region, it is worth mentioning the importance of Afghanistan for the Chinese lithium policy. In 2010, a small team composed of US officials and geologists discovered nearly $1 trillion in unexploited mineral deposits in Afghanistan. The same team also conducted ground surveys on dry salt lakes in the western parts of Afghanistan, where they believe there are large deposits of lithium. According to their initial analysis in the Ghazni Province and in the southern region of Gowde Zereh, there were potential lithium deposits as large of those of Bolivia, which are known as world's largest lithium reserves.[87] Nonetheless, the actual size of these reserves has not been yet confirmed. According to an internal Pentagon memo that circulated at the time of the discovery, Afghanistan could become the "Saudi Arabia of lithium"[88]. However, 'the Soviets have known about Afghanistan's mineral wealth since they conducted the country's first geological surveys in the 1980s'[89].

For both Afghan and US officials, these reserves are likely to be a key to economic independence for Afghanistan, while for President Trump this mineral wealth may help pay for the 16-year war and for post-conflict reconstruction. However, a lack of basic infrastructure, widespread corruption, a cluttered administration and numerous local insurgencies have prevented the construction of a legitimate mining sector. Additionally, both the Ghazni Province and the Gowde Zereh region are still under Taliban control[90].

According to Professor Michel Chossudovsky, the implicit goal of US military presence in Afghanistan is to impede the establishment of Afghan-Chinese trade and investments relations. However, the American strategy has not hindered the establishment of the Afghan-Chinese economic partnership in 2012. Indeed, China is the frontrunner in developing projects in fields such as mining, energy, gas pipelines and infrastructure projects, and it is now Afghanistan's largest business investor. As a matter of fact, the Afghan government needs Chinese expertise in these areas to access its national deposits. China is also involved in the stability of the Afghan state due to its economic interests. Beijing also wants a peaceful environment for its companies working in Afghanistan, which in the end send Afghan natural resources back to China[91]. Chossudovsky states that Beijing objective is to ultimately integrate land transportation through the Wakhan Corridor, which links Afghanistan to China's Xinjiang region[92].

---

[87] Risen, J., 'U.S. Identifies Vast Mineral Riches in Afghanistan', *The New York Times*, 13 June 2010.
[88] *Ibidem.*
[89] Ng, T. P., 'China's role in shaping the future of Afghanistan', *Carnegie Endowment Policy Outlook*, 2010, pp. 13.
[90] Mackenzie, J., 'Donald Trump eyes Afghanistan's $1 trillion mineral reserves to pay for reconstruction after 16 years of war', *The Independent*, 21 August 2017.
[91] Chossudovsky, M., 'More American Troops to Afghanistan, To Keep the Chinese Out? Lithium and the Battle for Afghanistan's Mineral Riches', *Global Research*, 18 September 2017; Tahiri, N. R., *Afghanistan and China Trade Relationship*, Munich Personal RePEc Archive Paper No. 82098, Oruj University, 2017.
[92] Chossudovsky, M., *op. cit.*

China has all the intentions to also integrate Afghanistan into the transport network of Western China as part of the Belt and Road initiative (BRI, also known as the New Silk Road). As a matter of fact, in 2016 the Chinese and Afghan governments signed a Memorandum of Understanding that will move the Muslim country towards the Beijing sphere of influence. In the BRI plans, Afghanistan should recover its long-standing role as a bridge between the regions of South Asia, Central Asia, the Middle East and Eurasia. However, this strategy has created some tensions with the Indian government[93].

Chinese firms have acquired rights to mine copper and coal, and they also achieved an important oil exploration concession in the Afghan nation. China is also clearly aiming to the Afghan broad lithium deposits. Given the rising global demand for lithium, Afghanistan could become one of the world's most import mining centers[94]. Yet, major projects such as the Mes Aynak copper mine, acquired in 2008 by a Chinese consortium (composed by China Metallurgical Group and Jiangxi Copper) on a 30-year lease for about $3 billion, are still at a stalemate. Although the Taliban have explicitly stated that they would not have targeted it, the project has been hampered by delays[95]. Thus, as things stand today, no concrete lithium mining project has been purchased or proposed by Chinese companies in Afghanistan.

3.3 Green Economy

As far as the green economy is concerned, given the increasing demand and its internal economic growth, China is bolstering to increase the production of green facilities such as wind turbines, and in many other sectors that would require more domestic REEs and lithium. The production of these elements is also set to meet the rising demand for high tech products such as smartphones, computers and pcs[96]. Moreover, the Chinese government has encouraged its citizens throughout the years to move to the electric vehicles market in order to reduce urban air pollution and to boost the competitiveness of its national green cars market. The shift to electric vehicles (which have both REEs and lithium employed, but mostly the latter) is seen by Beijing as an opportunity to enhance its competitiveness in the global market in this particular sector, and it has defended this transition through national support packages. Through these subsidies, China has become the world leader in developing, testing and selling new models of electric cars, while contributing to the lowering prices for the rest of the world[97]. Chinese firms producing lithium-ion batteries now have control over Lithium Hydroxide, a strategic product (also

[93] Bose, S., 'India and China: An Agenda for Cooperation on Afghanistan', *Institute of Chinese Studies,* 2014, pp. 22.
[94] Stone, R., 'Slowly but surely, China is moving into Afghanistan', *TRT World,* 18 February 2019; Bismil, F., 'The Future of Special Economic Zones in Afghanistan', *The Diplomat*, 6 June 2018.
[95] Chossudovsky, M., *op. cit.*; Reuters in Kabul, 'Kabul reveals deals to ease graft fears', *The South China Morning Post,* 16 October 2012.
[96] Humphries, M., *op. cit,*
[97] Alteburg, T., et al., 'Green Industrial policy: concepts, policies, country experiences', *United Nation environmental program report*, 2017.

known as 'battery grade lithium') that goes into Tesla lithium batteries as well. The Japanese Panasonic makes then lithium cells for Tesla using Lithium Hydroxide[98].

As recently as of 2019, prices for lithium carbonate, a product widely used by battery makers, have fallen by 50 percent from 2018 in China. Chinese customers have been cautious to sign new contracts due to uncertainty about market conditions and concerns over the possible risk of oversupply, while the global market outside remained mostly unaffected. According to Paul Graves, CEO of the American lithium firm Livent, by 2025, while China is going to be an important actor in the lithium market, it is not going to be the only one[99]. With the issue of global warming and the current consumption rate of fossil fuels, demand for lithium as battery material will indisputably increase. Notwithstanding the recent fall, the price of lithium is expected to rise[100].

Moreover, the Chinese nation has become the largest manufacturing center in the world in the field of the rechargeable lithium battery (RLB, used both for electronic devices and electric vehicles), producing approximately 2.9 billion RLBs only in 2011. According to Xianlai Zeng and Jinhui Li, the lithium demand for electric vehicles batteries 'will grow rapidly, from 3.857 thousand in 2015, to 59.4 thousand in 2023, to 108 thousand tons in 2030, with an average annual increase of 180%'[101]. For them, the lithium demand in China for electric vehicles will soon account for the majority of the entire global demand for lithium applications. Along with this application in batteries, lithium is becoming more and more strategic due to its unique characteristics in energy storage.

Conclusion

The present analysis essay showed in what ways the Chinese government is developing its strategy towards the market of elements such as lithium and rare earths. After giving a brief presentation about what are these elements, their properties, where they can be found, and where they can be employed, the paper focused on what kind of policies China developed from the 1950s in order to gain control of the international market of lithium and rare earth elements.

Under Deng Xiaoping ruling, the national strategy towards REEs quickly developed, especially through program 863, and thanks to this, China bested the US and became the world's leader both in REEs production and commerce. After this, Beijing started to explore beyond its national boundaries, to create joint ventures with key partners, to set agreements and to purchase firms, shares of interests, mines and projects in countries such as Australia and the USA. Nonetheless, it still has to face some pressing domestic issues in

[98] Lithium Today, *op. cit.*
[99] Chazan, Y., *op. cit.*; Sanderson, H., 'Livent CEO says looking to acquire lithium projects in Argentina and Australia', *Financial Times,* 27 March 2019.
[100] Vargas, P., 'Lithium and the Foreseeable Future', Thesis from the University of Arkansas, Fayetteville, 2018.
[101] Zeng, X., Li, J., 'Implications for the carrying capacity of lithium reserve in China', *Resources, Conservation and Recycling* 80, 201, pp. 58-63.

this domain, especially the presence of small illegal miners, but also the risk of quickly depleting its national reserves of rare earth elements and the environmental harm produced by the separating process of REEs.

However, the essay showed also that the Chinese policy of quasi-monopoly over the REEs market, and its subsequent export quotas imposition, has been strategically used to boost the Chinese domestic economic growth. This was also believed to encourage foreign producers of REEs high-tech goods to move to China. The Chinese dominant position in the global REEs market has also been implemented as leverage against its economic opponents. The 2010 Chinese REEs embargo against Japan is a clear example of this strategic use since it was put in place after renewed diplomatic tensions over the Diaoyu/Senkaku Island.

It has been also made clear that by becoming the world's leader in the REEs (and REEs finished products) chain supply, China made itself indispensable for the global market, meaning that REE extracted outside of the Chinese territory would have needed to be exported to China to enter the value chains. This design permits China to force its strength in REEs production as a component of its national grand strategy, making countries such as the US dependent on Chinese exports and extremely vulnerable to Chinese quotas. From its leadership position, China aims to expand its diplomatic influence, especially in less developed countries that see in Beijing a country able to guarantee a market for REEs.

It can also be highlighted the fact that the rationale behind the purchase of overseas REEs mines lies in security reasons, for which China has the responsibility to defend its natural resources against any possible external threat. According to this, control over natural resources plays a key role in succeeding in a possible power struggle against any rival.

Regarding the Chinese policy towards lithium, this element was (and it still is) seen as the future petrol, a vital element in the production of electric vehicles, which is a booming market at the moment, and in the production of electronic devices such as computers and smartphones. In this sense, China owns the world's second largest reserve of lithium and it has become the leader in the global production of lithium-ion batteries. However, for some experts of the field, it may be a possibility that by 2025, while China is going to be an important actor in the lithium market, it's not going to be the only one. Additionally, the dependence on lithium imports (mainly coming from Australia, Chile and Argentina) may endanger its resource security. For this important issue, numerous Chinese lithium began begun exploring lithium resources, projects and investment opportunities overseas: in Australia, Latin America (especially in Bolivia, Chile and Argentina), South Central Asia (mostly Afghanistan, even if a lithium mining project is still in standby), Canada, Ireland and Africa.

About its projects in Afghanistan, China has all the intentions to also link the country into Belt and Road initiative, which will move the Muslim country towards the Chinese sphere of influence. In this sense, Afghanistan will become a bridge between the various Asian

regions, and it will be more connected to Beijing in matters of trade and mineral and oil exploitations. The link between the development of the BRI project and the future hold on Afghan lithium mines will make Beijing even stronger in comparison to other economic opponents, and it will make it more influent in Eurasia.

Talking about the use of lithium in the green economy, China has become the world's leader in developing, testing and selling new models of electric cars, while contributing to the lowering prices for the rest of the world. It also has become the largest manufacturing center in the world in the field of the rechargeable lithium battery. Chinese firm producing lithium-ion batteries now also have control over Lithium Hydroxide, a strategic product-also known as 'battery grade lithium') that goes into batteries for electric cars such as the Tesla ones.

In conclusion, it can be said that the Chinese strategy towards the purchase of lithium and REEs mines is to be framed in a broader and more complex design. This strategy touches issues such as strategic fear of dependence on foreign imports and of foreign competition, but also the desire to achieve a leading role in all the processes that see the involvement of lithium and rare earths, in order to be a vital actor at every level of the supply chain of both raw elements and finished products.

Bibliographie

Alteburg, T., et al., 'Green Industrial policy: concepts, policies, country experiences', *United Nation environmental program report*, 2017.

AVZ Mineral Limited official website, *Overview*, (https://avzminerals.com.au/overview), accessed on 30 March 2019.

Bismil, F., 'The Future of Special Economic Zones in Afghanistan', *The Diplomat*, 6 June 2018.

Bose, S., 'India and China: An Agenda for Cooperation on Afghanistan', *Institute of Chinese Studies*, 2014, pp. 1-22.

Brickley, P., 'Mountain Pass Mine Approved for Sale to JHL, QVT, Shenghe', *The Wall Street Journal,* 23 June 2017.

Buerk, R., 'Japan and China in rare earth dispute', *BBC news (video), 2010 (https://www.bbc.com/news/av/business-11727224/japan-and-china-in-rare-earth-dispute)*, accessed on 22 February 2019.

Chakhmouradian, A. K., Wall, F., 'Rare earth elements: minerals, mines, magnets (and more)', *Elements* 8.5, 2012, pp. 333-340.

Chazan, Y., 'China Rushes to Dominate Global Supply of Lithium', *The Diplomat*, 23 February 2019.

Chossudovsky, M., 'More American Troops to Afghanistan, To Keep the Chinese Out? Lithium and the Battle for Afghanistan's Mineral Riches', *Global Research*, 18 September 2017.

Chung, D., Elgqvist, E., Santhanagopalan, S., 'Automotive lithium-ion cell manufacturing: Regional cost structures and supply chain considerations', *National Renewable Energy Lab Report*, Golden, CO (US), 2016.

Church, S., 'America's Only Rare Earth Mine Is Stuck in a Distressed Debt Dispute', *Bloomberg*, 22 June 2017.

Duarte, P., *Pax Sinica : all roads lead to China*, Chiado Books, Portugal, June 2017.

Ebensperger, A., Maxwell, P., Moscoso, C., 'The Lithium Industry: its recent evolution and future prospects', *Resource Policy* 30.3, 2005, pp. 218-231.

Evans, R. K., 'An abundance of lithium', *Santiago: World Lithium*, 2008.

Farnsworth, E., 'The new mercantilism: China's emerging role in the Americas', *Current History*, February 2011, pp. 56-61.

Ganfeng Lithium official website, *Lithium Compound Manufacturers in China-About Gangfeng*, (http://www.ganfenglithium.com/about_en.html), accessed on 30 March 2019.

Gholz, E., 'Rare earth elements and national security', *Council on Foreign Relations- energy report*, 2014.

Gobbo, L., *Le terre rare : effetti economici del monopolio cinese e ricerca di alternative*, Thesis from the University of Padua, 2011.

Han, A., Jianping, G., and Yaling, L., 'Vertical vs horizontal integration: game analysis for the rare earth industrial integration in China', *Resource Policy* 50, 2016, pp. 149-159.

Hao, H., et al., 'Material Flow Analysis of Lithium in China', *Resources Policy* 51, 2017, pp. 100-106.

Humphries, M., *Rare earth elements: the global supply chain*, Diane Publishing, 2013.

Hurst, C., *China's rare earth elements industry: What can the west learn?*, Institute for the Analysis of Global Security, Washington DC, 2010.

Ingram, T., 'China to build $400m lithium plant in WA, expand major mine', *Financial Review*, 7 September 2016.

International Lithium corp. official website, *Ganfeng Lithium*, (https://www.internationallithium.com/ganfeng-lithium/), accessed on 30 March 2019.

Ivanova, I., 'Trade War with China could hurt the US business most', *CBS News*, 23 March 2018.

Jamasmie, C., 'China's Tianqi Lithium buys minority stake in SQM for $4.1bn', *mining.com*, 17 May 2018, (http://www.mining.com/chinas-tianqi-lithium-buys-minority-stake-sqm-4-07bn/), accessed on 1 April 2019.

Koch-Weser, I., *Chinese Mining in Latin America: a Review of Recent Findings*, Inter-American Dialogue, 2014.

Lithium Today (website), *Lithium Supply in China*, (http://lithium.today/lithium-supply-china/), accessed on 22 March 2019.

Lu, B., Liu, J., Yang, J., 'Substance flow analysis of lithium for sustainable management in mainland China: 2007–2014', *Resources, Conservation and Recycling*, 119, 2017, pp. 109-116.

Mackenzie, J., 'Donald Trump eyes Afghanistan's $1 trillion mineral reserves to pay for reconstruction after 16 years of war', *The Independent*, 21 August 2017.

Mancheri, N. A., 'World trade in rare earths, Chinese export restrictions, and implications', *Resources Policy 46*, 2015, pp. 262-271.

Mancheri, N., Sundaresan, L., Chandrashekar, S., *Dominating the World. China and the Rare Earth Industry*, National Institute of Advanced Studies 10, 2013, pp. 1-74.

Market Screener, *Avz Minerals : Huayou Cobalt Group Increases Shareholding in AVZ*, (https://www.marketscreener.com/AVZ-MINERALS-LTD-10355251/news/Avz-Minerals-Huayou-Cobalt-Group-Increases-Shareholding-in-AVZ-28182191/), accessed on 31 march 2019.

Market wired official website, *Lithium Americas Announces US$174 Million Strategic Investment by Ganfeng Lithium*, 17 January 2017, (http://www.marketwired.com/press-release/lithium-americas-announces-us174-million-strategic-investment-by-ganfeng-lithium-tsx-lac-2188754.htm), accessed on 26 February 2019.

Martin, G., et al., 'Lithium market research-global supply, future demand and price development', *Energy Storage materials* 6, 2017, pp. 171-179.

Medeiros, C. A., Trebat, N. M., 'Transforming natural resources into industrial advantage: the case of China's rare earths industry', *Brazilian Journal of Political Economy* 37.3, 2017, pp. 504-526.

Ministry of Science & Technology of the PRC, *National High-tech R&D Program (863 Program)*, (http://www.most.gov.cn/eng/programmes1/), accessed on 10 March 2019.

Müller, M. A., Schweizer, D., Seiler, V., 'Wealth effects of rare earth prices and China's rare earth elements policy', *Journal of Business Ethics* 138.4, 2016, pp. 627-648.

Ng, E., ‘China goes all out to secure lithium, cobalt supplies – key to dominating the world electric car market’, *South China Morning Post*, 4 June 2018.

Ng, T. P., ‘China’s role in shaping the future of Afghanistan’, *Carnegie Endowment Policy Outlook*, 2010, pp. 1-13.

Rare Earth Information, ‘Technology guide for the export of NdFeB magnet material and triphosphor phosphor powder’, *passes the Ministry of Commerce’s review. Rare Earth Information* 289, 2008, pp. 17–18.

Rathi, A., ‘One Chinese company now controls most of the metal needed to make the world’s advanced batteries’, *Quartz,* 30 May 2018.

Reuters in Kabul, ‘Kabul reveals deals to ease graft fears’, *The South China Morning Post,* 16 October 2012.

Risen, J., ‘U.S. Identifies Vast Mineral Riches in Afghanistan’, *The New York Times*, 13 June 2010.

Sanderson, H., ‘Livent CEO says looking to acquire lithium projects in Argentina and Australia’, *Financial Times,* 27 March 2019.

Seaman, J., *Rare earths and clean energy: analyzing China's upper hand*, Institut Francais des Relations Internationales, Paris & Brussels, 2010, pp. 1-40.

Siljković, B., Nebojša, D., Rakić, G., ‘Environmental and Economic assessments of the effect of critical mineral of green revolution: Lithium’, *Mining and Metallurgy Engineering Bor* 1-2, 2017, pp. 103-114.

Smith, R., ‘The world's biggest economies in 2018’, *World Economic Forum Official Website*, 18 April 2018, (https://www.weforum.org/agenda/2018/04/the-worlds-biggest-economies-in-2018/), accessed on 10 March 2019.

Stegen, K. S., ‘Heavy rare earths, permanent magnets, and renewable energies: an imminent crisis’, *Energy Policy* 79, 2015, pp. 1-8.

Stone, R., ‘Slowly but surely, China is moving into Afghanistan’, *TRT World,* 18 February 2019.

Struye, T., 'La Chine et le «Soft power»: une manière de défendre l'intérêt national de manière «douce»?', *Note d'analyse pour la Chaire InBev Baillet – Latour Programme «Union Européenne – Chine»,* 2009, pp. 1-17.

Tahil, W., 'The trouble with lithium, Implications of Future PHEV Production for Lithium Demand', *Martainville: Meridian International Research*, 2007.

Tahiri, N. R., *Afghanistan and China Trade Relationship*, Munich Personal RePEc Archive Paper No. 82098, Oruj University, 2017.

Tianqi lithium official website, *Talison Lithium*, (http://www.tianqilithium.com/en/resinfo.aspx?ContentID=6&t=56), accessed n 31 March 2019.

Valle, V. M., Holmes, H. C., 'Bolivia's Energy and Mineral Resources Trade and Investments with China: Potential Socioeconomic and Environmental Effects of Lithium Extraction', *Latin American Policy* 4.1, 2013, pp. 93-122.

Vargas, P., 'Lithium and the Foreseeable Future', Thesis from the University of Arkansas, Fayetteville, 2018.

Wübbeke, J., 'Rare earth elements in China: policies and narratives of reinventing an industry', *Resource Policy* 38.3, 2013, pp. 384-394.

Zeng, X., Li, J., 'Implications for the carrying capacity of lithium reserve in China', *Resources, Conservation and Recycling* 80, 201, pp. 58-63.

Zhang, K., Kleit, A. N., Nieto, A., 'An economic strategy for criticality-application to rare earth element Yttrium in new lighting technology and its sustainable availability', *Renewable and Sustainable Energy Reviews* 77, 2017, pp. 899-915.

Les recherches du CECRI sont menées au sein de l'Institut de science politique Louvain-Europe (ISPOLE) de l'Université catholique de Louvain. Elles portent sur la géopolitique, la politique étrangère et l'étude des modes de prévention ou de résolution des crises et des conflits.

L'analyse des éléments déclencheurs des conflits et des instruments de leur gestion - sanctions et incitants économiques comme moyens de politique étrangère; crises et interventions humanitaires; rôle de la mémoire dans un processus de réconciliation, par exemple - est combinée à l'étude empirique de différends internationaux et de processus de paix spécifiques.

UCL
Université catholique de Louvain