



# Issues Paper

## Leveraging Central Asia's Rare Earth Elements for Economic Growth

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## Foreword

The global energy transition has underscored the vital importance to advanced economies of rare earth elements (REEs), the 17 minerals with broad and, to this point, irreplaceable uses in a wide variety of high technology, green energy, and defense industries. As the uses for these minerals has expanded, so too has global competition for them in a time of sharply increasing geostrategic and geoeconomic tension.

Advanced economies with secure, reliable access to REEs enjoy economic advantages in manufacturing and corresponding economic disadvantages accrue for those without this access. China's current dominance of both mining and, importantly, processing of REEs poses challenges for Western and other companies seeking to continue leadership in the global energy transition and other high technology industries.

This report therefore features an increasingly attractive opportunity in the global market for REEs, analyzing the abundance of many of these materials in Central Asia. It has a particular focus on Kazakhstan, the region's leading economy and holder of the largest reserves of REEs in the region. Kazakhstan also holds the world's largest chromium reserves and the second largest reserves of uranium, as well as a very strong position in many other mining and extractive industries.

The need for reliable supplies of REEs reaffirms the importance of ties with these countries, and in particular with Kazakhstan, not only in securing REEs for Western markets but in building closer geopolitical ties. While recent diplomatic initiatives are encouraging, more must be done to build deeper and more sustainable ties with those countries -- and to encourage further economic partnership and integration among them, strengthening their collective impact on the global stage.

Further, the report recommends reforms Central Asian countries can take to expand their global share of REE mining and processing, including greater transparency of data and access, steps towards limiting the environmental impact of REE mining through new extracting and processing technologies, diversifying the customer base, building stronger transportation links, and encouraging foreign investment. Looking beyond the region for foreign investment will both signal Central Asia's openness to global markets and help safeguard Central Asian countries' sovereignty and economic progress.

What has been termed "soft infrastructure" -- tax, trade, and regulatory policies -- is essential to attract foreign investment. By establishing a strong investment climate, nations can unleash private capital for sustainable economic growth. Using market signals, rather than simply relying on subsidies, to encourage private investments in critical minerals for the energy transition will best ensure both a just transition and strong US leadership in that transition.

While the report offers steps Central Asian nations to take advantage of this increasingly important global market, its call to action applies with equal force to nations outside the region, not least the United States, to recognize the importance of Central Asia to this highly significant global market and act with urgency to build the ties that will ensure the US and Western countries have access to REEs in a highly competitive global market. The report aims to spur action to seize this unique opportunity.

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## I. Introduction

The energy transformation stemming from concerns about climate change, geopolitical tensions, and China's ambitions to reshape the international order are all fueling a global race for rare earth elements (REEs). REEs are vital for the production of countless modern and emerging technologies, from artificial intelligence (AI) to green energy. The competition for REEs will be as central to 21<sup>st</sup> century geoeconomics, as the race to control petroleum was in the 20<sup>th</sup> century.

China currently has a decisive advantage in the race for dominance in this sector, with a near monopoly in refining and mining REEs. For example, "each F-35 aircraft jointly produced by 14 allied nations contains 920 pounds of Chinese-origin REEs"<sup>1</sup>. China controls approximately 80-90% of the international refining capacity of REEs. Increasingly, assertive Chinese foreign policy has accelerated the West's desire to diversify REE supply chains.

Central Asia is rich in natural resources, producing minerals from iron and non-ferrous metals to uranium. Despite this, many analyses neglect the region in favor of analyzing domestic REE endowments in the United States or China. Articles and reports that examine the international geoeconomic competition for REEs usually focus on widely known cases such as Latin America's Lithium Triangle,<sup>2</sup> the coltan fields of the Democratic Republic of Congo,<sup>3</sup> or the increasing prominence of European or American REE discoveries.

While Chinese demand for REEs has not yet increased imports from Central Asia, the massive size of the Chinese economy and the Chinese Communist Party's (CCP) conscious efforts to dominate the REE sector globally mean such increases are a matter of time. Without proactive Western investment in the discovery and mining of REEs in Central Asia, there is a growing likelihood that China will step in instead, increasing the economic dependency of the Central Asian states on Beijing.

Western and Asian governments in Tokyo, New Delhi, and Seoul must support and encourage investments into Central Asian REE exporting and refining capacity while simultaneously supporting these states in their quest for broad investment and economic diversification. Central Asian countries must look beyond their immediate neighborhood and more proactively search for strategic investors to safeguard their sovereignty, enhance regional integration, and boost economic freedom. REE mining and refining can enable these goals and be a "win-win" for all involved.

This report will first analyze the state of REEs in Central Asia, listing ongoing survey projects, legal issues, and recent significant development agreements. It will provide a broader geopolitical and geoeconomic analysis pertinent to REE mining and refining in Central Asia. The report will also highlight the ramifications of Russia's invasion of Ukraine, China's dominance of the REE market, and various international developments. It will also include a case study of Kazakhstan, including its multivector foreign policy and Astana's reliance on energy and mining as the cornerstone of its economy. We will also discuss subsidies, refining and production, and environmental issues.

Policy recommendations regarding how Central Asian countries can maximize their geostrategic situation and enhance revenue derived from their rare earth deposits will be provided to conclude the analysis.

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<sup>1</sup> Sharma, Vaishali Basu, *The EurAsian Times*, "China is Rapidly Monopolizing Rare Earth Elements, Why the World Must Act Now to Stop the Dragon", October 20, 2022, <https://www.eurasiantimes.com/the-world-must-come-together-to-stop-chinas-monopoly/>

<sup>2</sup> Samar Ahmad, *The Harvard International Review*, "The Lithium Triangle: Where Chile, Argentina, and Bolivia Meet", 15 January 2020, <https://hir.harvard.edu/lithium-triangle/>

<sup>3</sup> Oluwole Ojewale, "What coltan mining in the DRC costs people and the environment", *The Conversation*, May 29, 2022, <https://theconversation.com/what-coltan-mining-in-the-drc-costs-people-and-the-environment-183159>

## II. Why Are REEs Essential?

REEs are essential to nearly every facet of modern life and constitute a discrete national security interest for every state actor. The field is characterized by:

1. High demand for modern technologies (particularly in the energy sector) and advanced materials, of which REEs are critical components.
2. Threatened supply, due to China's dominance.
3. Unique physical properties, including electronic, magnetic, and optical characteristics, which, for the time being, cannot be similarly matched in performance by other metals or synthetic materials.<sup>1,2</sup>

Element	Symbol	Atomic number	Crustal abundance
Light REEs			
Lanthanum	La	57	39
Cerium	Ce	58	66.5
Praseodymium	Pr	59	9.2
Neodymium	Nd	60	41.5
Samarium	Sm	62	7.05
Europium	Eu	63	2.0
Gadolinium	Gd	64	6.2
Heavy REEs			
Terbium	Tb	65	1.2
Dysprosium	Dy	66	5.2
Holmium	Ho	67	1.3
Erbium	Er	68	3.5
Thulium	Tm	69	0.52
Ytterbium	Yb	70	3.2
Lutetium	Lu	71	0.8
Yttrium	Y	39	33

**Graph 1. List of the rare-earth elements found in natural deposits—the “lanthanides” plus yttrium**  
 Source: USGS Mineral Resources Program. U.S. Geological Survey. Fact Sheet 2014-3078. November 2014: 1  
 Accessed via: <https://pubs.usgs.gov/fs/2014/3078/pdf/fs2014-3078.pdf>

REEs are vital for national security due to their broad uses in the military, information technology, electronics, and high tech. Securing stable and reliable foreign and domestic supply chains is paramount, particularly for the United States as the primary guarantor of the international system. The importance of REEs for the U.S. defense industrial base is no longer a niche concern and attracts popular scholarship and interest. It was discussed as recently as August 16, 2023, in a lengthy analysis about the future of warfare and the

<sup>1</sup> “Rare Earth Element and Rare Metal Inventory of Central Asia,” US Geological Survey, Fact Sheet 2017-3089, 2018: 2

<sup>2</sup> Ibid.

U.S. defense industrial base by John Barrett, a career logistician with the U.S. Air Force, for the defense publication *War on the Rocks*:

*These complex [defense] systems also rely on more diverse global supply chains. For example, tantalum, a key metal for hypersonic platforms, isn't even mined in the United States. Meanwhile, China produces over three-quarters of the world's bismuth, magnesium, and tungsten, all of which are key elements for semiconductors. The basic issue is that investments in autonomous platforms to deter the Chinese military rely on Chinese-produced materials.<sup>3</sup>*

Defense is not the only reason REEs are growing in importance. As concerns about climate change are growing, including in Central Asia,<sup>4</sup> REEs are recognized as vital to any CO2 remediation policy. Governments worldwide are working to cut carbon emissions and turn to sustainable energy.

The American Security Project, a research center in Washington, DC, explains: "While countries across the globe commit to cutting carbon emissions in the near future, a frequently asked question is how these targets will be achieved. A crucial part of many of these pledges is the replacement of carbon-intensive energy sources with cleaner technologies such as wind and solar power."<sup>5</sup> REEs and critical minerals (e.g., lithium) are essential for developing cleaner energies and as the world races to stop or slow climate change, demand will only climb.

Increasing demand means that the profitability of the global REE market can only grow. For example, Research Nester predicts that the Compound Annual Growth Rate (CAGR) for REEs will climb 8 percent between 2022 and 2035, reaching around USD 20 billion by 2035.<sup>6</sup> Transparency Market Research predicts that the REE CAGR will grow 7.4 percent over the next decade, reaching USD 21.7 billion by 2031.<sup>7</sup> ResearchAndMarkets.com provides an even more optimistic prediction, arguing that the market is set to reach USD 20.9 billion by 2028, with a CAGR of 14.04 percent from 2022 to 2028.<sup>8</sup>

Raw materials are a "significant element in the cost structure of many technologies required in energy transitions," according to the International Energy Agency.<sup>9</sup> In the case of lithium-ion battery production, lithium "costs now loom larger, accounting for some 50-70% of total battery costs, up from 40-50% five years ago." This high cost relative to the rest of the supply chain is unique to critical minerals like lithium and REEs, further incentivizing producers and investors.

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<sup>3</sup> Barrett, John, "You Go to War With the Industrial Base You Have, Not the Industrial Base You Want," *War on the Rocks*, Commentary, August 16, 2023, <https://warontherocks.com/2023/08/you-go-to-war-with-the-industrial-base-you-have-not-the-industrial-base-you-want/>

<sup>4</sup> Stronger droughts, exacerbated by climate change, are already affecting Central Asia, the future does not look promising. "Economic damages from droughts and floods in Central Asia are projected to be up to 1.3% of GDP per annum, while crop yields are expected to decrease by 30% by 2050, leading to around 5.1 million internal climate migrants by that time," explains the World Bank. "Climate Change in Europe and Central Asia," The World Bank, Brief, <https://www.worldbank.org/en/region/eca/brief/climate-change-in-europe-and-central-asia>

<sup>5</sup> Knoll, Samuel, "Domestic Supply Chains for Rare Earth Elements," American Security Project, June 6, 2023 [https://www.americansecurityproject.org/domestic-supply-chains-for-rare-earth-elements/?mc\\_cid=347396811a&mc\\_eid=c5f9bc7ac7](https://www.americansecurityproject.org/domestic-supply-chains-for-rare-earth-elements/?mc_cid=347396811a&mc_eid=c5f9bc7ac7)

<sup>6</sup> "Global Market Size, Forecast, and Trend Highlights Over 2023-2035," Research Nester, <https://www.researchnester.com/reports/rare-earth-metals-market/5142>

<sup>7</sup> "Global Rare Earth Metals Market to Register a Staggering 7.4% CAGR from 2022 to 2031, Reaching US\$ 21.7 Billion: TMR Report," Transparency Market Research, June 6, 2023, <https://www.globenewswire.com/en/news-release/2023/06/06/2683268/0/en/Global-Rare-Earth-Metals-Market-to-Register-a-Staggering-7-4-CAGR-from-2022-to-2031-Reaching-US-21-7-Billion-TMR-Report.html>

<sup>8</sup> "Global Rare Earth Elements Market Trends, Opportunity, and Forecasts Report 2023-2028 with Focus on China's Influence on the Market," *ResearchAndMarkets.com*; BusinessWire, May 18, 2023, <https://www.businesswire.com/news/home/20230518005585/en/Global-Rare-Earth-Elements-Market-Trends-Opportunity-and-Forecasts-Report-2023-2028-with-Focus-on-Chinas-Influence-on-the-Market---ResearchAndMarkets.com>

<sup>9</sup> "The Role of Critical Minerals in Clean Energy Transitions," Executive Summary, International Energy Agency, World Energy Outlook Special Report, 2021 <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary>

### III. Rare Earth Elements in Central Asia

We will now discuss the status of REE mining and surveying across Central Asia.

#### 1. REE Distribution Through Central Asia

The United States Geological Survey (USGS) defines REEs as “a relatively abundant group of 17 elements composed of scandium, yttrium, and the lanthanides.”<sup>10</sup> It is a misnomer to use “rare” to define these substances as it suggests scarcity, as REEs are abundant in the earth’s crust.”<sup>11</sup> The only characteristic that makes them “rare” is their relative lack of concentration. Compared to other staple commodity ores such as iron or copper, the density of REEs is usually far lower. This situation makes producing and sourcing REE ores more expensive, technically challenging, and environmentally damaging to the immediate locations where they are mined.

These characteristics can work to the advantage of prospective REE producers. Regulatory barriers, more common in the West, can be more easily mitigated by Central Asian states, while the lack of density in extracted minerals incentivizes localized production due to the higher costs associated with transporting unrefined rocks.

Across Central Asia, REEs are found in significant concentrations in two key areas (1) the Paleozoic Central Asian Orogenic Belt, which includes the Kazakh Steppe, Kazakh Uplands, and the Tien Shan Mountains of Kazakhstan, Kyrgyzstan, and easternmost Uzbekistan; and (2) the late Paleozoic to Mesozoic Tethys Orogenic Belt, the central and northern part of which includes the Pamir Mountains in Tajikistan.<sup>12</sup> Central Asia’s most commonly reported REE-Rare Metals (RM)-bearing minerals “are monazite, zircon, apatite, xenotime, pyrochlore, allanite, and columbite.”<sup>13</sup>

In 2012, the USGS began compiling an inventory of REE and all mineral deposits throughout Central Asia. The inventory, completed in 2016, showed 384 REE- (RM) occurrences, including 160 in Kazakhstan, 87 in Uzbekistan, 75 in Kyrgyzstan, 60 in Tajikistan, and two in Turkmenistan.<sup>14</sup> An updated 2018 report by the USGS adds that the 2016 findings range from mineral showings to previously developed deposits. The most critical attributes recorded in the inventory include “occurrence location, geologic setting, deposit type, size, associated commodities, grade, mineralogy, and age of mineralization.”<sup>15</sup> Specific areas of interest noted by the USGS include the Uraltides Belt, the Kazakh Steppe Belt, the Kazakh Uplands Belt, the North Tien Shan Belt, the South Tien Shan Belt, and the Pamir Belt.<sup>16</sup>

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<sup>10</sup> National Minerals Information Center, “Rare Earths Statistics and Information,” U.S. Geological Survey, <https://www.usgs.gov/centers/national-minerals-information-center/rare-earths-statistics-and-information>

<sup>11</sup> Knoll, “Domestic Supply Chains for Rare Earth Elements”

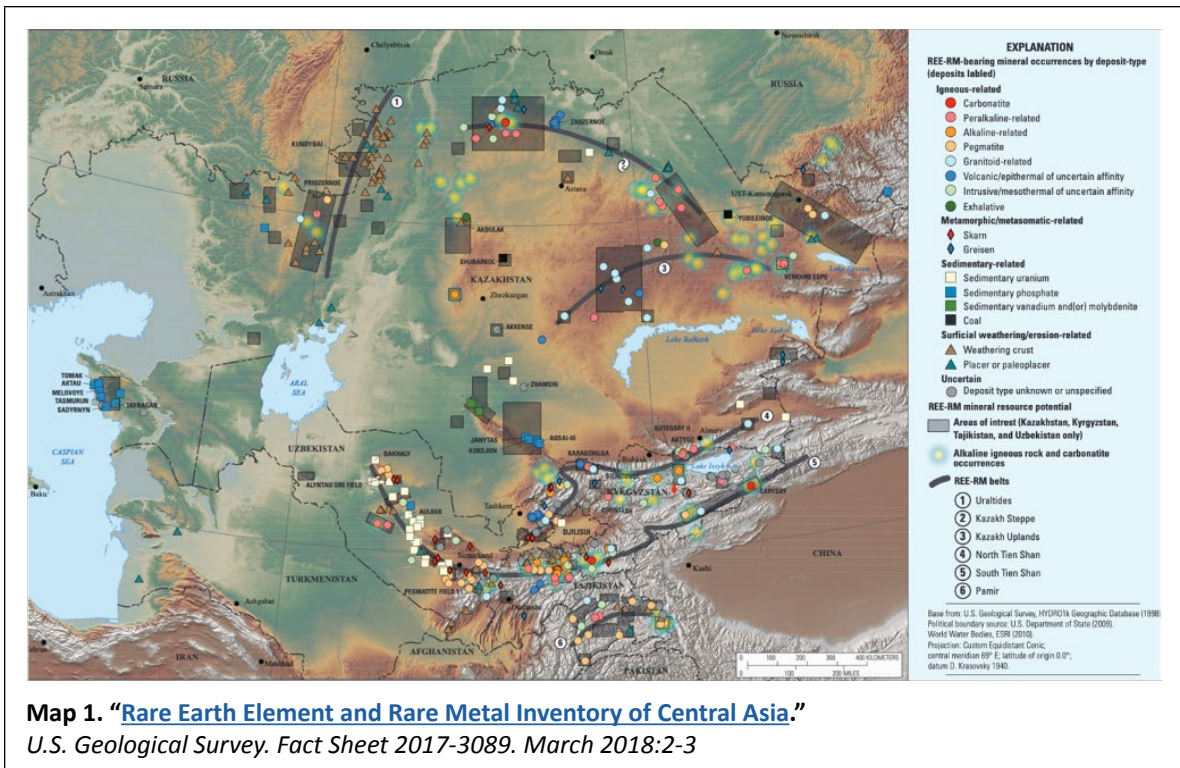
<sup>12</sup> “Rare Earth Element and Rare Metal Inventory of Central Asia”: 1

<sup>13</sup> Ibid: 3

<sup>14</sup> Mihalasky, M.J., Orris, G.J., Briggs, D.A., Tucker, R.D., Renaud, Karine, and Verstraeten, I.M., “Rare earth element mineral occurrence database of the Tien Shan region, Central Asia,” U.S. Geological Survey 2017 <https://doi.org/10.5066/F7TM7913>

<sup>15</sup> “Rare Earth Element and Rare Metal Inventory of Central Asia”: 2

<sup>16</sup> Ibid: 4



More recent reports provide more information about these resources. A 2022 report by the Caspian Policy Center (CPC), a research center in Washington, DC, explains that Kazakhstan's REE deposits are primarily concentrated in:

- Uraltides Belt – large Kundybai deposit
- Kazakh Steppe Belt – peralkaline, carbonatite, and granitoid
- Kazakh Uplands Belt – peralkaline, granitoid, and other igneous rock-related occurrences
- North Tien Shan Belt – Aktyuz cluster of deposits
- Southern Tien Shan Belt – peralkaline, granitoid, other igneous-rock-related occurrences
- Pamir Belt – pegmatite, peralkaline, and granitoid

**Kazakhstan** has the world's largest chromium reserves; the country is estimated to have 230 million metric tons of chromium, while the global reserves amount to 570 million metric tons.<sup>17</sup> Moreover, in Kazakhstan, the "rare earths already being produced—supervised by Kazakhstan's state-owned nuclear-holding company Kazatomprom—include rhenium, tantalum, and gallium, while ores bearing beryllium, tantalum, and hafnium can also be found," explained Professor Alex Calvo in a 2012 analysis about Japan's interest in Central Asian REEs.<sup>18</sup>

**Uzbekistan** has a mineral resources potential as high as USD 5.7 trillion, "even with only 20 percent of its territory studied," according to the CPC. They also noted that "the country boasts 14 known deposits of

<sup>17</sup> Vakulchuk, Roman; Overland, Indra, "Central Asia is a missing link in analyses of critical materials for the global clean energy transition," *One Earth*, Vol. 4, Issue 12, December 2021: 1680

<sup>18</sup> Calvo, Alex, "Japan returns to Central Asia in search of Rare Earths," *Shingetsu Electronic Journal of Japanese-Islamic Relations*, Volume 7, March 2012: 9



rare earth minerals that have attracted foreign investors' attention."<sup>19</sup> The explored molybdenum reserves exceed 204,000 tons, while there are about 117,000 known tons of tungsten trioxide. Moreover, Uzbekistan is home to the Center for the Study of Rare Earth Metals at the Almalyk Mining and Metallurgical Complex Joint Stock Company (AMMC), the only institute of its kind in Central Asia. AMMC was created with the assistance of the Korea Institute of Industrial Technology (KITECH)<sup>20</sup> and in addition to South Korea, Turkey is also working with Tashkent regarding REEs. In 2018, the State Committee for Geology of Uzbekistan and the Ministry of Energy and Natural Resources of Turkey signed an agreement on geological exploration for gold, molybdenum, and tungsten.<sup>21</sup>

**Kyrgyzstan** holds 20 REE deposits, the most critical of which is the Kutessay II mining center (seen in Map 2 below). However, the Kyrgyz government has been in legal limbo for over a decade after revoking mining licenses granted to companies working Kutessay II.<sup>22</sup> Work in the mine stopped in 2012<sup>23</sup> due to conflicting claims of ownership of the mining license. Negotiations between Bishkek and Toronto-based Stans Energy were unsuccessful, and an arbitration process is underway. In July 2022, Akylbek Japarov, Chair of the Cabinet of Ministers of Kyrgyzstan, stated that "in the near future, Kutessai-II, a plant for processing rare earth metals, will be put into operation, and exploration of the Taldy-Bulak and Andash mines will also be completed. We completely took over the extraction of minerals."<sup>24</sup>

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<sup>19</sup> "Sourcing Rare Earth Minerals in Central Asia," Caspian Policy Center, Policy Brief, June 2022: 7-8 [https://api.caspianpolicy.org/media/ckeditor/media/2022/06/15/sourcing-rare-earth-minerals-in-central-asia\\_IUGwsVB.pdf](https://api.caspianpolicy.org/media/ckeditor/media/2022/06/15/sourcing-rare-earth-minerals-in-central-asia_IUGwsVB.pdf)

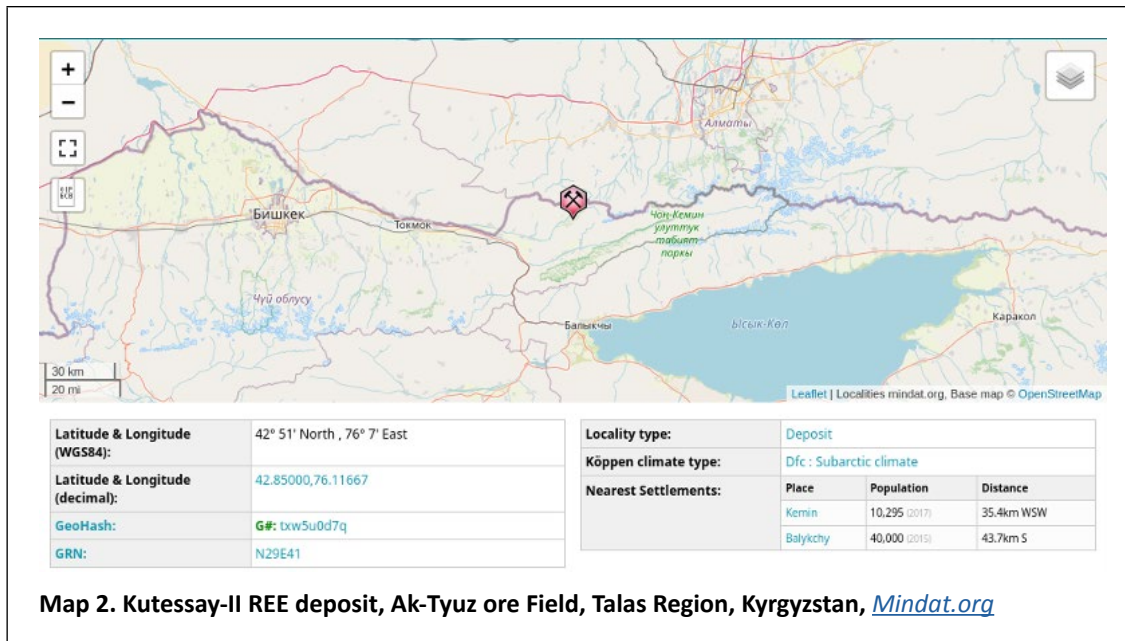
<sup>20</sup> "Узбекистан первым в Центральной Азии начнет изучать редкие металлы." *Sputnik News*, April 25, 2019, <https://uz.sputniknews.ru/20190425/Uzbekistan-pervym-v-Tsentralnoy-Azii-nachnet-izuchat-redkozemelnye-metally-11350460.html>

<sup>21</sup> "Турция проведет геологоразведку золота и редкоземельных металлов в Узбекистане," *Azathabar*, May 2, 2018, <https://rus.azathabar.com/a/29203906.html>

<sup>22</sup> "Kyrgyzstan owes \$ 15 million for revocation of license for Kutessay II," *24.kg*, 23 August 2019, [https://24.kg/english/127293\\_Kyrgyzstan\\_owes\\_15\\_million\\_for\\_revocation\\_of\\_license\\_for\\_Kutessay\\_II/](https://24.kg/english/127293_Kyrgyzstan_owes_15_million_for_revocation_of_license_for_Kutessay_II/)

<sup>23</sup> "Work Stoppage at Kutessay II Expires," *BusinessWire*, 1 October, 2012 <https://www.cnn.com/2012/10/01/work-stoppage-at-kutessay-ii-expires.html> Also see: Trilling, David, "Kyrgyzstan: At Kumtor Mine, "No Light at the End of the Tunnel," *Eurasianet*, 14 November, 2013, <https://eurasianet.org/kyrgyzstan-at-kumtor-mine-no-light-at-the-end-of-the-tunnel>

<sup>24</sup> "На месторождении Кутессай-II скоро запустят комбинат по переработке редких металлов — глава кабина," *Economist.kg*, 14 July, 2022, <https://economist.kg/novosti/2022/07/14/na-mestorozhdenii-kutessaj-ii-skoro-zapustyat-kombinat-po-pererabotke-redkih-metallor-glava-kabmina/>



The *Economist.kg* announced in July 2022 that a new entity called Heritage of the Great Nomads Holding Company had received licenses for the exploration of four deposits: the Andash and Taldy-Bulak gold deposits, the Kutessay II mining center, and the Kurmenty limestone deposit.<sup>25</sup> However, by early February 2023, the company was liquidated after the arrest of Tengiz Bolturuk, the former interim manager of Kyrgyzstan's Kumtor Gold Company and alleged founder of Heritage of the Great Nomads Holding Company.<sup>26</sup>

Tajikistan also has great promise for REE development. In 2014, Dzhumazoda Murod Hall, then-head of Tajikistan's geology administration, announced that starting in 2015, the country would conduct a decade-long study of rare earth deposits. "We do not have proven uranium deposits in our country, but there are some uranium manifestations that could receive the status of deposits after approval of their reserves," according to Dzhumazoda.<sup>27</sup> Authorities similarly explained in 2018 that a search for new mineral deposits across the country was underway.<sup>28</sup> The International Atomic Energy Agency's (IAEA) database shows a 2021 study about REEs at the Sokhkadambulak deposit (Northern Tajikistan), published by the Reports of the Academy of Sciences of Tajikistan.<sup>29</sup>

the Tajik Department of Geology gave a presentation at the 2021 Tyumen Oil and Gas Forum held in Russia, They stated that the Leninabad Combine of Rare Metals company at the Isfara Hydrometallurgical Plant

<sup>25</sup> "Холдингу «Наследие великих кочевников» передали месторождения Кутессай-II, Андаш, Талды-Булак и Курменты," *Economist.kg*, July 19, 2022, <https://economist.kg/novosti/2022/07/19/holdingu-nasledie-velikh-kochevnikov-peredali-mestorozhdeniya-kutessaj-ii-andash-taldy-bulak-i-kurmenty/>

<sup>26</sup> "Heritage of Great Nomads Holding to be liquidated in Kyrgyzstan," *24.kg*, February 11, 2023, [https://24.kg/english/258185\\_Heritage\\_of\\_Great\\_Nomads\\_Holding\\_to\\_be\\_liquidated\\_in\\_Kyrgyzstan/](https://24.kg/english/258185_Heritage_of_Great_Nomads_Holding_to_be_liquidated_in_Kyrgyzstan/); "Jailed Former Kyrgyz Gold Mine Manager's Request For House Arrest Denied," *Radio Free Europe/Radio Liberty*, March 10, 2023, <https://www.rferl.org/a/kyrgyz-court-rejects-jailed-kumtor-gold-mine-arrest/32311979.html>

<sup>27</sup> "Tajikistan to study uranium from rare earth deposits," *World Nuclear News*, July 10, 2014, <https://world-nuclear-news.org/Articles/Tajikistan-to-study-uranium-from-rare-earth-deposi>

<sup>28</sup> В Таджикистане проводится геологоразведка редкоземельных месторождений." Avesta Information Agency, 29 January, 2018, <https://avesta.tj/2018/01/29/v-tadjikistane-provoditsya-geologorazvedka-redkozemelnyh-mestorozhdenij/>

<sup>29</sup> Safaraliev, N.S., "Properties of rare earth elements of Sokhkadambulak deposit (Northern Tajikistan)," [Povedenie redkozemel'nikh elementov v nekotorykh mineralakh Shokhkadambulakskogo jelezorudnogo mestorojdeniya] Geosciences, Doklady Akademii Nauk Respubliki Tajikistan, V. 54 (11): 926-931 in INIS Repository, [https://inis.iaea.org/search/search.aspx?orig\\_q=RN:45020422](https://inis.iaea.org/search/search.aspx?orig_q=RN:45020422)

operated at 10 to 15 percent capacity in 2021.<sup>30</sup> The government official admitted that Tajikistan does not have a strong REE survey program, as the country's deposits were "discovered only by chance [via] passing points and anomalous concentrations during geochemical sampling in survey areas and at objects."<sup>31</sup> He explained that Tajikistan requires international partners to survey its territory for REE deposits properly. With growing China's ties in Tajikistan, this may happen sooner rather than later.

In July 2023, Ilkhom Oymuhammadzoda, the head of the Main Directorate of Geology of Tajikistan, noted that a new research project "will be carried out in the central part of Tajikistan, where there are promising areas of rare earth metals." Additionally, there are "more than eight promising deposits" throughout the country.<sup>32</sup> Lastly, an analysis of Tajikistan's interest in REEs points out that "although the country has traditionally been known for its significant hydropower potential, the development of lithium and rare earth deposits represents a promising opportunity to stimulate economic growth and attract foreign investment."<sup>33</sup>

Turkmenistan should not be ignored for its REE reserves according to a 2021 interview with technical scientist Dr. Allaberdi Ilyasov. He singled out the resources in Karabogazgol Bay, in to the Caspian Sea, which could be exploited: "The naturally renewable surface and buried brines of the Karabogazgol Bay are not the only ones of interest as hydromineral raw materials. There are also industrial, underground, associated and formation waters of oil and gas fields."<sup>34</sup> The Turkmen Geological Research Expedition is currently searching for potential sites nationwide and conducting geological and economic analyses.<sup>35</sup> As for international partners, the Russian holding company Rosgeo has a presence in Turkmenistan, where the country surveys for solid minerals and hydrocarbons.<sup>36</sup>

Other reports about REEs in Central Asia provide statistics that highlight the region's rare earth wealth. A 2021 TFI Global News report explains that the area possesses "38.6% of global manganese ore reserves, 30.07% of chromium, 20% of lead, 12.6% of zinc, 8.7% of titanium, 5.8% of aluminum, 5.3% of copper, 5.3% of cobalt, and 5.2% of molybdenum."<sup>37</sup>

Mongolia is not usually associated with the five Central Asian countries. Still, the country's REE deposits and its economic relationship with China are noteworthy as they will compete with Kazakhstan and other Central Asian states, foretell the danger of Chinese economic influence, and share core competencies in mining and similar geoeconomics and geopolitical characteristics warrant its inclusion. The Mesozoic Mushgai Khudag and Khotgor carbonatites and the Devonian Khalzan-Buregtei peralkaline granites "...have significant REE reserves, and Khalzan-Buregtei also hosts important niobium-tantalum-zirconium mineralization. Several

<sup>30</sup> Bakhtdavlatov, R.D. "Geology of Tajikistan - transition to international standards," Tyumen Oil and Gas Forum, September 16, 2021 <https://unece.org/sites/default/files/2021-10/%D0%93%D0%B5%D0%BE%D0%BB%D0%BE%D0%B3%D0%B8%D1%8F%20%D0%A2%D0%B0%D0%B4%D0%B6%D0%B8%D0%BA%D0%B8%D1%81%D1%82%D0%B0%D0%BD%D0%B0%20%E2%80%93%20%D0%BF%D0%B5%D1%80%D0%B5%D1%85%D0%BE%D0%B4%20%D0%BD%D0%B0%20%D0%BC.pdf>

<sup>31</sup> Ibid.

<sup>32</sup> "Таджикистан ведет работы по освоению редкоземельных металлов," *Sputnik News*, July 27, 2023, <https://tj.sputniknews.ru/20230727/tadjikistan-raboty-osvoenie-metally-1058472593.html>

<sup>33</sup> Sh. Sabina, "Таджикистан ведет активный поиск залежей лития и других редкоземельных металлов," *CA Viral News*, July 28, 2023, <https://www.caviral.com/tadjikistan-vedet-aktivnyj-poisk-zalezhej-litiya-i-drugih-redkozemelnyh-metallor/>

<sup>34</sup> "Turkmenistan may become largest supplier of lithium in world markets," *CentralAsia.news*, December 8, 2021, <https://centralasia.news/12669-turkmenistan-may-become-largest-supplier-of-lithium-in-world-markets.html>

<sup>35</sup> "Gaty magdanlar," Turkmen Geological Research Expedition [https://tmgeology.gov.tm/institutions/hard\\_rocks/show](https://tmgeology.gov.tm/institutions/hard_rocks/show)

<sup>36</sup> "Росгеология предлагает Туркменистану сотрудничество в геологоразведке." *Rusgeology*, January 20, 2023 <https://rusgeology.ru/press/news/rosgeologiya-predlagaet-turkmenistanu-sotrudnichestvo-v-geologorazvedke/>

<sup>37</sup> Narang, Akshay, "Central Asia is sitting on a treasure trove that will decide the world's future," *TFI Global*, December 21, 2021, <https://tfiglobalnews.com/2021/12/21/central-asia-is-sitting-on-a-treasure-trove-that-will-decide-the-worlds-future/>

other promising rare earth occurrences have not yet been explored and deserve further investigations,” according to an analysis in *Minerals*.<sup>38</sup> Due to geographical, capital, and infrastructure constraints, China is a dominating player in Mongolia’s mining industry.

Mongolia is also a well-known producer of copper, gold, uranium, and zinc. While no REE mines are operational in the country, there is still global interest. Germany’s Federal Institute for Geosciences and Natural Resources and the Mineral Resources Authority of Mongolia prepared an in-depth report 2013.<sup>39</sup> In 2022, the South Korean foreign minister visited the country and signed “an agreement to boost cooperation on global supply chain issues, with a focus on the development of rare earths.”<sup>40</sup> President Emmanuel Macron carried out the first-ever visit of a French head of state to Mongolia in May 2023, and “cooperation on the extraction and trade of minerals used in satellites, cell phones, and other key technologies” was discussed.<sup>41</sup>

Another potential new player in Mongolia’s REEs is the United States. During an August 2023 visit to Washington, DC, Mongolian Prime Minister L. Oyun-Erdene announced his country’s interest in increasing cooperation with the United States regarding REEs.<sup>42</sup> The “Joint Statement on the Strategic Third Neighbor Partnership between the United States of America and Mongolia,” signed during his meeting with U.S. Vice President Kamala Harris, does not mention REEs but highlights the shared “desire to deepen the bilateral economic relationship in areas of mutual interest and to pursue opportunities for cooperation in the mineral resources sector.”<sup>43</sup>

## 2. Freedom of REE Data

To attract new partners and investors, Central Asian governments must conduct surveys for REE deposits across their territory and make REE-related data readily available for potential investors and partners. For example, Kazakhstan and Uzbekistan have digitized their data. This is the first step in further international development of these REE deposits that Kyrgyzstan, Tajikistan, and Turkmenistan should follow.

Central Asian governments should also amalgamate information about REEs compiled in the Soviet era with more recent data analyses, like USGS surveys. Tajikistan is a mineral-rich country that would especially benefit from information sharing, as the government has yet to release the findings of its REE deposits survey announced nearly a decade ago.

The Caspian Policy Center’s 2022 report focuses on the Soviet legacy, saying that “many of the region’s

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<sup>38</sup> Dostal, Jaroslav; Gerel, Ochir, “Rare Earth Element Deposits in Mongolia,” *Minerals*, 13(1), 2023, <https://doi.org/10.3390/min13010129>; Peyrouse, Sebastien, “Rare Earth Metals in Central Asia and Mongolia: A Promising but Paradoxical Agenda,” Central Asia Economic Paper, No. 1 George Washington University, August 2012, <https://centralasiaprogram.org/rare-earth-metals-central-asia-mongolia-promising-paradoxical-agenda>

<sup>39</sup> “Rare Earths of Mongolia: Evaluation of Market Opportunities for the Principal Deposits of Mongolia,” (Federal Institute for Geosciences and Natural Resources and Mineral Resources Authority of Mongolia, 2103, [https://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Downloads/mongolei\\_MRAM\\_RareEarthsMongolia.pdf?\\_\\_blob=publicationFile&v=3](https://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Downloads/mongolei_MRAM_RareEarthsMongolia.pdf?__blob=publicationFile&v=3)

<sup>40</sup> Krusekopf, Charles, “Mongolia’s Development of Critical Minerals” National Bureau of Asian Research, August 16, 2023, <https://www.nbr.org/publication/mongolias-development-of-critical-minerals-opportunities-and-challenges/>

<sup>41</sup> “Rare earths, Ukraine top agenda on French President Macron’s historic visit to Mongolia,” *Associated Press*, May 22, 2023, <https://apnews.com/article/mongolia-france-macron-minerals-ukraine-e066e3c17f9fb81f93252cedcd43f1c6>

<sup>42</sup> Lewis, Simon & Brunnstrom, David, “Mongolia to deepen cooperation with US on rare earths, prime minister says,” *Reuters*, August 2, 2023, <https://www.reuters.com/world/mongolia-deepen-cooperation-with-us-rare-earth-pm-says-washington-visit-2023-08-03/>

<sup>43</sup> “Joint Statement on the Strategic Third Neighbor Partnership between the United States of America and Mongolia,” The White House, August 2, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/08/02/joint-statement-on-the-strategic-third-neighbor-partnership-between-the-united-states-of-america-and-mongolia/>

countries [tend] to be overly secretive regarding allowing access to geologic data [...] In some instances, even when authorities in one of the Central Asian states have been willing to share data, they have had to get Russian permission.”<sup>44</sup> Secretive attitudes in Central Asian governments, geological institutes, and mining companies hinder the development of their REE deserves. Greater transparency and information-sharing is critical for successfully attracting new partners and investors.

## IV. Policy Challenges in Central Asian REEs: Analysis and Discussion

This section will discuss the geopolitical, geoeconomic, and industrial issues to consider when looking for new partners, investors, and customers for Central Asia's REEs.

### 1. Geopolitical & Geoeconomic Considerations

The Russian invasion of Ukraine has dramatically affected global geopolitics. Great power competition is stoking fear that another Cold War may be upon us, including the proxy and direct conflicts that go with it. Economic warfare is also rearing its head again, seen in incidents like the September 2022 sabotage attacks against the Nord Stream pipeline<sup>45</sup> and international sanctions against Russia's oil industry,<sup>46</sup> both of which will have long-term effects on the future of European energy in particular.

Procuring REEs will help Washington to diversify its energy sources, develop renewable energy resources, and combat climate change. It is also vital to the great power competition: Should a conflict with Beijing occur, Washington wants guaranteed access to REEs.

The United States plans to establish a domestic REE supply and refining chain due to this great power competition with Russia and China. An article in *National Defense* magazine highlights this, noting that Beijing “controls nearly 60 percent of rare earth mining operations, more than 85 percent of processing capacity and more than 90 percent of permanent magnet production” which “poses a vulnerability within the United States' supply chain and poses potential national security risks.”<sup>47</sup>

Economic warfare has been and will continue to be relevant to REE development. In October 2023, Namibia cut off supplies of lithium<sup>48</sup> and other REEs to China over contract disputes.<sup>49</sup> Ironically, this emulates China's own weaponization of REEs when Beijing capped a decade of intermittent ad-hoc restrictions on REE exports in April 2023, aimed at limiting U.S. imports of Chinese REEs. While Central Asia countries are in an ideal position to capitalize on changing geopolitical and energy shifts, caution is necessary.

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<sup>44</sup> “Sourcing Rare Earth Minerals in Central Asia”: 13 [https://api.caspianpolicy.org/media/ckeditor\\_media/2022/06/15/sourcing-rare-earth-minerals-in-central-asia\\_IUGwsVB.pdf](https://api.caspianpolicy.org/media/ckeditor_media/2022/06/15/sourcing-rare-earth-minerals-in-central-asia_IUGwsVB.pdf)

<sup>45</sup> Roth, Andrew, “Biden ‘knew of Ukrainian plan to attack Nord Stream’ three months before explosion,” *The Guardian*, June 6, 2023, <https://www.theguardian.com/business/2023/jun/06/biden-knew-of-plan-to-attack-nord-stream-three-months-before-explosion>; Vakulenko, Sergey, “Shock and Awe: Who Attacked the Nord Stream Pipelines?” Carnegie Endowment for International Peace, September 30, 2022, <https://carnegieendowment.org/politika/88062>

<sup>46</sup> “EU sanctions against Russia explained,” European Council, <https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-against-russia-over-ukraine/sanctions-against-russia-explained/> In June 2022, the Council adopted a sixth package of sanctions that, among others, prohibits the purchase, import or transfer of seaborne crude oil and certain petroleum products from Russia to the EU. The restrictions apply from 5 December 2022 for crude oil and from 5 February 2023 for other refined petroleum products.

<sup>47</sup> Eley, Mikayla, “SPECIAL REPORT: U.S. Begins Forging Rare Earth Supply Chain,” *National Defense*, February 10, 2023, <https://www.nationaldefensemagazine.org/articles/2023/2/10/us-begins-forging-rare-earth-supply-chain>

<sup>48</sup> Nyungwa, Nyasha “Namibia orders police to stop Chinese firm's lithium exports” *Reuters*, October 24, 2023, <https://www.reuters.com/world/africa/namibia-orders-police-stop-chinese-firms-lithium-exports-2023-10-24/>

<sup>49</sup> Newcomb, Tim “Why China is Banning Rare Earth Metal Exports”, *Popular Mechanics*, April 7, 2023, <https://www.popularmechanics.com/technology/a43589885/why-is-china-banning-rare-earth-metal-exports/>

Central Asian states still must maintain close relations with Russia and China, as both have significant sway in the region. This has led regional capitals to take part in organizations like the Eurasian Economic Union, the Shanghai Cooperation Organization, the Commonwealth of Independent States, and the Collective Security Treaty Organization. Presidents Xi Jinping and Vladimir Putin have conducted numerous meetings with leaders of Central Asian states and visited the countries repeatedly.<sup>50</sup> Trade and commercial relations remain strong, and Russia remains a popular destination for Central Asian migrant workers who provide billions of dollars worth of remittances, especially to Kyrgyzstan, Tajikistan, and Turkmenistan.<sup>51</sup> Defense relations are also critically important, with Russia's 201st Rifle Division being based in Tajikistan, as an example.<sup>52</sup>

Defense ties between Russia and Central Asia have gotten more complicated since Moscow's invasion of Ukraine. Heavy Russian losses and the Wagner crisis<sup>53</sup> have cast doubt on Moscow's ability to wage war. There is concern in Central Asia after Russia announced the importance of protecting ethnic Russians living in Northern Kazakhstan,<sup>54</sup> an argument similar to Moscow's reasoning to attack Ukraine in February 2022 and 2014.<sup>55</sup> Central Asian governments must balance the risk of a weakened Russia lashing out, and seizing the opportunity that a weakened Russia offers.

Central Asian states must be cautious in working with the United States and Europe on REE projects, lest they anger Moscow. It is important for Central Asian actors not to harm the regional balance, maintain a stable relationship with Russia, and avoid circumstances or arrangements that could hurt the Central Asian economies through secondary sanctions. For example, at the United Nations, the five Central Asian countries have taken a neutral stance regarding resolutions against Russia. In February 2023, UN General Assembly Resolution A/ES-11/L.7 passed with 141 votes in favor, seven against, and 32 abstentions: four Central Asian countries abstained, while Turkmenistan did not vote.<sup>56</sup>

## 2. Extra-Regional Partners are critical for Central Asia's REEs

Economic gravity ensures that Central Asian states need to maintain substantial financial relationships with Russia and China. This does not mean that Central Asia must be politically dependent on Moscow and Beijing, nor does it preclude relations with the West. In 2023 alone, several high-profile meetings and visits highlight how Central Asian governments seek new trade partners and investors.

Between February 28 and March 3, 2023, U.S. Secretary of State Antony Blinken traveled to Kazakhstan and

<sup>50</sup> Sino-Central Asia relations have also reached the "C5+1" format. The first ever Central Asia-China summit took place in May 2023 in China. Devonshire-Ellis, Chris, "China-Central Asia Summit Results In Xi'an Declaration and Regional Trade & Investment Advances," *Silk Road Briefing*, May 22, 2023, <https://www.silkroadbriefing.com/news/2023/05/22/china-central-asia-summit-results-in-xian-declaration-and-regional-trade-investment-advances/>

<sup>51</sup> Putz, Catherine, "War and Migration: Central Asian Migrant Worker Flows Amid the Ukraine Conflict," *The Diplomat*, May 31, 2023, <https://thediplomat.com/2023/05/war-and-migration-central-asian-migrant-worker-flows-amid-the-ukraine-conflict/>; "The Plight of Central Asian Migrants in Wartime Russia," Stratfor, August 17, 2023, <https://worldview.stratfor.com/article/plight-central-asian-migrants-wartime-russia>

<sup>52</sup> "Up To 1,500' Russian Troops Redeployed To Ukraine From Tajik Base, Investigation Reveals," *Radio Free Europe/Radio Liberty*, September 14, 2022, <https://www.rferl.org/a/russia-troops-tajik-base-redeployed-ukraine/32033791.html>

<sup>53</sup> "Assessing the Wagner Group's Aborted Run on Moscow: What Comes Next?" International Crisis Group, June 29, 2023, <https://www.crisisgroup.org/europe-central-asia/caucasus/russia-internal/assessing-wagner-groups-aborted-run-moscow-what-comes>; Altman, Howard, "Ukraine Situation Report: Prigozhin's Son Has Eye On Wagner Reboot," *The Drive*, October 3, 2023, <https://www.thedrive.com/the-war-zone/ukraine-situation-report-prigozhins-son-has-eye-on-wagner-reboot>

<sup>54</sup> Altynbayev, Kanat, "Ethnic Russians in Kazakhstan tell Moscow they don't need 'saving'" *Caravanserai*, March 22, 2022, [https://central.asia-news.com/en\\_GB/articles/cnmi\\_ca/features/2022/03/22/feature-01](https://central.asia-news.com/en_GB/articles/cnmi_ca/features/2022/03/22/feature-01)

<sup>55</sup> Ashby, Heather, Ph.D., "How the Kremlin Distorts the 'Responsibility to Protect' Principle," United States Institute for Peace, April 7, 2022, <https://www.usip.org/publications/2022/04/how-kremlin-distorts-responsibility-protect-principle>

<sup>56</sup> "UN General Assembly calls for immediate end to war in Ukraine," *UN News*, February 23, 2023, <https://news.un.org/en/story/2023/02/1133847>; "UN tells Russia to leave Ukraine: How did countries vote?" *Al Jazeera*, February 24, 2023, <https://www.aljazeera.com/news/2023/2/24/un-tells-russia-to-leave-ukraine-how-did-countries-vote>

Uzbekistan. In Astana, Blinken participated in a ministerial meeting of the C5+1 (the five Central Asian states plus the United States) and discussed the war in Ukraine and sanctions with his fellow ministers.<sup>57</sup> In June 2023, the U.S. Chamber of Commerce's U.S.-Kazakhstan Business Council took its first business delegation to Almaty and Astana.<sup>58</sup> That same month, the American Chamber of Commerce in Uzbekistan hosted a U.S. Department of Commerce trade mission in Tashkent.<sup>59</sup>

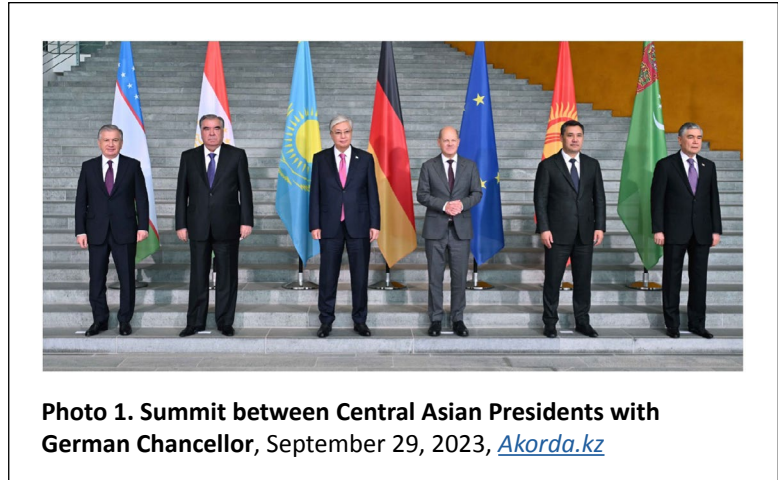
During the September 2023 UN General Assembly in New York City, President Joe Biden and the five Central Asian presidents held a historic C5+1 summit, the first meeting of all Central Asian heads of state and the U.S. president. The Declaration of New York does not mention Ukraine, Russia, or sanctions. Still, it does mention Washington's interest in supporting, among others, "critical transport, clean energy and critical minerals supply chains."<sup>60</sup>

**European** governments also continue to grapple with their dependence on China.

In April 2023, the European Union passed an act that endeavors to "make the bloc more self-sufficient in the production of critical materials. The export controls on gallium and germanium are already putting pressure on countries to consider alternatives and will continue to erode China's market dominance for critical materials."<sup>61</sup> The European Union's decision shows that the bloc is open to new suppliers.

Central Asian governments must use this momentum in Europe to demonstrate that they can provide REEs, as well as uranium, natural gas, and oil. On September 29, 2023, the five Central Asia presidents traveled to Germany for a summit with German Chancellor Olaf Scholz.<sup>62</sup> While Berlin, Kazakh President Kassym-Jomart Tokayev met with Dennis Schwindt, Chairman of the Board of HMS Bergbau AG, a German commodities marketing company. The company presented "a project for the construction of a mining and processing plant for the extraction and processing of lithium in the East Kazakhstan region. The total amount of planned investments will be \$500 million."<sup>63</sup> If this project moves forward, it will significantly benefit the development of Kazakhstan's mining industry.

**Japan** has historically been present in Central Asia, particularly Kazakhstan. Agreements have been signed between Nipponese Oil, Gas, and Metals National Corporation (JOGMEC) and local authorities to explore



**Photo 1. Summit between Central Asian Presidents with German Chancellor, September 29, 2023, [Akorda.kz](https://www.akorda.kz)**

<sup>57</sup> "Secretary Blinken's Travel to Kazakhstan, Uzbekistan, and India," US Department of State, Press Statement, February 23, 2023, <https://www.state.gov/secretary-blinkens-travel-to-kazakhstan-uzbekistan-and-india/>

<sup>58</sup> "U.S. Chamber Leads its First Business Delegation to Kazakhstan," US Embassy in Kazakhstan, June 9, 2023, <https://kz.usembassy.gov/u-s-chamber-leads-its-first-business-delegation-to-kazakhstan/>

<sup>59</sup> "The American Chamber of Commerce in Uzbekistan Hosts a U.S. Department of Commerce Certified Trade Mission to Tashkent, Uzbekistan," U.S. embassy in Uzbekistan, <https://uz.usembassy.gov/american-chamber-of-commerce-in-uzbekistan/>

<sup>60</sup> "C5+1 Leaders' Joint Statement," The White House, September 21, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/21/c5-1-leaders-joint-statement/>

<sup>61</sup> Godek "Why China's Export Controls on Germanium and Gallium May Not Be Effective." ; "EU acts to secure access to critical raw materials," Economist Intelligence, April 17, 2023, <https://www.eiu.com/n/eu-acts-to-secure-access-to-critical-raw-materials/>

<sup>62</sup> Pannier, Bruce, "Central Asia in Focus: Central Asian Leaders Visit Berlin," *Radio Free Europe/Radio Liberty*, October 3, 2023, <https://pressroom.rferl.org/a/32620984.html>

<sup>63</sup> "Порядка \$600 млн вложат немецкие инвесторы в строительство двух заводов в Казахстане," *Vlast.kz*, September 28, 2023, <https://vlast.kz/novosti/56944-poradka-600-mln-vlozhat-nemeckie-investory-v-stroitelstvo-dvuh-zavodov-v-kazhstane.html>

REEs in the Karaganda and Kostanay regions.<sup>64</sup> In 2011, Reuters reported that “Kazatomprom is also forming a joint venture with Japan’s Toshiba Corp while in neighboring Kyrgyzstan, Canadian junior miner Stans Energy Corp plans to relaunch a mine that supplied 80 percent of the Soviet Union’s rare earths.”<sup>65</sup>

To boost ties with resource-rich Central Asia, Japan will organize the first-ever C5+1 between Tokyo and the five governments in 2024. “Japanese Foreign Minister Yoko Kamikawa confirmed the plans when she met with Kazakh Foreign Minister Murat Nurtleu on the sidelines of the [2023] U.N. General Assembly in New York,” reported *Nikkei*.<sup>66</sup> A joint statement by the Kazakh and Japanese foreign ministers adds that “it is meaningful to hold the Summit of the ‘Central Asia plus Japan’ Dialogue at a suitable time next year” and confirmed that Kazakhstan, the current Chair of the Dialogue, and Japan would cooperate on coordinating with other related countries.”<sup>67</sup> During the summit, we can expect REEs, among other energy resources and critical goods, to be discussed.

**Arab states** are also seeking to increase their commercial and trade ties with Central Asia. In July 2023, the Central Asia-Gulf Cooperation Council summit was held in Saudi Arabia.<sup>68</sup> Saudi Arabia’s Crown Prince Mohammed bin Salman stressed the importance of respecting the sovereignty, independence, and values of states, non-interference in their internal affairs, and the need to intensify joint efforts to confront everything that affects energy security and global food supply chains. No REE-related contracts were signed during the summit, but they could occur soon, particularly since countries like Saudi Arabia are focused on developing green energy.

In 2023 alone, all five Central Asian presidents have met, as a group, with the leaders of the United States, Germany, China, and the Arab states. Central Asian regulatory and economic engagement with the West has a long way to go. Having regional leaders meet with extra-regional actors as a unit promotes regional harmony and confidence-building. This continued regional integration and joint engagement with interested extra-regional parties are vital if the region is to achieve win-win REE-related agreements.

### 3. The Global Race for REEs has Already Started

Given the global energy revolution, other countries where REEs and critical minerals are located are also focusing on exploiting their natural resources. If Central Asia does not rapidly engage with the REE market, market competitors will. Such a failure to act quickly would imperil future investment.

Argentina, Bolivia, and Chile form the so-called “Lithium Triangle” of South America. The Chilean government plans to nationalize its lucrative lithium industry “to boost its economy and protect its environment.”<sup>69</sup> Neighboring Peru intends to join the Lithium Triangle by beginning lithium exports this decade.<sup>70</sup>

<sup>64</sup> Jamasmie, Celilia, “Japan tightens grip on Kazakhstan’s emerging rare earths sector,” *Mining.com*, <https://www.mining.com/japan-tightens-grip-on-kazakhstan-emerging-rare-earth-secor/>

<sup>65</sup> Orininskaya, Olga & Paxton, Robin, “Central Asia joins hunt for rare earth metals,” *Reuters*, March 24, 2011, <https://www.reuters.com/article/us-metals-kazakhstan-rare-idUSTRE72N1XG20110324>

<sup>66</sup> Nemoto, Rey, “Japan seeks to boost Central Asia relations with 1st summit in 2024,” *Nikkei*, September 22, 2023, <https://asia.nikkei.com/Politics/International-relations/Japan-seeks-to-boost-Central-Asia-relations-with-1st-summit-in-2024>

<sup>67</sup> “Japan-Kazakhstan Foreign Ministers’ Meeting,” Ministry of Foreign Affairs (Japan), September 20, 2023, [https://www.mofa.go.jp/erp/ca\\_c/kz/page4e\\_001479.html](https://www.mofa.go.jp/erp/ca_c/kz/page4e_001479.html)

<sup>68</sup> “Saudi crown prince: We look forward to benefiting from joint GCC-Central Asian cooperation,” *Arab News*, July 19, 2023, <https://www.arabnews.com/node/2340586/saudi-arabia>

<sup>69</sup> Villegas, Alexander; Scheyder, Ernest, “Chile plans to nationalize its vast lithium industry,” *Reuters*, April 21, 2023, <https://www.reuters.com/markets/commodities/chiles-boric-announces-plan-nationalize-lithium-industry-2023-04-21/>

<sup>70</sup> “Perú autorizará exploración de litio en la región de Puno,” *The Logistics World*, April 11, 2023, <https://thelogisticsworld.com/actualidad-logistica/peru-autorizara-exploracion-de-litio-en-la-region-de-puno/>



REE mining in Latin America is in its infancy, but great interest exists. Located in Goias, Brazil, the [Serra Verde](#) project is “one of the largest known ionic clay rare earth deposits outside of China.” Specific REEs were found there are neodymium, praseodymium, and terbium dysprosium. The company aims to produce “at least 5,000 tons of [REEs] during a period of 25 years.”<sup>71</sup> When operational, the project in will be Brazil’s first REE mine.

In Colombia, [Auxico Resources Canada](#) plans to build a refinery for REEs valued at USD 116.2 million.<sup>72</sup> The Chilean company [Aclara Resources](#) is currently conducting environmental impact studies for the Penco Module mining project where REEs like dysprosium and neodymium exist.<sup>73</sup> Graph 2 shows the company’s current schedule: production is expected to begin by Q2 of 2027, three years after its environmental impact assessment (EIA). Northern Argentina also possesses REE deposits, but no mining projects are currently underway.<sup>74</sup>

**Graph 2. “Aclara provides an update on permitting and development strategy for the Penco Module project in Chile”**

- |                               |         |
|-------------------------------|---------|
| ▪ EIA 1 Filing:               | Q1 2024 |
| ▪ Anticipated EIA 1 Approval: | Q4 2025 |
| ▪ Feasibility Study Filing:   | Q3 2025 |
| ▪ Construction:               | Q1 2026 |
| ▪ Production:                 | Q2 2027 |

[Aclara](#), September 25, 2023

Regional universities are also carrying out REE-related research. Chile’s Bernardo O’Higgins University researched and analyzed the potential of the REE industry in the Bío Bío region. The study concluded that future REE-mining projects in the area could create “up to 2,200 direct and indirect jobs,” while Chile could become Latin America’s mining industry leader, displacing Brazil from the top slot.<sup>75</sup> As discussed in this report, it is vital that universities also participate in researching and analyzing the potential of REEs in their respective countries.

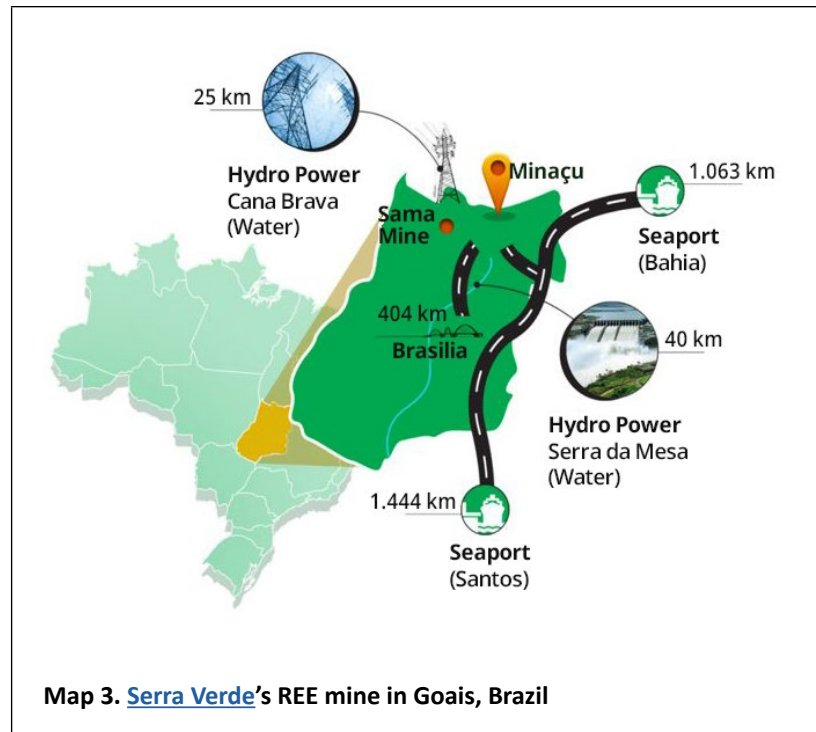
<sup>71</sup> Hinostroza, Kevin, “Serra Verde pone en marcha mina de tierras raras Pela Ema,” *Rumbo Minero*, June 22, 2023, <https://www.rumbominero.com/brasil/serra-verde-mina-de-tierras-raras-pela-ema/>

<sup>72</sup> Meneses, Elizabeth, “Auxico planea construir refinería de tierras raras en Santa Marta,” *Rumbo Minero*, November 29, 2021, <https://www.rumbominero.com/colombia/auxico-refineria-de-tierras-raras-santa-marta/>; “Tierras raras: los minerales que explotará Colombia y se extraen de pocos países,” *El Espectador*, August 27, 2023, <https://www.elespectador.com/ambiente/que-son-tierras-raras-sus-usos-precios-y-paises-productores/>

<sup>73</sup> “Penco Module - Mineral Resources,” Aclara, <https://www.aclara-re.com/operations-penco-module-mineral-resources>

<sup>74</sup> “Tierras raras’: Argentina tiene minerales clave para las nuevas tecnologías,” *Agenda.ar*, December 29, 2022, <https://agendarweb.com.ar/2022/12/29/tierras-raras-argentina-tiene-minerales-clave-para-las-nuevas-tecnologias/>

<sup>75</sup> “Tierras Raras: Chile podría convertirse en líder latinoamericano en la producción de este material,” Universidad Bernardo O’Higgins, May 22, 2023, <https://www.ubo.cl/tierras-raras-chile-podria-convertirse-en-lider-latinoamericano-en-la-produccion-de-este-material/>; Flores, Tomas; Berger, Felipe, “Tierras Raras,” University Bernardo O’Higgins, Working Paper, April 2023 <https://prensa.ubo.cl/wp-content/uploads/2023/05/Informe-Tierras-Raras-mayo.pdf>



**Africa** also has untapped REE resources.<sup>76</sup> REE deposits across Sub-Saharan Africa that could benefit U.S. interests have been widely analyzed. The U.S. think tank Institute for Defense Analyses issued a 2022 report titled “Rare Earth Elements in Africa: Implications for U.S. National and Economic Security.”<sup>77</sup> The report concludes: “In the search for alternative sources of REEs, Africa emerges as a relatively untapped source. The U.S. Geological Survey identifies 99 deposits of REEs in 27 African countries. Still, the most recent information indicates that mining companies have contracts to explore in only eight countries, which presents an opportunity for the U.S. market.”<sup>78</sup>

As with Latin America, research of Africa's REEs is on the rise.<sup>79</sup> The African Development Group released a 2021 report titled *Rare Earth Elements: Value Chain Analysis for Mineral-Based Industrialization in Africa*.<sup>80</sup> The report noted that “Africa's REE ore deposits are mostly located in the eastern and southern parts of the continent....to date [2021], the 14 deposits are estimated to have a combined mineral resource (mainly at inferred category) with potential for a contained total Rare Earth Oxide (TREO) content of more than four million tons.”<sup>81</sup> Moreover, news outlets and analysts have published articles about how African governments can attract REE investment and projects. Energy Capital & Power, which describes itself as “Africa's leading investment platform for the energy sector,” published an article titled “Five Ways Africa can Maximize its

<sup>76</sup> Baskaran, Gracelin, “Could Africa replace China as the world's source of rare earth elements?” *Brookings Institution*, December 29, 2022, <https://www.brookings.edu/articles/could-africa-replace-china-as-the-worlds-source-of-rare-earth-elements/>

<sup>77</sup> Bekoe, Dorina; Daly, Sarah; Burchard, Stephanie; Deathearage, Sydney; Sindle, Erin, “Rare Earth Elements in Africa: Implications for U.S. National and Economic Security,” *Institute for Defense Analyses*, February 2022, <https://apps.dtic.mil/sti/trecms/pdf/AD1204908.pdf>

<sup>78</sup> *Ibid*: 13

<sup>79</sup> Harmer, Robin; Nex, Paul. A. M., “Rare Earth Deposits of Africa,” *Episodes*, Vol. 39, Issue, 2, June 2016: 381-406 [https://www.researchgate.net/publication/305918070\\_Rare\\_Earth\\_Deposits\\_of\\_Africa](https://www.researchgate.net/publication/305918070_Rare_Earth_Deposits_of_Africa) Also see: Temga, Jean Pierre, et al., “Rare earth elements in tropical soils, Cameroon soils (Central Africa),” *Geoderma Regional*, Vol. 25, June 2021, <https://www.sciencedirect.com/science/article/abs/pii/S2352009421000146>

<sup>80</sup> “Rare Earth Elements (REE) - Value Chain Analysis for Mineral Based Industrialization in Africa,” African Natural Resources Centre, African Development Bank Group, 2021 <https://www.afdb.org/fr/documents/rare-earth-elements-ree-value-chain-analysis-mineral-based-industrialization-africa>

<sup>81</sup> *Ibid*: 15

Rare Earths Mining Industry” in February 2023.<sup>82</sup> The proposals are similar to those discussed in this report about Central Asia: the need to enhance exploration and production, strengthen infrastructure, develop local value chains, utilize regional trade agreements, and attract foreign investment.

**Asia**, excluding China and Central Asia, is another focus of REE development. In September, President Joe Biden paid a historic visit to **Vietnam**, where he met with General Secretary Nguyen Phu Trong. A strategic partnership was signed during the visit, which explains that “the United States is expanding its collaboration with Vietnam through new projects and mechanisms,” including:

***Diverse and Securing Critical Mineral Supply Chains: A bilateral Memorandum of Understanding strengthens technical cooperation to support Vietnam’s efforts to quantify its REE resources and economic potential, attract quality investment for integrated REE sector development, and meet high environmental, social, and governance standards.***<sup>83</sup>

Vietnam aims to increase its output of REEs to 2.02 million tons by 2030. Reuters reported that “Vietnam will develop three to four new mines after 2030, aiming to raise its output of raw rare earths to 2.11 million tons by 2050.”<sup>84</sup> Other Asian countries are drafting more protective and cautious REE-related policies. For instance, Indonesia and Malaysia are restricting the export of REEs to “stimulate the development of a domestic processing industry.”<sup>85</sup>

The lack of academic and commercial English-language analyses of Central Asia’s REE deposits and industry has limited development. Worldwide, competitors are taking every initiative to incentivize foreign investment. The digitization of data and ongoing surveys, like in Tajikistan, are encouraging. More transparency and openness are necessary for the world to recognize the potential of Central Asia’s REE.

Great power competition is not the sole reason Central Asia nations should develop their domestic refining and mining potential. Other regions that possess REEs and critical minerals are already seeking to exploit and profit from them—Japan is even considering seabed mining for REEs to reduce its dependence on China.<sup>86</sup> Central Asia is well positioned to benefit from its natural resources if the right steps are taken to attract investors powered and resourced to put together significant deals and deliver on the projects agreed to.

## 4. Incentivizing the green transition

Developed economies are providing incentives to go green. Scholarly research divides incentives into three categories: “1) incentives stemming from policies, 2) incentives based on market interactions, and 3) energy efficient finance.”<sup>87</sup> A 2019 Organization for Economic Cooperation and Development (OECD) analysis

<sup>82</sup> Hollands, Charne, “Five Ways Africa can Maximize its Rare Earths Mining Industry,” *Energy Capital & Power*, February 27, 2023, <https://energycapitalpower.com/five-ways-africa-can-maximize-its-rare-earths-mining-industry/>

<sup>83</sup> “President Joseph R. Biden and General Secretary Nguyen Phu Trong Announce the U.S.-Vietnam Comprehensive Strategic Partnership,” The White House, Fact Sheet, September 10, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/10/fact-sheet-president-joseph-r-biden-and-general-secretary-nguyen-phu-trong-announce-the-u-s-vietnam-comprehensive-strategic-partnership/>

<sup>84</sup> “Vietnam to up annual raw rare earths output to 2m tonnes by 2030,” *Reuters/Nikkei*, July 25, 2023, <https://asia.nikkei.com/Business/Materials/Vietnam-to-up-annual-raw-rare-earths-output-to-2m-tonnes-by-2030>

<sup>85</sup> Strangio, Sebastian, “Malaysia Flags Ban on Export of Rare Earth Minerals,” *The Diplomat*, September 12, 2023, <https://thediplomat.com/2023/09/malaysia-flags-ban-on-export-of-rare-earth-minerals/>; Maulia, Erwida, “Indonesia bets on critical mineral export bans as deadline nears,” *Nikkei*, May 23, 2023, <https://asia.nikkei.com/Spotlight/Asia-Insight/Indonesia-bets-on-critical-mineral-export-bans-as-deadline-nears>

<sup>86</sup> Foster, Scott, “Japan dives into rare earth mining under the sea,” *Asia Times*, January 10, 2023, <https://asiatimes.com/2023/01/japan-dives-into-rare-earth-mining-under-the-sea/>

<sup>87</sup> Tryndia, Nicole, et al, “Renewable energy incentives on the road to sustainable development during climate change: A review,” *Frontiers in Environmental Science*, Vol. 10, 2022, <https://www.frontiersin.org/articles/10.3389/fenvs.2022.1016803/full>

argued that “a well-managed transition to a greener economy will create opportunities for businesses and workers. Opportunities will arise all along the supply chain, from technology providers to users of more energy-efficient technologies. Some sectors will grow more than others, but within each sector, companies using resources more efficiently will have a competitive advantage.”<sup>88</sup>

The **United States’ [Inflation Reduction Act \(IRA\)](#)**, signed into law by President Biden in August 2022, encourages companies to go green by providing more incentives such as tax credits. The IRA provides “a two-tiered system for renewable energy investment tax credits, provides a base credit equal to 20% of the maximum credit and a bonus credit equal to an additional 80% of the maximum credit.”<sup>89</sup> Moreover, as explained in Graph 3 below, “the Investment Tax Credit (ITC) and Production Tax Credit (PTC) allow taxpayers to deduct a percentage of the cost of renewable energy systems from their federal taxes. These credits are available to taxable business entities and certain tax-exempt entities eligible for direct payment of tax credits.”<sup>90</sup>

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<sup>88</sup> “Innovation and Business/Market Opportunities associated with Energy Transitions and a Cleaner Global Environment,” Organisation for Economic Co-operation and Development, Issue Paper, February 2019: 15 <https://www.oecd.org/g20/summits/osaka/OECD-G20-Paper-Innovation-and-Green-Transition.pdf>

<sup>89</sup> “How tax credits can be used to capitalize on the Green Transition,” *Reuters*, April 24, 2023, <https://www.thomsonreuters.com/en-us/posts/esg/tax-credits-green-transition/>

<sup>90</sup> “Summary of Inflation Reduction Act provisions related to renewable energy,” US Environmental Protection Agency, June 1, 2023, <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy>

Eligible for ITC or PTC	Eligible for ITC	Eligible for PTC
multiple solar and wind technologies, municipal solid waste, geothermal (electric), and tidal	energy storage technologies, microgrid controllers, fuel cells, geothermal (heat pump and direct use), combined heat & power, microturbines, and interconnection costs	biomass, landfill gas, hydroelectric, marine and hydrokinetic

**Graph 3. Summary of Inflation Reduction Act provisions related to renewable energy**  
[U.S. Environmental Protection Agency](#), June 1, 2023

France is drafting a bill that will provide up to EUR 500 million (approximately USD 504 million) annually on tax credits for power generated from renewable energy sources, batteries and heat pumps. The tax credit, the French Ministry of Finance projects, will “generate EUR 23 billion (approximately USD 24.4 billion) in private investments in the green energy sector by the end of the decade and create around 40,000 new jobs.”<sup>91</sup> Japan also plans on investing in the U.S. green energy transformation, with USD 1 trillion earmarked for its development over the next decade. Reuters explains that this “...project, which will include banks such as Mitsubishi UFJ Financial Group... will [center] around Sapporo, in the northernmost main island of Hokkaido, which in 2024 will be designated a special zone to attract renewable energy investment.”<sup>92</sup>

## 5. Case Study: Kazakhstan's Rare Minerals and Multivector Foreign Policy

Since independence, Kazakhstan has become well-known for its effective multivector foreign policy. Astana has sought to create friendships, secure partnerships with global powers, boost its presence in multinational organizations and institutions, and expand its worldwide recognition. The strategy has been quite effective, as Kazakhstan is widely regarded as Central Asia's most developed nation and a regional leader. Attesting to its international sway, Kazakhstan is the only Central Asian nation elected as a rotating member of the UN Security Council (2017-2018), was the Organization of Security and Cooperation in Europe (OSCE) chair in 2010, organized the Astana Peace Process to resolve the Syrian civil war, and participated in early negotiations between the UNSC P5 and Iran.<sup>93</sup>

Astana's economy currently is overly dependent on its extraction of oil, coal, and uranium. Between January and June of 2023, the country increased its oil exports by 8 percent compared to the same period in 2022,

<sup>91</sup> George, Violet, “France To Spend €500M On Tax Credits For Green Tech,” *Carbon Herald*, May 19, 2023, <https://carbonherald.com/france-to-spend-e500m-on-tax-credits-for-green-tech/>

<sup>92</sup> Lies, Elaine, “Japan, large banks to launch plan to attract investment in green transformation, Nikkei reports,” *Reuters*, June 17, 2023, <https://www.reuters.com/sustainability/japan-govt-large-banks-launch-plan-attract-investment-green-transformation-2023-06-17/>; Komachi, Hitomi; Neilson, Scott; Voss, Mathias, “Japan unveils green subsidy programme – can it compete with the U.S. Inflation Reduction Act?” *Allen & Overy/JD Supra*, April 11, 2023, <https://www.jdsupra.com/legalnews/japan-unveils-green-subsidy-programme-6441356/>

<sup>93</sup> Lillis, Joanna, “Cautious Optimism as Kazakhstan Hosts Iran Nuclear Talks,” *Eurasianet*, April 4, 2013, <https://eurasianet.org/cautious-optimism-as-kazakhstan-hosts-iran-nuclear-talks>

reaching 35.70 million metric tons.<sup>94</sup> Astana has sought to diversify its economy in recent years by creating the Astana International Financial Centre (AIFC), aimed at making the country an investment magnet of the region; jumpstart its agriculture and tourism industries; and attract international investors to non-energy sectors like manufacturing.

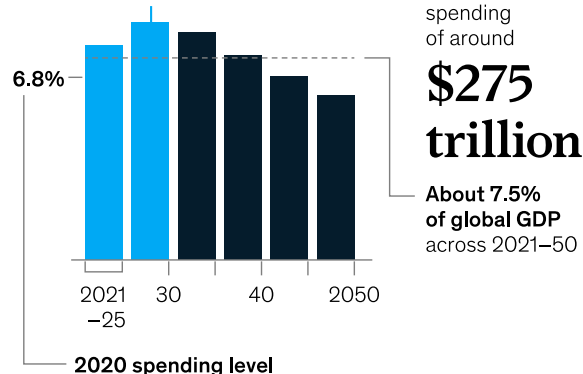
Investing in REEs would provide Kazakhstan a set of commodities which are easily exportable given its existing economic core competencies, and are more future-proof than coal or hydrocarbons. Furthermore, the logistical realities of REE export means that developing REE mining could ultimately result in a 21st century green technology manufacturing base, if Astana plays its cards right.

Astana also aims to achieve carbon neutrality by 2060. In February 2023, Kazakhstan's Ministry of Ecology and Natural Resources and the Ministry of National Economy, in cooperation with the World Bank and Kazakhstan Association (ECOJER) launched a series of workshops and dialogues to support Kazakhstan in implementing its critical climate and environmental strategies, including the transition to a low-carbon economy, air quality management, and resilience to climate change. The country has also issued *The Strategy on Achieving Carbon Neutrality by 2060*, which sets "ambitious net-zero carbon goals for climate action and identifies key technological transformations needed for the country's decarbonization."<sup>95</sup> The future of Kazakhstan's REE industry is intrinsically linked to the country's domestic environmental policies.

The war in Ukraine has benefited Kazakhstan in surprising ways. For instance, several companies have moved their facilities from Russia to Kazakhstan, such as Russian-owned and London-listed High Tech Co. and the U.S.-based manufacturing company Honeywell.<sup>96</sup> As for REEs, Astana is seeking foreign investment to exploit REE mining and refining. Kazakhstan "will have to manage such overtures extremely carefully, given Russian and Chinese sensitivities around critical elements such as rare earths and uranium," according to Kate Mallinson, Managing Director of Prism Political Risk Management company.<sup>97</sup> The future of the proposed project presented by [HMS Bergbau AG](#) during the C5+1 summit in Germany will be an interesting barometer of European interest in Kazakh REEs—especially as the war in Ukraine shows little signs of slowing.

### Global capital spending in the transition could rise in the short term before falling back.

8.8% of global GDP in 2026–30



Note: Estimates based on Net Zero 2050 scenario from the Network for Greening the Financial System, which limits warming to 1.5°C, a hypothetical scenario, not a prediction or projection.  
Source: *The net-zero transition: What it would cost, what it could bring by* McKinsey

Graph 4. "Six characteristics define the net-zero transition," McKinsey Sustainability

<sup>94</sup> "Kazakhstan increased oil exports in 1H 2023 by 8% y/y, transit via Russia rising," *Reuters*, August 1, 2023, <https://www.reuters.com/article/kazakhstan-oil-exports-idUKL8N39I2N2>

<sup>95</sup> "Kazakhstan Discusses Ways for Achieving Carbon Neutrality and Building Resilience," *The World Bank*, February 28, 2023, <https://www.worldbank.org/en/news/press-release/2023/02/28/kazakhstan-discusses-ways-for-achieving-carbon-neutrality-and-building-resilience>

<sup>96</sup> Akhmetkali, Aibarshyn, "Honeywell Opens Its First Assembly Plant in Kazakhstan as Part of New Localization Strategy," *The Astana Times*, July 21, 2022, <https://astanatimes.com/2022/07/honeywell-opens-its-first-assembly-plant-in-kazakhstan-as-part-of-new-localization-strategy/>

<sup>97</sup> Assaniyaz, Assem, "West to Increase Interest in Kazakhstan's Natural Resources, Transport and Transit Potential, Says British Expert," *The Astana Times*, January 18, 2023, <https://astanatimes.com/2023/01/west-to-increase-interest-in-kazakhstan-natural-resources-transport-and-transit-potential-says-british-expert/>

## 6. Local Refining Capacities, Subsidies, and Other Issues

The future of the REE industry in Central Asia must go hand-in-hand with new policies that consider the environment, human capital, and strategic thinking. While the long-term economic gains of REE far outweigh environmental damage, they still have significant localized front-end costs common with all mining projects.

Regardless of which mineral is being extracted, there will be pollution from mining operations, as environmentally conscious mining policies are neither widespread nor respected. REE-related mining pollution occurs during three stages: extraction and 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.”<sup>98</sup> Therefore, as with any other mining operation, REE extraction will pose a public health risk. Strict security rules for protecting miners and local populations are mandatory.<sup>99</sup>

The environmental impact of REE mining can be limited using new extracting and processing technologies. One notable example is through recycling retired technology such as old computer hard drives. A 2021 report by the Kleinman Center for Energy Policy at the University of Pennsylvania titled “The Not-So-Rare Earth Elements: A Question of Supply and Demand” provides hope for sustainable REE mining. Research results suggest several “efficient and environmentally benign methods of extracting REEs from phosphogypsum, a byproduct of phosphoric acid production, by using organic, bacterial-induced acids such as gluconic acids as opposed to strong industrial acids such as sulfuric acid.”<sup>100</sup>

There is reason to be optimistic. On September 1, 2023, Kazakh President Tokayev gave a speech that heavily focused on protecting Kazakhstan’s water resources and shifting towards green energy—and potentially nuclear power—to address climate change.<sup>101</sup> Similarly, in September 2023, Uzbekistan’s President Shavkat Mirziyoyev approved the Uzbekistan-2030 Strategy. Among its objectives, the Strategy seeks to save “water resources and [protect] the environment.”<sup>102</sup> Future REE mining operations across Central Asia must align with the environmental policies set by local governments.

Kazakhstan has a strong mining history, exemplified by the country’s international status as a global producer of iron ore, non-ferrous metals, and uranium. In the uranium sector, the Government of Kazakhstan, particularly Kazatomprom, has drastically increased investment and sought new partnerships. The country’s Soviet-era “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,” wrote Professor Sebastien Peyrouse of George Washington University in 2012.<sup>103</sup> While countries like Kazakhstan have dramatically improved their mining equipment and infrastructure since independence, other Central Asian countries have lagged behind.

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<sup>98</sup> Peyrouse, “Rare Earth Metals in Central Asia and Mongolia: A Promising but Paradoxical Agenda”: 4

<sup>99</sup> Ibid: 4-5

<sup>100</sup> Kim, Hyong-Min; Jariwala, Deep, “The Not-So-Rare Earth Elements: A Question of Supply and Demand,” Kleinman Center for Energy Policy, September 23, 2021, <https://kleinmanenergy.upenn.edu/research/publications/the-not-so-rare-earth-elements-a-question-of-supply-and-demand/>

<sup>101</sup> “Послание Главы государства Касым-Жомарта Токаева народу Казахстана «Экономический курс Справедливого Казахстана,” Presidency of Kazakhstan, September 2, 2023, <https://akorda.kz/ru/poslanie-glavy-gosudarstva-kasym-zhomarta-tokaeva-narodu-kazahstana-ekonomicheskii-kurs-spravedlivogo-kazahstana-18588>; Sanchez, Wilder Alejandro, “Kazakhstan Aims to Protect the Blue while Going Green,” *Geopolitical Monitor*, September 14, 2023, <https://www.geopoliticalmonitor.com/kazakhstan-aims-to-protect-the-blue-while-going-green/>

<sup>102</sup> The President Shavkat Mirziyoyev approved the Uzbekistan-2030 Strategy,” CAREC, September 22, 2023, <https://centralasiacclimateportal.org/the-president-approved-the-uzbekistan-2030-strategy/>; “Uzbekistan-2030 Strategy targets. Highlights,” *The Tashkent Times*, September 12, 2023, <http://tashkenttimes.uz/national/11683-uzbekistan-2030-strategy-targets-highlights>

<sup>103</sup> Peyrouse, “Rare Earth Metals in Central Asia and Mongolia”: 3

Kazakhstan is well positioned to use these advantages to compete internationally in REEs, even in areas traditionally associated as being beyond its core competency. The construction of a Canadian REE processing plant in Louisiana the early 2010s gives a sample cost breakdown of the fixed and operational costs within the industry.

*SNC-Lavalin estimated capital and operating costs for a separation plant with a capacity of 10,000 tons per annum. The cost estimates are based on fourth-quarter 2011 price quotations and have an intended overall accuracy of ±25%. The estimated capital cost for the separation plant is US\$302 million, which includes a complete separation plant facility; infrastructure, utilities, and ancillary services; indirect costs; and contingency. The most significant capital expense is the solvent extraction circuit consisting of over 1,000 mixer-settlers and makes up 33% of the total capital cost at US\$101 million.<sup>104</sup>*

Data show that REE processing and refining remains a costly venture. For example, “the estimated operating cost is \$5,634 per ton of rare earth oxide product, which includes labor, operating supplies, supplies and reagents, and maintenance costs,” according to Andrew Topf, writing in 2012 about a prospecting project in Canada by Avalon Rare Metals.<sup>105</sup> “Reagent costs, with hydrochloric acid and sodium hydroxide being the two largest contributors, make up 70% of the total operating costs at US\$3,934 per ton of rare earth oxide product,” Topf noted.<sup>106</sup> When Central Asian governments, extra-regional companies, and investors negotiate new REE-related ventures, updates to Soviet-era infrastructure and training the local workforce must also be addressed as a part of cost considerations.

## V. Policy Recommendations

Demand for REEs is growing, and given their natural resources, the evolving geopolitical situation across the globe, and the rise of the Trans-Caspian International Transport Route (TITR, aka Middle Corridor) to transport goods to the European and global market, Central Asian states have the opportunity to profit significantly.

**Diversify the customer bases of Central Asia's REEs (United States, Europe, India, South Korea, and Japan).** The U.S. government and those seeking to decrease their reliance on Chinese REE are eager to diversify their supply chains. The September 2023 Declaration of New York highlights that Washington is ready to utilize agencies, including the U.S. Department of State, Development Finance Corporation, the U.S. Export-Import Bank, and the U.S. Agency for International Development, “to support infrastructure across [Partnership for Global Infrastructure and Investment (PGI)] priorities, including critical transport, clean energy and critical minerals supply chains, and digital connectivity.”<sup>107</sup> The C5+Gulf Cooperation Council summit and the C5+1 summit with Germany in June and September 2023, respectively, and the C5+1 summit with Japan scheduled for 2024 exemplify that countries worldwide are eager to work with Central Asia. South Korea-Central Asian relations have not reached the “C5+1” format—yet. The annual

<sup>104</sup> Topf, Andrew, “Processing plant to cost \$302 million- 1/3 of Avalon's rare earth project capex,” *Mining.com*, 13 April, 2012, <https://www.mining.com/avalons-rare-earth-separation-plant-in-louisiana-to-cost-302-million/#:~:text=The%20estimated%20operating%20cost%20is,and%20reagents%2C%20and%20maintenance%20costs>

<sup>105</sup> Topf, “Processing plant to cost \$302 million”

<sup>106</sup> Ibid

<sup>107</sup> “C5+1 Leaders' Joint Statement,” The White House, 21 September, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/21/c51-leaders-joint-statement/>



Korea-Central Asia Cooperation Forum<sup>108</sup> continues to promote increased dialogue that could result in REE-related investments and deals. Trade and commerce with China and Russia are unavoidable, but many potential customers, partners, and investors will decrease their dominance of Central Asia.

**Prioritize the development of the Middle Corridor**, which already transports critical energy resources in high demand—besides energy supplies—across the Caspian Sea. Kazatomprom has already utilized the Middle Corridor to transport uranium to global customers, including Romania and Canada.<sup>109</sup> The TITR can move REEs across Central Asia to the international market. When approaching potential customers, Central Asian governments and enterprises should highlight deliveries of REEs that can be made using the Middle Corridor, thereby bypassing Russia. This scenario will undoubtedly be very desirable to U.S./Western clients who will want to avoid sanctions or the continuing deterioration of relations with Russia. The Declaration of New York encourages the “continued investment in and development” of the TITR.<sup>110</sup> Geography matters, and since it is a landlocked region, the future of Central Asian REE mining and transportation is deeply linked to the continued success of transportation routes, which will ideally bypass Russian territory.

**Create an REE mineral bank** with international assistance modeled after Kazakhstan's uranium bank. Kazakhstan's uranium bank serves as both a technically impressive safe repository for countries with peaceful civilian nuclear ambitions, and as a commodity version of a standard Central Bank. This bank should act both as a strategic resource reserve, analogous to many international petroleum reserves, and as a central-lending bank. This would allow Kazakhstan and other REE-producing countries to increase the liquidity of their exports, hedge against supply shocks, exploit price hikes, and maintain long term financial support for commodity projects. The International Atomic Energy Agency (IAEA) has opened a [Low Enriched Uranium \(LEU\) Bank](#) at the Ulba Metallurgical Plant in Oskemen, Kazakhstan. A similar model should be used to create an REE mineral bank.

**Facilitate FDI in the REE sector by being transparent about geological and economic data, creating information hubs, and encouraging private exploration.** Doing so would reassure potential investors and partners that the country, including its tax regime, is stable and transparent. Several institutions have issued comprehensive analyses about how to attract FDI to mining. A 2011 report titled “How to Attract and Benefit from FDI in Mining: Lessons from Canada and Chile” was issued by the UN Conference on Trade and Development about this subject. The report also encourages pro-activity by “addressing the water, energy, and transportation needs of major mines through high-level interaction between the government and the industry” and using “policy instruments that assure foreign investors of ... constitutional guarantees of property rights and security of tenure, tax, and regulatory stability contracts with the state, and international investment agreements and the use of multi-stakeholder consultations to create social and political consensus on the general direction of mining policy.”<sup>111</sup> Kazakhstan must address these concerns head on to ensure continuing foreign investment and national prosperity.

**Embrace the great power competition for REEs**, as this is unlikely to change soon. The war in Ukraine

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<sup>108</sup> Wonju, Yi, “(LEAD) S. Korea, 5 Central Asian nations discuss cooperation in Busan forum,” *Yonhap News Agency*, 25 October 2022, <https://en.yna.co.kr/view/AEN20221025004051325>

<sup>109</sup> “Kazatomprom completes trans-Caspian uranium delivery,” *World Nuclear News*, 20 December, 2022, <https://world-nuclear-news.org/Articles/Kazatomprom-completes-trans-Caspian-uranium-delive> Also see: “Kazatomprom has successfully delivered uranium for Romania's nuclear power plant,” Kazatomprom, 5 April, 2023, [https://www.kazatomprom.kz/en/media/view/kazatomprom\\_uspeshno\\_osushestvil\\_postavku\\_urana\\_dlya\\_aes\\_rumynii](https://www.kazatomprom.kz/en/media/view/kazatomprom_uspeshno_osushestvil_postavku_urana_dlya_aes_rumynii)

<sup>110</sup> “C5+1 Leaders' Joint Statement,” The White House, 21 September, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/21/c51-leaders-joint-statement/>

<sup>111</sup> “Best Practices in Investment for Development: How to Attract and Benefit from FDI in Mining - Lessons from Canada and Chile,” United Nations Conference on Trade and Development, Investment Advisor Series, Series B, Number 7, 2011, <https://unctad.org/publication/best-practices-investment-development-how-attract-and-benefit-fdi-mining-lessons-canada>

lingers on, so Russia will continue to be treated with great caution by the U.S. and its closest allies for years to come. The U.S. and China are also becoming increasingly confrontational, with Washington wanting to reduce its reliance on the Chinese economy and supply chains. Central Asia should recognize that the West is looking to move away from the China- and Russia-based supply chains in developing REE projects.

**Create a geographically sensitive REE export policy.** Geography is challenging, as Central Asia is physically distant from partners and potential investors in the United States, Canada, Europe, and Japan. Central Asian governments should invest in forums held in key cities and in front of relevant audiences (London, Washington, Toronto, Tokyo, New York, Frankfurt, Berlin, Singapore, and Riyadh, to name a few) to promote awareness about what Central Asia can offer. Central Asian governments and relevant industries can work with regional research centers and expos to host panels and roundtables about these topics, during which updated studies about REE deposits in the region can be made available, particularly in English, to reach a wider audience.

**Diversify REE export agreements by pursuing relationships with other developed states.** While the United States, Canada, and Europe are the ideal customers for Central Asia's REEs, Central Asian governments must adopt an ambitious, broad perspective and look for other partners and investors in REEs. The Arab countries, Japan, and South Korea are already seeking to increase commercial and trade relations with Central Asia, especially in the energy field. Central Asian governments must search for non-great powers interested in their REEs.

**Promote intra-regional integration so that all of Central Asia can profit from their REE resources.** Central Asia has never really created something that resembles a "Central Asian Union." There are still tensions and disputes between certain states, most recently seen in the 2022 clashes between Kyrgyzstan and Tajikistan.<sup>112</sup> Central Asian participation in the C5+1 summits are a positive step toward tighter integration. However, more cooperation and trust between the five states is necessary to maximize profits from REEs. Kyrgyzstan and Tajikistan, with limited transportation infrastructure, a challenging topography, and limited state resources, will require assistance from their neighbors to develop and export REEs. The Middle Corridor can help connect Central Asia's smaller states with the rest of the world. Given that Kazakhstan hosts the headquarters of the Middle Corridor and agencies like the Astana International Financial Centre (and the Conference on Interaction and Confidence Building Measures in Asia (CICA), Astana is uniquely positioned to lead Central Asia in this rising industry.

**Create a Central Asian REE Center for information sharing** to inform potential customers, investors, partners, interested scholars, and other professionals about the REE wealth that Central Asia possesses. This Center should digitize Soviet-era surveys and analyses and serve as a repository for new surveys and academic studies and analyses carried out by Ministries of Mining, universities, and other relevant organizations.<sup>113</sup>

<sup>112</sup> "Kyrgyzstan/Tajikistan: Apparent War Crimes in Border Conflict," Human Rights Watch, 2 May, 2023, <https://www.hrw.org/news/2023/05/02/kyrgyzstan/tajikistan-apparent-war-crimes-border-conflict>

<sup>113</sup> "Научные проекты (2020-2022)," Al-Farabi Kazakh National University, No date, <https://www.kaznu.kz/en/23534/page/> Also see: Sh.Zh. Arynova, G.M. Omarova, N.P. Korogod, I. Yu. Chidunchi; A.B. Kalieva, R.H. Kurmanbaev, B.U. Sharipova, "Pavlodar Region (Republic of Kazakhstan) Saline Sediments in Natural Fresh Waters – Study of Rare-Earth Elements," *Ecology series*. No. 1 (74). 2023: 16-25 <https://bulletin-ecology.kaznu.kz/index.php/1-eco/article/view/1447/1001> Also see: G.B. Melentiev, A.E. Vorobyov, O.Sh. Shamshiev, "Rare Metal Potential of Kyrgyzstan: Status and Outlook" Bulletin of RUDN University, Engineering Research series, No. 4, 2015, <https://cyberleninka.ru/article/n/redkometallnyy-potentsial-kyrgyzstana-sostoyanie-i-perspektivy> Also see: R. Zh. Andamasova, "Boron compounds in the soil – Study of meeting forms," International scientific conference of students and young scientists Farabi World, no date, <https://pps.kaznu.kz/ru/Main/FileShow2/49728/73/3/8507/0/> Also see: М.Р. Шаутонов, Ш.А. Телков, И.Ю. Мотовилов, "ИССЛЕДОВАНИЕ ПО ГРАВИТАЦИОННОМУ ОБОГАЩЕНИЮ РЕДКОЗЕМЕЛЬНОЙ РУДЫ КОРЫ ВЫВЕТРИВАНИЯ," Те хник а лық Ғ ылымдар, No. 4, 2013: 89-94 <https://official.satbayev.university/download/document/7153/%D0%92%D0%95%D0%A1%D0%A2%D0%9D%D0%98%D0%9A-2013%20%E2%84%964.pdf> Also see: М.Р. Шаутонов, Ш.А. Телков, И.Ю. Мотовилов, Н.Т. Акказина, "ИССЛЕДОВАНИЕ ГРАВИТАЦИОННОЙ ОБОГАТИМОСТИ РЕДКОЗЕМЕЛЬНОЙ РУДЫ НА ОСНОВЕ ФРАКЦИОННОГО АНАЛИЗА," Те хник а лық Ғ ылымдар, No. 4, 2013: 219 -223 <https://official.satbayev.university/download/document/7153/%D0%92%D0%95%D0%A1%D0%A2%D0%9D%D0%98%D0%9A-2013%20%E2%84%964.pdf>

This proposed Center could be part of the Astana International Financial Center, which already has created dedicated agencies like the [Green Finance Center](#), and it can form a partnership with the Uzbek Center for the Study of Rare Earth Metals.

**Conduct due diligence of potential investors, surveyors, and mining partners.** Like any craze new actors will rise and fall with increased interest in REEs. The Canadian company [Vital Metals](#), which called itself “Canada’s first rare earths mining company,” is reportedly bankrupt and suspending operations;<sup>114</sup> The company commenced its operations in 2021, and just two years later, it is fighting for financial survival. As mining and commodities marketing companies like [HMS Bergbau AG](#) court Central Asian governments, the five states need to be open and cautious about potential new projects.

## VI. Conclusions

There is a global demand for REEs amid a worldwide energy revolution. Climate change, a focus on renewable energies, and great power competition have made countries more aware of their own energy vulnerability. Energy independence and invigorating domestic supply chains are national security priorities for Washington and others. There has never been a greater geopolitical and market forces alignment for emerging REE producers.

Central Asia has a vast wealth of energy deposits, including critical minerals and REEs. Despite growing pains, rising demand for REEs has provided Central Asian states with a rare developmental and geopolitical opportunity. Should Central Asian governments decide to invest more heavily in their REE deposits and the policies needed to aid their exploitation, Central Asia and the West can both win: Central Asian states gain new export routes, trade partners, and geopolitical opportunities to balance against predatory neighbors; and Western actors can break China’s monopoly in the REE sector.

The world is reaching a point of no return regarding energy transformation, as the impacts of climate change are ever more apparent. A massive re-focus on how humanity lives, including where we obtain our energy, is underway. Moreover, global geopolitics, including tensions between the great power, have national security consequences, which include access to energy and critical minerals for vital industries and sectors, including defense and high tech. REEs are critical to these global changes and can be found throughout Central Asia.

These tectonic shifts will not inevitably enrich Central Asia or help Western regional policy. To capitalize on their REE endowments, Central Asian states must consciously cultivate REE-conscious domestic and foreign policies. Only foresight, strategic thinking, and novel approaches can position Central Asia to benefit from its resources and the foundational shifts of the 21st century.

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<sup>114</sup> Lasley, Shane, “Vital Canadian REE company is bankrupt,” *Mining News*, 6 October 2023 <https://www.miningnewsnorth.com/story/2023/10/06/news/vital-canadian-ree-company-is-bankrupt/8146.html> Also see: “N.W.T. mine project owner sends Canadian subsidiary into bankruptcy, drops processing plant,” *CBC*, 3 October 2023 <https://www.cbc.ca/news/canada/north/vital-metal-closes-sask-plant-1.6985346>

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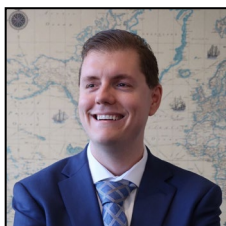
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