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Industry Report

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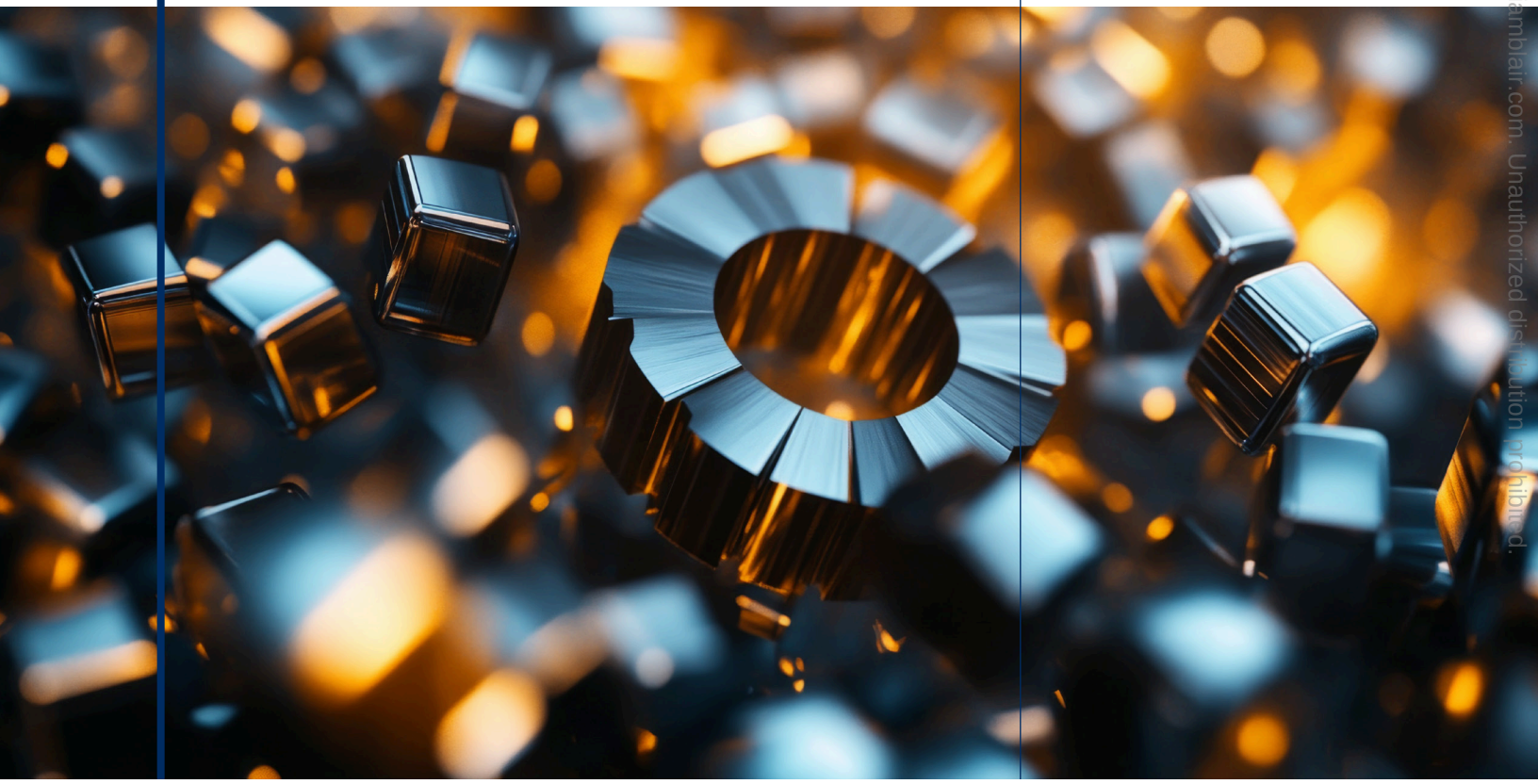
Rare Earth Minerals

Potential for Critical Mineral Sovereign Fund and Other Backing



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Thesis

As global demand for rare earth elements rises, U.S. companies have started the process to reduce reliance on China by rapidly expanding domestic production, processing, and recycling. For national and economic security, the U.S. government including the Department of Defense (DOD) and the Department of Energy (DOE) has stepped in, strategically funding rare earth supply chain projects. These investments are expected to drive a surge in U.S. mine-to-magnet capacity, securing critical minerals, strengthening supply chains, and supporting both national security and the clean-energy transition.

Summary

While many rare earth stocks have hit the cover off the ball in recent weeks, we believe there is still material future upside. Continued geopolitical developments and recent major financial institution investment pledges have increased the valuations significantly for all five of our covered companies—American Resources Corporation, Royalty Management Holding Corporation, United States Antimony Corporation, USA Rare Earth, and NioCorp Developments—along with other rare earth equity companies. However, while short-term adjustments may occur, we believe China's dominance in the minerals market will not subside anytime soon, though project greater involvement from the current administration and substantial investments from financial institutions.

Problem
China currently controls 70% of the mining, 90% of separation, and 93% of worldwide rare earth oxide and magnate production. This causes an unhealthy global reliance, especially for making magnets, which are critical for defense, electric vehicles (EVs), and robotics. Making matters worse, China recently added five additional rare earth minerals to its trade restrictions list, equivalent to a total 12 banned medium and heavy rare earths. China's new export restrictions on these critical minerals require companies to obtain government-issued export licenses not only for the raw materials themselves but also for foreign-made products containing those materials. This policy effectively tightens control over the entire rare earth supply chain, impacting mining, smelting, refining, and manufacturing across global industries. This move is a strategic defensive play, allocating greater leverage toward China in sectors including clean energy, electronics, and defense, while placing additional pressure on other nations to develop and secure independent supply sources for these essential materials. The primary issue here is that two of the elements, terbium and dysprosium, are needed for high-term magnets.

Response
The Trump administration has focused on reducing U.S. dependency on Chinese rare earths, retaliating against export restrictions, and expanding the domestic supply chain. These efforts, build on initiatives started under the Biden administration, with the goal to diversify supply sources and strengthen access to critical minerals. Since 2020, The DOD has invested $439 million dollars into U.S. rare earth projects, including material direct stakes in three public rare earth companies: MP Materials, Lithium Americas, and Trilogy Metals. J.P. Morgan recently stated that it will invest up to $10 billion into companies critical to U.S. national security as part of a broader $1.5 trillion 10-year initiative to facilitate, finance, and invest in industries central to the growth of the U.S. economy. We anticipate that other institutions will follow suit and believe there is potential for the administration and U.S. financial institutions to form a sovereign rare earth fund, although the current government shutdown could delay timing.

Next Move Up
We recognize the recent stock appreciation of rare earth-related companies. However, we believe that significant new financial backing and direct government stakes in rare earth companies could provide a second meaningful leg up for several rare earth stocks. We anticipate government funding in the five companies we have initiated on, excluding Royalty Management Holding Corporation as it is ineligible as a holding company. On October 6, 2025, the current administration announced investments in MP Materials, Lithium Americas, and Trilogy Metals, leading to massive stock price increases. We expect additional funding in other rare earth companies in the near term as part of the ongoing domestic supply chain buildout initiative.

In conjunction with this report, we initiated on five companies that we believe offer ways to play continued rare earth upside:

- ***American Resources*** – a unique rare earth separator and refining rare earth company
- ***NioCorp Developments*** – a rare earth company in the development stages for the Elk Creek mining project
- ***Royalty Management Holding*** – a non-operated aggregator of rare earth minerals, technology, and data center revenue streams
- ***USA Rare Earth*** – a mine-to-magnet company, with magnet production expected to commence soon and extraction likely to take place in the near-term
- ***United States Antimony*** – a fully integrated company with current antimony sales and mining targeted to begin within the upcoming quarters

Introduction

Rare earth minerals are essential to modern technologies, from clean energy to national defense, and the U.S. has identified 54 critical minerals as vital to economic and security interests. Today, China controls 70% of mining, 90% of separation, and 93% of worldwide rare earth oxide and magnate production, leading to an unhealthy global reliance—especially for making magnets, which are crucial for several domestic industries. The U.S. government codified a law in 10 U.S.C §4872, to require U.S. defense contractors to disclose the source of their rare earths or face contractual loss. This law was written with the intention to eliminate dependence on Chinese rare earths by January 1, 2027 (which seems aggressively timed, in our opinion), and will pose major implications for trade, profitability, and the global supply chain.

The exploration and production (E&P) and rare earth sectors are increasingly interconnected through shared exposure to resource extraction, infrastructure, and U.S. government funding initiatives that are focused on creating critical mineral supply chain security and sustainable energy innovation. E&P companies possess geological expertise, subsurface data, and established infrastructure that can be leveraged to identify and extract rare earth elements from unconventional sources, such as coal mines, produced water, and mineral-rich byproducts. Ongoing DOE and U.S. Geological Survey (USGS) programs provide funding and technical support for projects that recover rare earth elements from fossil-based materials, creating opportunities for E&P operators to repurpose assets and participate in the domestic critical minerals supply chain.

Rare earth companies are constantly innovating energy systems in support of the clean energy transition. These firms play a key role in developing more sustainable extraction, separation, and processing technologies to supply materials critical to EVs, wind turbines, and advanced defense systems. Various companies are also integrating recycling and circular-economy initiatives to reduce environmental impact and improve material efficiency.

China's initial rare earth dominance began in the early 2000s, implemented by aggressively low pricing that undercut market competitors. In addition, China added export restrictions that periodically tightened global supply, causing more price volatility. Although countries such as the United States, Australia, Canada, and Russia have significant potential reserves, green and/or brownfield projects are time consuming and capital-intensive. The concentration of supply within a single country has created vulnerabilities for the global economy, especially given China's history of strategically increasing or restricting antimony and other metal exports and imports to influence pricing on a global scale and maintain control over the sector.

The U.S. government has taken an active stance to address this concentration risk through funding initiatives enacted by the DOD, DOE, and the Export-Import Bank of the U.S., directly investing in domestic mining, processing, and recycling operations to build out a long-term supply chain. The government has engaged in a series of public to private collaborative funding initiatives, with the majority of funding consisting of equity-based deals. These initiatives will allow for reliable access to U.S. critical minerals, reduce dependence on foreign suppliers, heighten national security, while setting up to potentially receive a larger return from its investments in domestic rare earth companies.

Rare Earths

Rare earth elements are a group of 17 metallic minerals categorized into light and heavy rare earths. They are characterized by their magnetic, luminescent, and electrochemical features, making them essential inputs in a wide array of modern technologies. Such uses include smartphones, hard drives, semiconductors, EV motors, wind turbines, aerospace systems, and advanced defense electronics. As demand for semiconductors, batteries, touchscreens, magnet-driven motors, and other high-tech products accelerates over the coming decade, pressure on rare earth supply chains intensifies. The International Energy Agency projects that demand for critical minerals, including rare earths, could nearly triple by 2030 under net-zero emissions scenarios. This surge underscores how the energy transition and electrification wave are driving exponential growth in the need for critical minerals, making heavy rare earths and supply chain resilience central to U.S. economic and national security strategies.

Exhibit 1
2025 List of 54 Critical Minerals in the United States

Mineral Commodities Not Produced Predominately as Byproduct				
Aluminum	Copper	Manganese	Silicon	Zinc
Barite	Fluorspar	Nickel	Tantalum	
Beryllium	Lead	Niobium	Tin	
Cesium	Lithium	Platinum	Titanium	
Chromium	Magnesium	Potash	Tungsten	

Mineral Commodities Predominately Produced as Byproduct	
Mineral	**Main host commodities**
Antimony	Lead, gold, other base and precious metals.
Bismuth	Lead, tungsten, copper, tin, molybdenum, fluorspar, zinc.
Cerium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Cobalt	Nickel, copper.
Dysprosium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Erbium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Europium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Gadolinium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Gallium	Bauxite and zinc.
Germanium	Zinc and coal fly ash.
Graphite	Needle coke (for synthetic graphite).
Hafnium	Zirconium.
Holmium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Indium	Zinc.
Iridium	Platinum, nickel.
Lanthanum	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Lutetium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Neodymium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Palladium	Nickel, platinum.
Praseodymium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Rhenium	Molybdenum, copper.
Rhodium	Nickel, platinum.
Rubidium	Cesium, lithium.
Ruthenium	Nickel, platinum.
Samarium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Scandium	Cobalt, nickel, titanium, zirconium.
Silver	Zinc, lead, copper, gold.
Terbium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Thulium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Vanadium	Steel slag from vanadiferous iron ore, spent catalysts.
Ytterbium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Yttrium	Other rare earths, iron ore, heavy mineral sands (titanium, zirconium).
Zirconium	Titanium, tin.

Source: USGS, August 26, 2025

Minerals Are of U.S. Economic Importance

Critical minerals are defined under the Energy Act of 2020 as any mineral, element, substance, or material designated as critical by the Secretary of the Interior. While most identified minerals are important to the U.S. economy, the most important rare earth minerals for the U.S. GDP are those essential for high-tech manufacturing, including:

- neodymium, praseodymium, dysprosium, terbium, and samarium for magnets in EVs and wind turbines

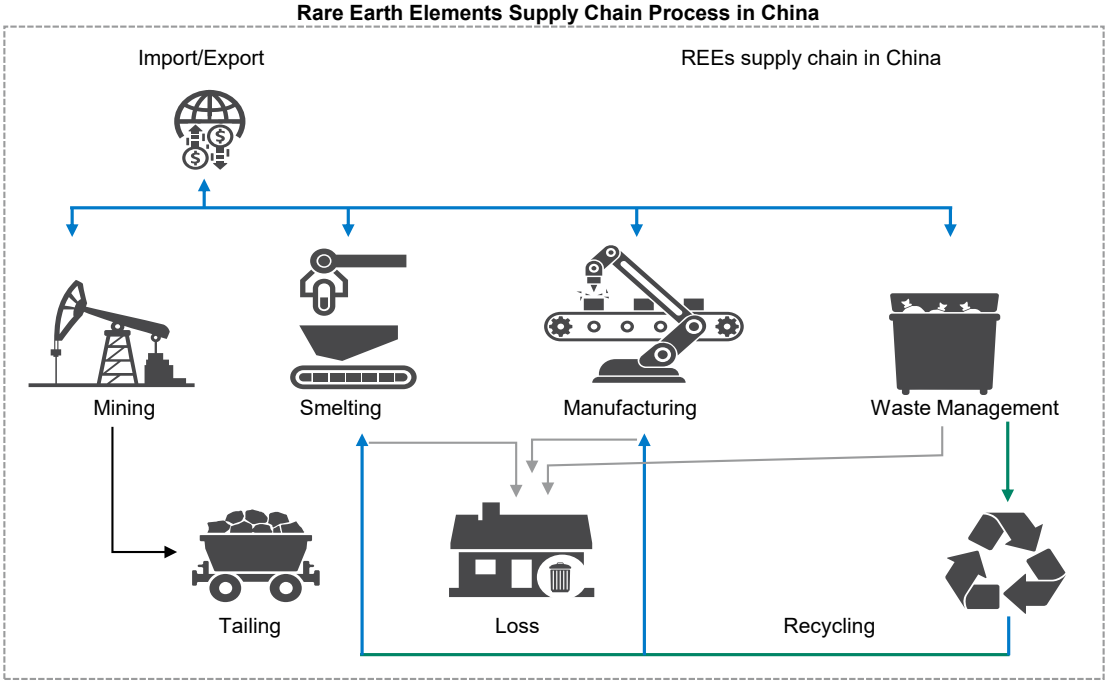
- cerium for catalytic converters
- gallium for semiconductors, LEDs, and high-frequency military electronics
- beryllium for lightweight, high-stiffness aerospace and defense alloys
- antimony for flame retardants, specialty alloys, and defense applications
- niobium and scandium for high-strength, lightweight alloys in pipelines, aerospace, and specialty electronics
- titanium for corrosion-resistant, high-strength alloys in industrial, medical, and defense uses.

In addition, metallurgical carbon is essential for steelmaking, while precious metals like gold and silver serve both industrial and monetary uses.

Supply Chain Process for Minerals

Critical mineral supply chains have five key stages: extraction, processing, components, end-use technologies, and recycling. Extraction refers to mining minerals either as primary resources (like monazite or bastnaesite for rare earths) or as byproducts of other mining operations, a process the USGS notes is common for many strategic minerals. Processing involves separating and refining materials to high-purity forms, such as neodymium metal or oxides used in magnets, optics, and ceramics. These refined materials are then transformed into components, like magnet parts, which feed into end-use technologies, such as EVs, wind turbines, and defense systems, with recycling taking the final spot of the chain. The DOE emphasizes that supply risks and opportunities exist at every stage of this chain, shaped by geological, technical, environmental, political, and economic factors. In particular, byproduct recovery can complicate pricing and availability, as the supply of one mineral is often tied to demand for another. Understanding this interconnected structure is essential for building resilient U.S. supply chains and reducing vulnerability to foreign dependence.

Exhibit 2
Rare Earth Elements Supply Chain Process in China

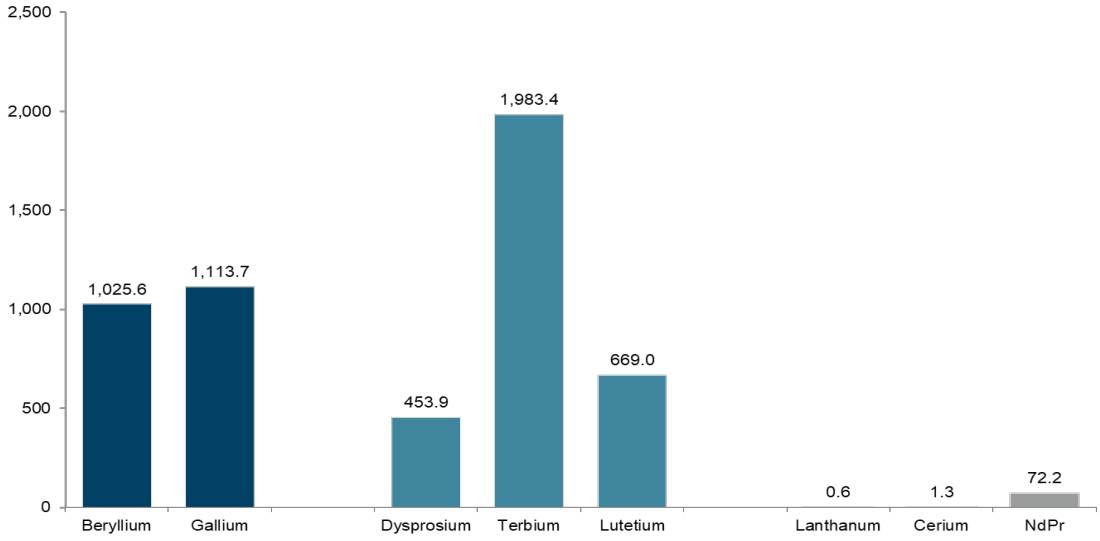


Source: William Blair Equity Research

Heavy Rare Earths

Heavy rare earth elements, such as dysprosium, terbium, yttrium, and lutetium, are critical to U.S. national security and clean energy supply chains. Their importance has surged since China's trade restrictions and export controls, which have tightened supply and driven global price spikes. Dysprosium and terbium are used to strengthen neodymium-iron-boron (NdFeB) magnets, allowing them to retain performance at high temperatures for EVs, wind turbines, and advanced defense systems. Yttrium is used in lasers, ceramics, phosphors, and radar displays, serving both commercial electronics and military applications, while lutetium, though extremely rare, is vital in nuclear medicine, PET scan detectors, and radiation sensors. With China controlling nearly all refining capacity for heavy rare earth elements, the U.S. faces significant supply-chain vulnerabilities just as demand accelerates. We believe that the U.S. development projects, such as those led by US Antimony and USA Rare Earth, are indispensable for building resilient production, expanding processing capacity, reducing reliance on Chinese exports, and stabilizing costs for these critical technologies.

Exhibit 3
Critical Mineral and Rare Earth Prices (USD/kg)



Source: USA Rare Earth Company Report

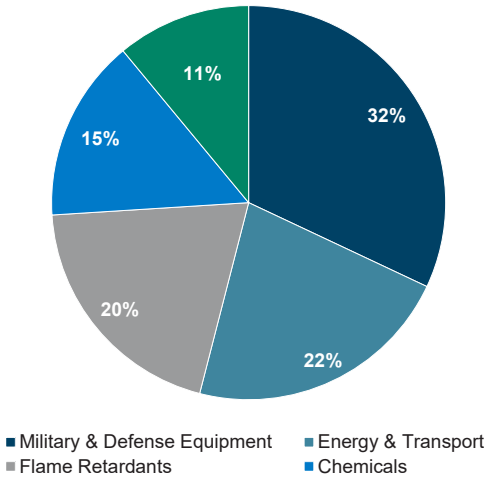
Key Minerals

Antimony

Antimony (Sb) is a shiny, soft, grey metalloid found in over 100 different minerals, particularly in stibnite (Sb_2S_3), and is commonly found in Algeria, Bolivia, China, Mexico, Peru, and South Africa. In addition, antimony can be sourced by old batteries, one major operation conducted by American Resources. In 2020, over half of the antimony mined in the world was produced in China, with the remainder from Russia and other countries.

When antimony is heated to a range of 500°C to 1,000°C, it enters its gaseous phase as antimony trioxide, which has various end-products essential for the military and defense, energy/transport, chemical, and technology industries, as shown in exhibit 4. Specific products where one can find antimony include flame retardants, bullets, semiconductors, electrical cables, fiberglass, paint pigments, rubber, paints, lithium-ion batteries, and as a phosphorescent agent used in fluorescent light bulbs.

Exhibit 4
Antimony End-Products



Sources: WSJ and William Blair Equity Research

Exhibit 5 depicts antimony ingots with a 99.65% purity level, with current prices of around $34,750 per metric ton, up from $27,750 in 2024.

Exhibit 5
Antimony Ingot 99.65% Purity Price Chart (2015-2025)

Sources: Bloomberg, William Blair Equity Research

Dysprosium

Dysprosium (Dy) is a bright, silvery metal with extreme magnetic strength and is an essential component to produce permanent magnets. Dysprosium is added to neodymium-iron-boron (NdFeB) magnets to boost coercivity, or the resistance to demagnetization, at temperatures up to 200°C, essential for EV motors and wind turbine generators. Exhibit 6 depicts dysprosium oxide with a 99% purity level, with current prices of around $240 per kilogram, remaining relatively flat since 2024.

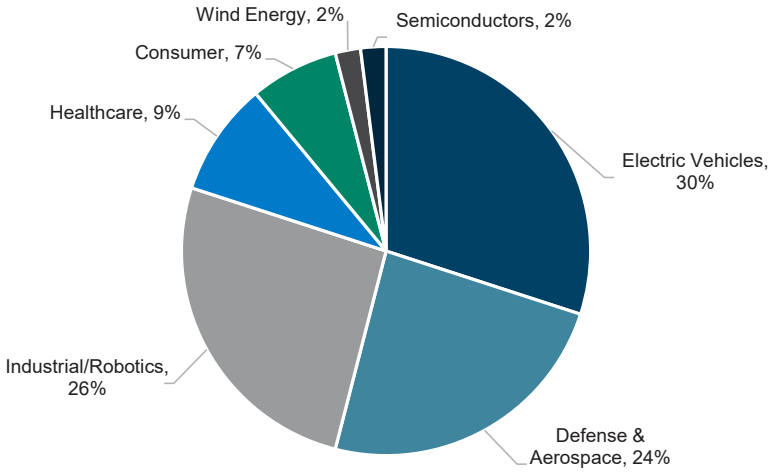
Exhibit 6
Dysprosium Oxide 99% Purity Price Chart (2015-2025)

Sources: Bloomberg, William Blair Equity Research

Neodymium

Neodymium (Nd) is a highly reactive, silver-white light rare earth metal, best known for producing the strongest commercial permanent magnets. It plays a critical role in clean energy by powering EV motors and wind turbines; is used in various electronics, including computer hard drives and speakers; and in the defense and aerospace technology sectors is used for missile guidance and radar systems, etc.

Exhibit 7
Rare Earth Magnet Market by Industry



Sources: WSJ and William Blair Equity Research

Neodymium-iron-boron (NdFeB) or "neo" magnets are the strongest permanent magnets, vital for high-performance applications such as EV motors, wind turbines, robotics, medical imaging, and defense systems. Their compact size, strength, and efficiency make them essential to clean energy and advanced electronics. Production involves alloying neodymium with iron and boron, and often adding heavy rare earths like dysprosium or terbium to enhance high-temperature performance.

Due to complex manufacturing and limited rare earth supply, NdFeB magnets are technologically challenging. The DOE identifies them as a key supply-chain bottleneck, emphasizing the need for domestic production, recycling, and global partnerships to reduce dependence on China, which dominates magnet manufacturing. In 2025, China's export restrictions sparked the U.S. to build an independent "mine-to-magnet" supply chain by 2030.

Currently as of 2025, neodymium oxide with 99% purity is priced around $97,250 per metric ton, up from $60,750 per metric ton in 2024, and continues to rise amid ongoing trade restrictions.

Exhibit 8
Neodymium Oxide 99% Purity Price Chart (2015-2025)

Sources: Bloomberg, William Blair Equity Research

Niobium

Niobium (Nb) is a soft, silvery-grey refractory metal valued for its corrosion resistance and superconducting properties at cryogenic temperatures below -153°C. Over 90% of global niobium consumption comes from its use as an alloy agent in high-strength low-alloy (HSLA) steel in oil and gas pipelines, bridges, buildings, and automotive frames; adding less than 0.1% ferroniobium significantly increases strength and reduces overall weight. Nb-Ti and Nb_3Sn alloys are vital for conducting magnets used in MRI machines and particle accelerators, and aerospace superalloys are used for jet engines and turbines. Additional uses include medical implants and electronic capacitors using niobium oxide. Ferroniobium (60% niobium) sells for about $25,000 to $45,000 per metric ton or $25 to $45 per kg, while niobium oxide costs $45 to $65 per kg due to its higher niobium purity. Brazil has the largest niobium market, holding approximately 90% of global reserves totaling 14.2 million tonnes of capacity in 2023, and controls 85% of production, with Companhia Brasileira de Metalurgia e Mineração (CBMM) producing 80% from its Araxá mine. Canada's Niobec mine is the only other global producer, supplying 8%-10% of global output. The U.S., EU, and China are 100% import-dependent for this mineral, creating a strategic supply risk. Demand is projected to grow 4.5% annually through 2030, driven by Nb-enhanced batteries and advanced superconducting applications.

Exhibit 9 depicts niobium with a 98% purity, currently priced at around $93.96 per kilogram and expected to continue to rise due to the ongoing shortage and majority concentration in Brazil.

Exhibit 9
Niobium 98% Purity Price Chart (2019-2025)

Sources: Bloomberg, William Blair Equity Research

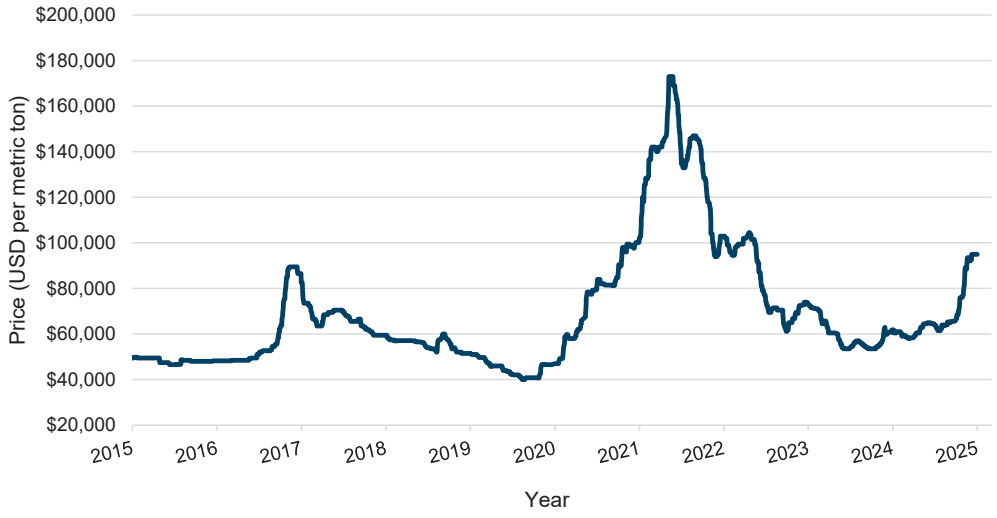
Praseodymium

Praseodymium (Pr) is a light rare earth element, characterized by its soft, silvery, malleable, and ductile metal structure. It also has greater resistance to corrosion in air, as opposed to other rare earths like neodymium or lanthanum, though the element will develop a greenish-yellow oxide coating when exposed to oxygen.

The majority of demand for praseodymium is for its combination with neodymium in neodymium-iron-boron (NdFeB) permanent magnets, where it enhances magnetic strength and thermal stability for EV motors, wind turbines, and electronics. It is also used in magnesium-based aerospace alloys for lightweight, high-temperature performance, and in coloring agents and specialty glass for ceramics, enamels, and protective eyewear. Currently, China has not imposed export restrictions on praseodymium or neodymium-praseodymium (NdPr), partly due to the development of alternative non-China sources, such as the U.S. Mountain Pass mine. Praseodymium metal currently trades around $143 per kg, while NdPr oxide prices are approximately $78 per kg.

As of 2025, praseodymium oxide with a 99% purity is priced at $95,000 per metric ton, depicted in exhibit 10, and is expected to continue to steadily rise in the future.

Exhibit 10
Praseodymium Oxide 99% Purity Price Chart (2015-2025)



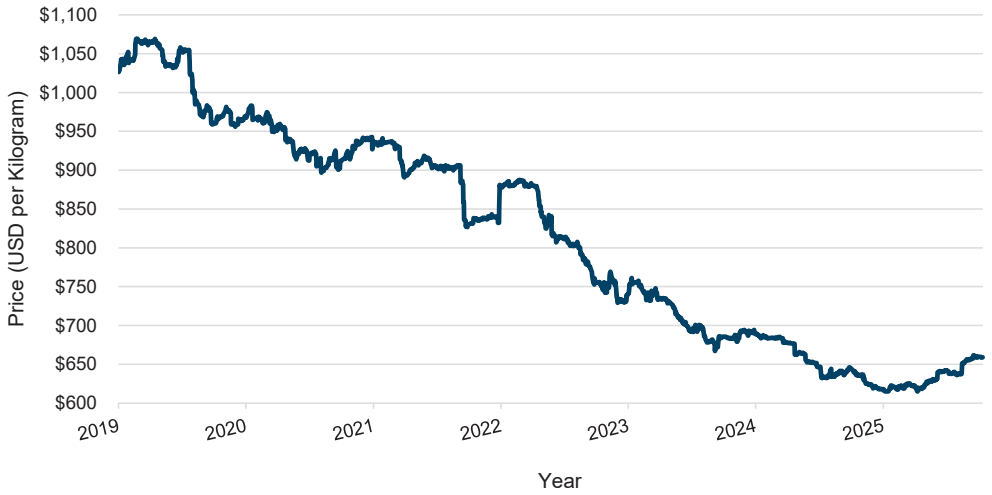
Sources: Bloomberg, William Blair Equity Research

Scandium

Scandium (Sc) is a stable, white, rare-earth oxide rare earth element with a cubic crystal structure, with its refined form used in advanced materials and chemical applications. Its rarity and specialized demand make it extremely valuable, with high-purity grades (99.9%–99.99%) priced between $660 and $1,000 per kilogram. China, which supplies approximately 85% of the world's refined scandium, imposed export licensing requirements in April 2025, classifying scandium and its alloys as dual-use items for civilian and military purposes, which have created administrative barriers, heightening supply chain uncertainty.

Exhibit 11 depicts the current price of scandium oxide with a 99% purity level at nearly $660 per kilogram. Prices for this rare earth have continuously fallen since 2019, though have seen a recent uptick in prices in the first half of 2025, with no signs of slowing.

Exhibit 11
Scandium Oxide 99% Purity Price Chart (2015-2025)



Sources: Bloomberg, William Blair Equity Research

Terbium

Terbium (Tb) is a soft, silvery-gray rare earth metal known for its luminescence and magnetic properties and is a vital component for green phosphors in LEDs and displays, terfenol-D alloys used in sensors and actuators, and permanent magnets in EV motors and wind turbines. Terbium is also used in euro banknotes as an anticounterfeiting feature. Commercial production of its stable oxide, Tb_4O_7, requires heating terbium oxalate or sulfate to around 1,000°C. In April 2025, China imposed export licensing requirements on terbium metal, oxide, and alloys, severely tightening global supply and driving price volatility.

As of 2025, terbium oxide with a 99.99% purity sells for about $1,088 per kilogram, and has continued to steadily rise once again, following a significant decline from post-COVID levels.

Exhibit 12
Titanium Dioxide FOB Price Chart (2019-2025)

Sources: Bloomberg, William Blair Equity Research

Titanium

Titanium (Ti) is a lightweight metal with the highest strength-to-density ratio of any element. It naturally forms a protective titanium dioxide (TiO_2) surface layer that provides exceptional corrosion resistance. While this oxide layer is distinct from industrial TiO_2 pigments, the same compound—titanium dioxide—accounts for about 95% of global titanium use, primarily valued for its brightness and opacity in paints, plastics, paper, and cosmetics. Titanium is produced from the extraction of ilmenite and rutile through industrial processes that separate and purify the metal. It is prized for being strong, lightweight, and resistant to heat and corrosion, making it widely used in aerospace alloys, biomedical implants, and marine structures. TiO_2 also serves as a UV blocker and photocatalyst in sunscreens and self-cleaning materials.

The U.S. and EU remain import-dependent and are currently enacting initiatives to reshore titanium supply chains for defense and aerospace security. In 2025, titanium dioxide sells for about $1,944 per metric ton.

Exhibit 13
Tungsten 88.5% FOB Price Chart (2015-2025)

Sources: Bloomberg, William Blair Equity Research

Tungsten

Tungsten (W) is a refractory metal with the highest melting point of any metal and exceptional resistance to heat and wear. Its main use is for tungsten carbide (WC) to manufacture cutting tools, mining drills, and armor-piercing rounds due to its diamond-like hardness. It is also vital in electronics and lighting (filaments, electrodes), aerospace and defense alloys, and chemical applications like catalysts and smart windows. The U.S. is 10 to 15 years behind in developing domestic tungsten production, but companies like US Antimony and Patriot Critical Minerals are advancing projects with government funding and permitting support, with Patriot expected to start production within three years. Older mines from the 1950s to 1960s that were closed due to low commodity prices are now being reactivated. These mines have open-pit potential and favorable offtake premiums of 15%-20% and receive government supply chain funding to establish the first fully domestic tungsten production and processing capability.

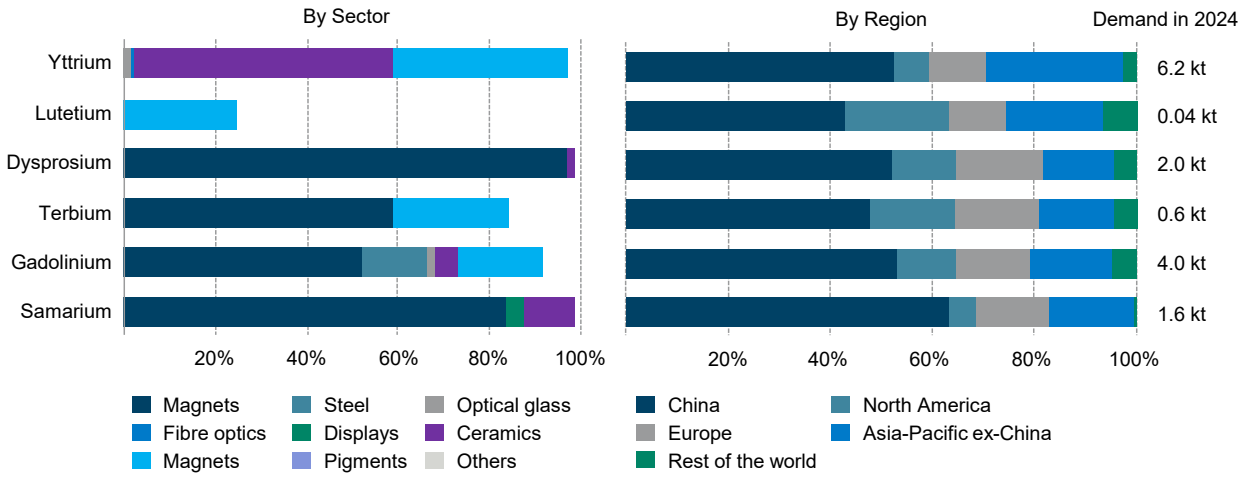
Exhibit 13 depicts the current 2025 price of tungsten with a purity of 88.5%, averaging $593 per metric ton, reflecting a significant 74% increase year-over-year.

Current Global Production

China is the key processor of rare earth elements, producing about 270,000 metric tons annually, or roughly 69% of global output. This represents a decline from controlling 97% of processing in 2010, but still far outweighs contributions from other producers, including the United States (~45,000 tonnes, 11.5%), Myanmar (~31,000 tonnes, 8%), and Australia (~13,000 tonnes, 3%-4%). Beyond mining, China controls nearly 90% of global rare earth element processing and refining and produces 85%-90% of rare earth magnets, the core inputs for EVs, wind turbines, and advanced defense systems. Beijing's influence extends to other critical minerals as well. China supplies 98% of global gallium (with export restrictions imposed in 2024), dominates the global antimony trioxide (ATO) market, and, alongside Russia, oversees more than 60% of global antimony ore reserves. China's Twinkle Star Antimony Mine in Hunan Province, historically the world's largest, is now nearing depletion after more than a century of production, signaling evident supply constraints.

This concentration of mining and processing capacity leaves the rest of the world exposed to Chinese industrial and policy shifts. While falling ore grades and tougher environmental rules have modestly slowed China's domestic growth, most international miners continue to rely on Chinese facilities to refine their ore. Supply disruptions are already visible: In 2024, Chinese antimony ingot exports fell by 45%, as domestic demand from solar cell manufacturers surged, sending ripples through global supply chains. Outside of China, refining capacity for rare earths, gallium, and antimony remains minimal, leaving no alternative infrastructure of comparable scale. This dominance provides Beijing with significant leverage over clean energy, electronics, and defense supply chains, making the expansion of non-Chinese processing and domestic U.S. capacity a strategic priority.

Exhibit 14
Demand for Rare Earth Elements Under Export Controls by Sector and Region 2024



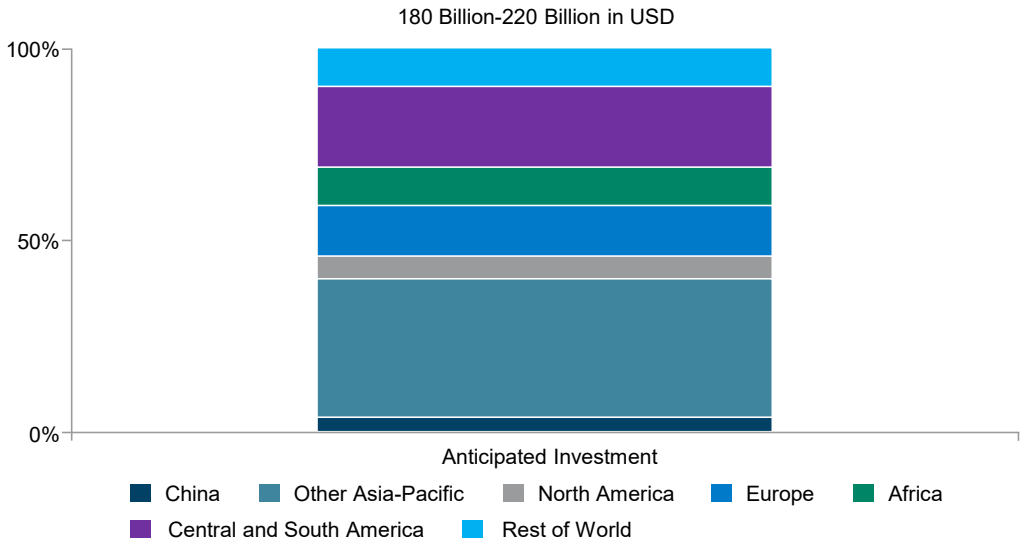
Source: IEA

Other Countries Rare Earth Operations

Despite progress in developing rare earth projects worldwide, China still controls the refinement processes for heavy rare earth elements, particularly dysprosium and terbium, which are a critical component to manufacture high-performance magnets, which are used in defense and clean energy technologies. Several nations in addition to the U.S. are funding mining, processing, and R&D initiatives to reduce dependence on China, including Australia, Brazil, South Africa, Saudi Arabia,

Japan, and Vietnam. For the United States, a reliable long-term control over the mineral price market involves supporting these alternative supply chains through financing and diplomacy. One of the most advanced examples is Australia's Browns Range project, which holds an estimated 2,294 metric tonnes of dysprosium reserves and could eventually produce 279,000 kilograms annually, marking the first major non-China source. However, refining capacity remains in a critical bottleneck; as an example, Lynas Rare Earths, the largest producer outside China, continues to ship oxides to Chinese facilities for processing, with initiatives to implement domestic refinement in places like the U.S. unlikely to occur before 2026.

Exhibit 15
Anticipated Investment in Critical Minerals Mining by Region (2022-2030)

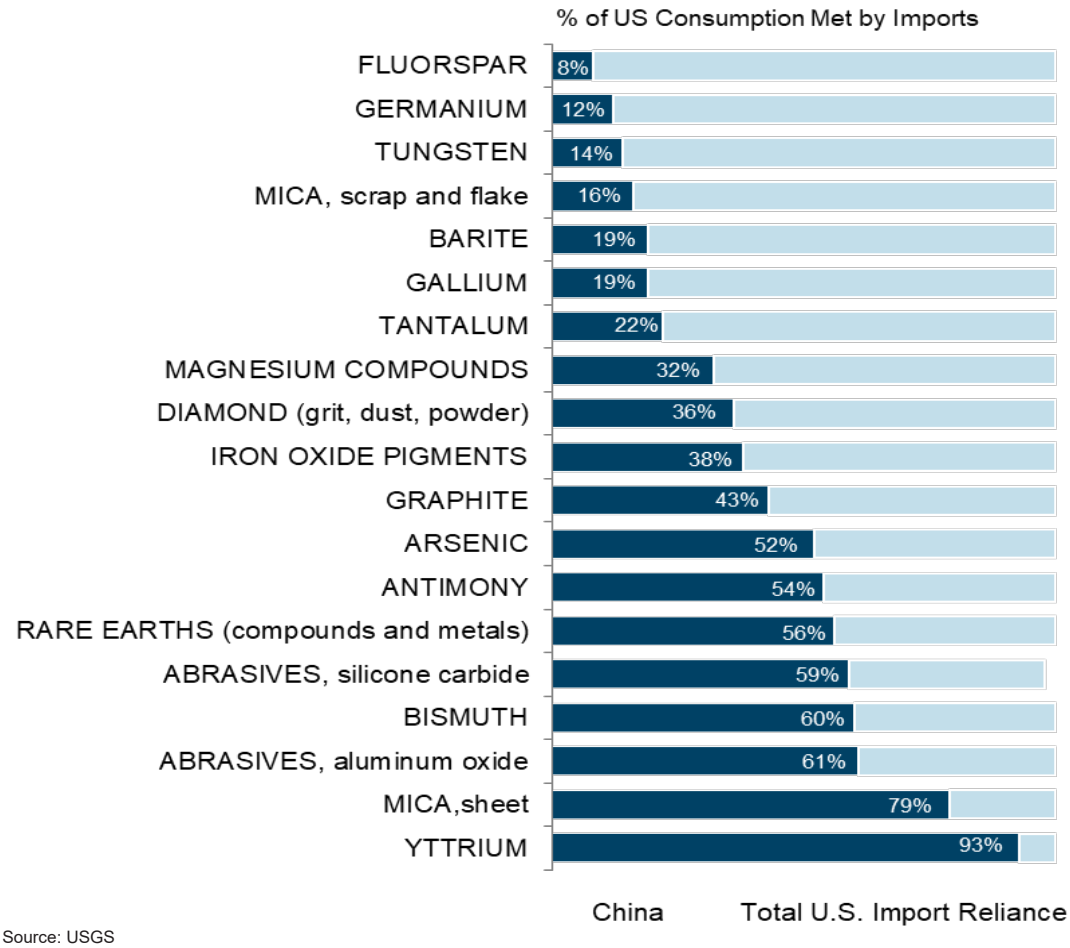


Source: IEA

U.S. Dependence and Trade Policy

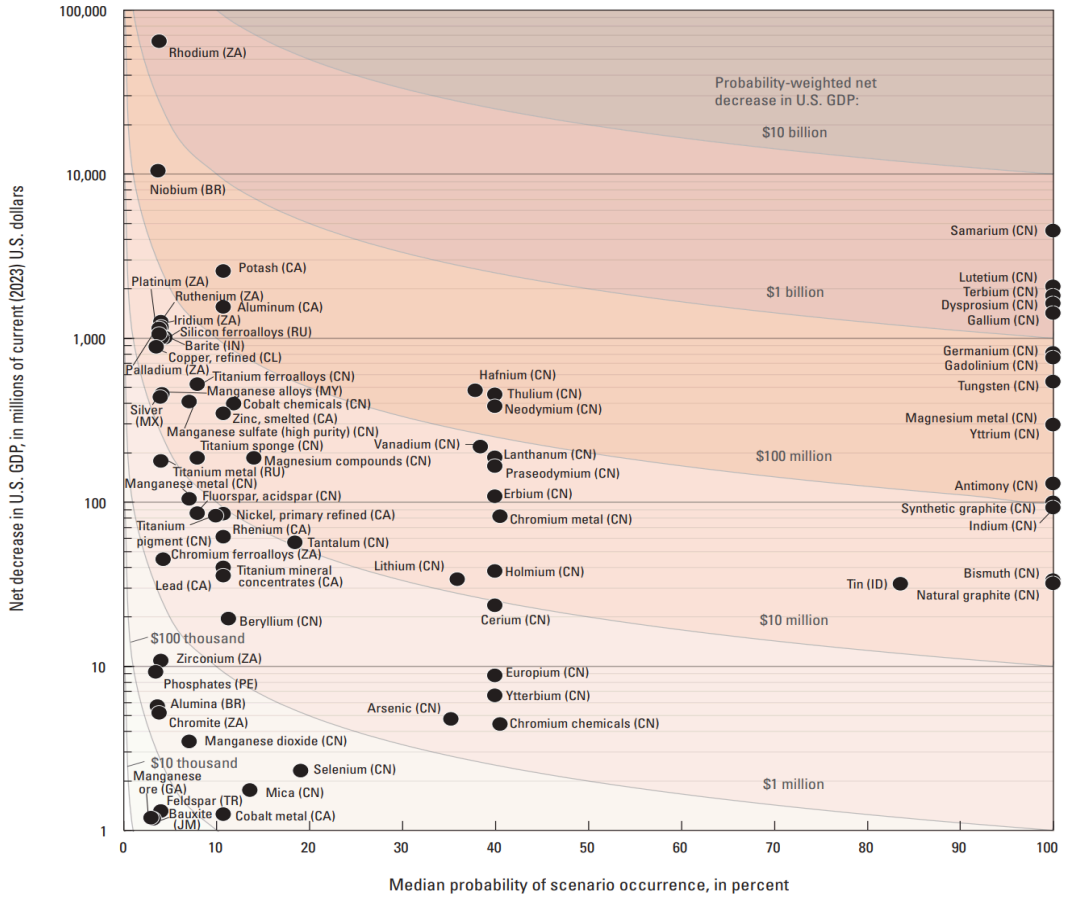
The United States imports more than 95% of the rare earths it consumes, with approximately 70%-72% of those imports historically coming from China, according to the USGS. Recognizing this strategic vulnerability, policy shifts began under the Biden administration and have been continued on by the Trump administration, with the enactment of several executive orders prioritizing critical mineral independence and federal funding for domestic projects. To reduce exposure, the U.S. Trade Representative has imposed Section 301 tariffs, with critical minerals and permanent magnets from China subject to an additional 25% duty, as published in the Federal Register in September 2024. These measures, combined with ongoing Defense Production Act funding and diplomatic support for allied projects, reflect Washington's objective of eliminating reliance on Chinese rare earths by 2027 through rapid expansion of domestic mining, processing, and recycling capacity.

Exhibit 16
U.S. Minerals Net Import Reliance on China



Source: USGS

Exhibit 17
U.S. Net GDP Decline From Mineral Commodity Trade Disruptions



Sources: USGS, Secretary of the Interior

China Trade Restrictions

Chinese initial rare earth restrictions were imposed in July 2010, when the Ministry of Commerce announced a 40% cut to its global rare earth export quota for the second half of that year. Largely due to retaliation for U.S. trade restrictions, China imposed export restrictions in April 2025 on seven rare earth elements—samarium, gadolinium, terbium, dysprosium, lutetium, scandium, and yttrium—requiring exporters to apply for licenses to sell these materials overseas. In October 2025, China further tightened its controls, with restrictions on five additional rare earth elements—holmium, erbium, thulium, europium, and ytterbium—as well as on certain rare earth-related equipment and components. The United States is particularly vulnerable to changes with these supply chains. Until 2023, China accounted for 99% of global heavy rare earth element processing, with only minimal output from a refinery in Vietnam. However, the Vietnamese facility has been shut down for the past year due to a tax dispute, leaving China maintaining its monopoly over supply. Notably, China did not impose trade restrictions on the exportation of light rare earths, due to the larger set of countries that require processing.

Restricted Rare Earth Elements

The 12 restricted rare earth elements were announced in two phases in 2025, as part of China's export control measures on critical materials. These restrictions limit the availability of key elements, used in semiconductors, EVs, and defense technologies, to foreign markets, increasing global supply chain pressure and highlighting the importance of developing domestic and diversified sources outside China.

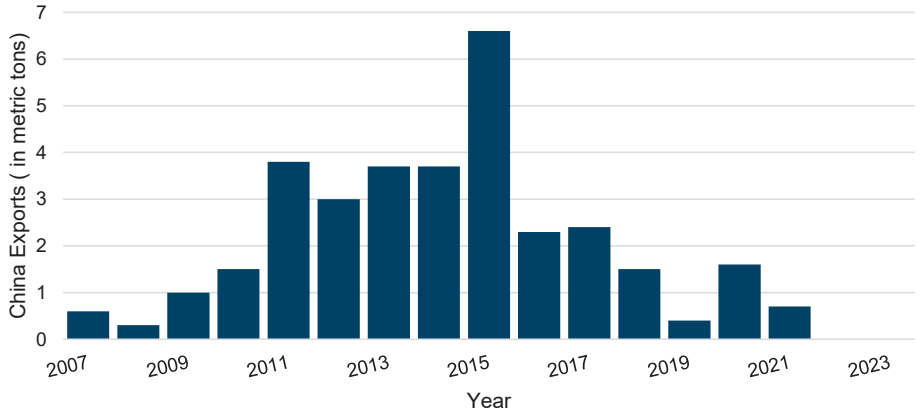
Announced in April 2025

1. Samarium (Sm): used in magnets for automotive parts, medical devices, and sensors
2. Gadolinium (Gd): used as a contrast agent for MRIs and in nuclear reactor control rods
3. Terbium (Tb): used in anti-counterfeiting ink and lasers
4. Dysprosium (Dy): a key component in high-performance magnets for EVs and wind turbines
5. Lutetium (Lu): used in lasers and radiation therapy
6. Scandium (Sc): an important material for aircraft parts and lasers
7. Yttrium (Y): used in electrode materials, lasers, and aircraft parts

Announced in October 2025

8. Holmium (Ho): used in advanced lasers and nuclear technology
9. Erbium (Er): critical for fiber optics
10. Thulium (Tm): used in portable X-ray devices and lasers
11. Europium (Eu): used to produce phosphors for displays
12. Ytterbium (Yb): an element with applications in fiber optic technology

Exhibit 18
China Exports of Gallium and Germanium (2007-2023)



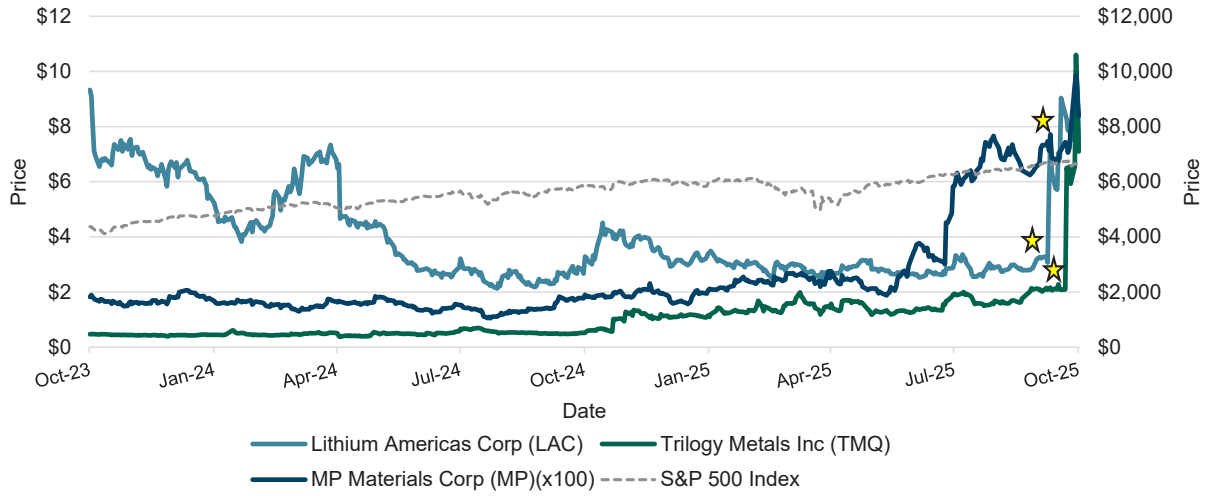
Source: USGS

Government Funding Domestic Rare Earth Supply Chain

The United States currently does not have any large-scale operational heavy rare earth separation facilities at scale, but it does have a significant opportunity to take control of its own supply chain through the provision of government funding, loans, and grants to firms building out distribution lines. The 2024 National Defense Industrial Strategy set a goal for the U.S. to establish a fully integrated mine-to-magnet rare earth supply chain, capable of satisfying U.S. defense needs by 2027. Since 2020, the DOD has committed over $439 million toward funding domestic rare earth supply chain initiatives. In November 2020, the Pentagon awarded MP Materials $9.6 million under the Defense Production Act (DPA) Title III for development of light rare earth separation at the Mountain Pass site. In 2022, an additional $35 million DPA investment was announced. These early investments aim to build out separation and refining infrastructure in California (Mountain Pass) and magnet manufacturing in Fort Worth, Texas, to connect the entire chain domestically.

Exhibit 19

Direct Impact of U.S. Government Funding Rare Earth Companies



Source: FactSet and William Blair Equity Research

Since July 9, 2025, MP Materials' stock has surged more than 230%, rising from $30 to nearly $100, compared with the S&P 500, which returned just under 8% over the same period. This growth was subsequent to the announcement by the DOD granting material funding of $400 million in MP's convertible preferred equity, in addition to a $150 million loan to expand its heavy rare earth separation and processing capabilities, thus securing MP's position as a key domestic rare earth supplier. The agreement also guarantees MP a 10-year floor price of $110 per kg for all neodymium-praseodymium (NdPr) products starting in fourth quarter 2025, reflecting a new price benchmark that other rare earth companies follow. In addition, the DOD committed to a 10-year offtake contract for MP's new "10X" magnet manufacturing facility, offering cost-plus pricing and a minimum $140 million annual EBITDA (2.0% escalator) guarantee.

This funding was crucial to MP's business model, as it enabled large-scale U.S.-based processing and magnet production that would not have been economical amid volatile rare earth prices and heavy Chinese competition. Without government backing, MP would have faced significant capital and market risk, limiting growth potential and threatening U.S. supply chain security. However, even under optimistic scaling, MP Materials' projected magnet output is relatively modest in the near term. By the end of 2025, MP expects to produce about 1,000 tons of neodymium-iron-boron

magnets, or less than 1% of the approximately 138,000 tons of NdFeB magnets China produced in 2018. In 2024, MP Materials announced record production of 1,300 tons of NdPr oxide. By contrast, China's neo-magnet output in that same year is estimated at 300,000 tons globally.

In January 2025, USA Rare Earth reported its first dysprosium oxide sample at 99.1% purity, derived from the Round Top deposit in Texas and processed at a research facility in Wheat Ridge, Colorado. While significant, scaling such samples into full commercial operations remains a formidable challenge, requiring years of investment, permitting, and engineering. However, although the U.S. remains distant from achieving full independence in rare earth supply chains as many projects are in early phases, the U.S. is likely to maintain its defensive funding strategy in this sector for years to come.

Current Government Funding for Our Initiated Names

The U.S. government has steadily expanded direct funding and contracting to advance domestic critical mineral and rare earth capabilities, with multiple companies receiving targeted support. American Resources Corporation's affiliate, ReElement Technologies, was awarded approximately $2 million from the DOD to scale refining and processing capabilities, building on its proprietary separation platform designed for rare earth elements, battery materials, and critical minerals recycling. United States Antimony Corporation secured one of the largest recent contracts, a sole-source multiyear supply agreement with the Defense Logistics Agency valued at up to $245 million, ensuring delivery of antimony ingots to the National Defense Stockpile to mitigate reliance on Chinese supply.

USA Rare Earth, while not yet awarded public DOD funding, has reported progress at its Round Top project in Texas and its Colorado pilot facility, recently producing dysprosium oxide at 99.1% purity and positioning itself as a future domestic supplier of heavy rare earths. NioCorp Developments received a Defense Production Act Title III award of up to $10 million in 2025 to accelerate development of a domestic scandium supply chain through its Elk Creek Critical Minerals Project in Nebraska, with funds directed to feasibility, drilling, and supply-chain development work. Together, these awards highlight a growing U.S. strategy of backing companies across the value chain, from antimony and scandium to rare earth refinement to move operations out of China and secure domestic supply chains.

Financial and Supply Chain Implications

Developing a U.S.-based rare earth and critical minerals supply chain will require massive investment estimated at $360 billion to $450 billion in global mining and processing capacity between 2022 and 2030. Much of this capital must be directed to mining, refining, separation, and recycling infrastructure to offset China's state-subsidized dominance. Although domestic production costs are currently higher, long-term benefits include reduced supply-chain risk, the creation of up to 250,000 American energy-sector jobs, and tens of billions of dollars in combined public and private economic activity. Recent U.S. initiatives have already catalyzed significant momentum: DOE awards for battery processing alone have mobilized over $16 billion in public funding and unlocked more than $1 billion in private investment, while the Bipartisan Infrastructure Law (2021) and Inflation Reduction Act (2022) have triggered broader inflows of private capital by de-risking project finance.

The clean energy transition is driving this investment imperative. Technologies such as wind turbines, EV batteries, and modernized electricity grids depend heavily on critical minerals, including lithium, cobalt, nickel, copper, and rare earths like neodymium, as well as bulk materials such as steel, cement, plastics, and aluminum. Under the International Energy Agency's Net Zero Emissions by 2050 scenario, demand for the five most essential critical minerals is projected to rise from 1.5 to 7 times by 2030, outpacing anticipated mining expansions. Due to the lengthy nature to develop and permit new mines, the majority of the required $360 billion-$450 billion investments must occur within the next three years to align supply demand. Improving material efficiency and recycling can help to reduce some pressure, but without rapid and large-scale mining and processing investment, global supply will remain in a shortage.

Conclusion

Overall, as global demand for rare earth elements continues to exponentially rise, the U.S. is rapidly expanding domestic production, processing, and recycling capabilities to reduce reliance on China, which currently dominates the supply chain. Strategic investments from the Department of Defense and the Department of Energy, together with significant backing from financial institutions, are accelerating the development of a secure, mine-to-magnet domestic supply chain. While China's control of critical minerals remains a long-term challenge, these initiatives toward building a domestic supply chain have already driven substantial returns for rare earth companies and we expect continued further upside in the long run. We initiate coverage of five rare earth levered companies, American Resources, NioCorp Developments, Royalty Management Holding, USA Rare Earth, and United States Antimony, all with Outperform ratings. We forecast material future top- and bottom-line growth supported by insatiable demand. Further, we project additional rare earth government and institutional support as the U.S. tries to rein in China, which could potentially raise the stock prices of four of our initiations to materially higher levels.

The prices (10/16) of the common stock of other public companies mentioned in this report follow:

American Resources Corporation (Outperform)	$4.25
Lithium Americas Corporation	$7.39
MP Materials Corporation	$83.84
NioCorp Developments (Outperform)	$8.30
Royalty Management Holding Corporation (Outperform)	$2.96
Trilogy Metals Inc.	$7.10
United States Antimony Corporation (Outperform)	$12.56
USA Rare Earth (Outperform)	$28.54

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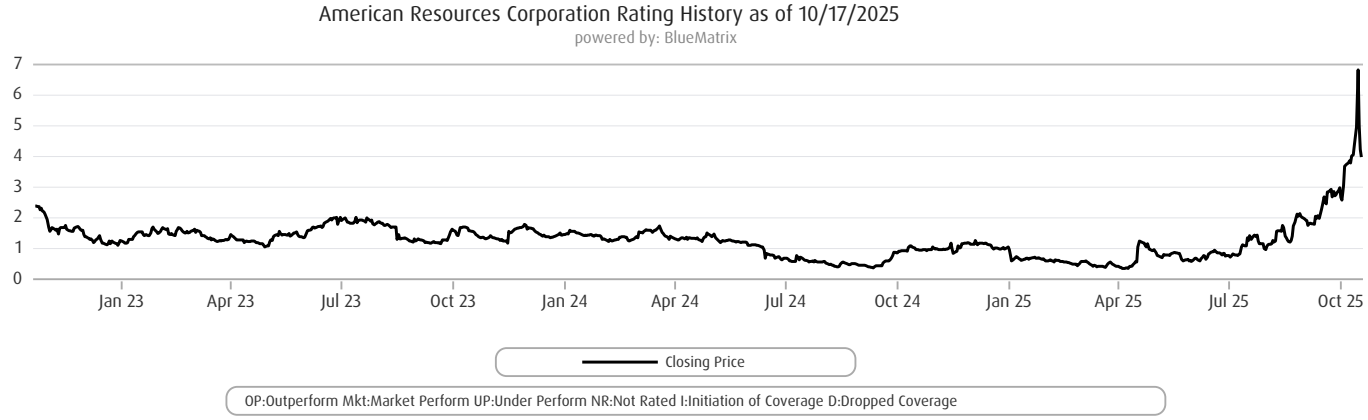
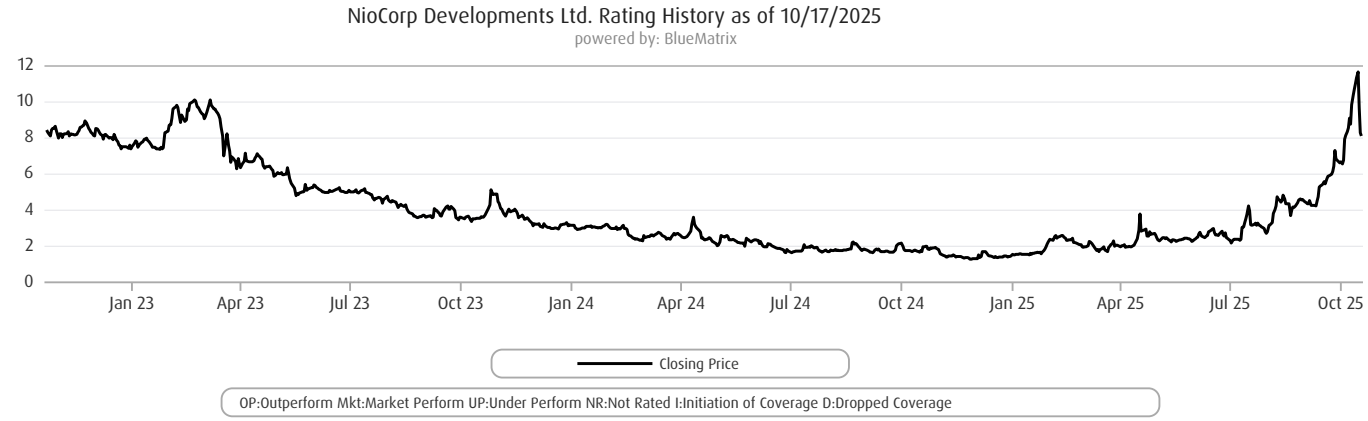
DOW JONES: 46190.60
S&P 500: 6664.01
NASDAQ: 22680.00



Source: FactSet & William Blair



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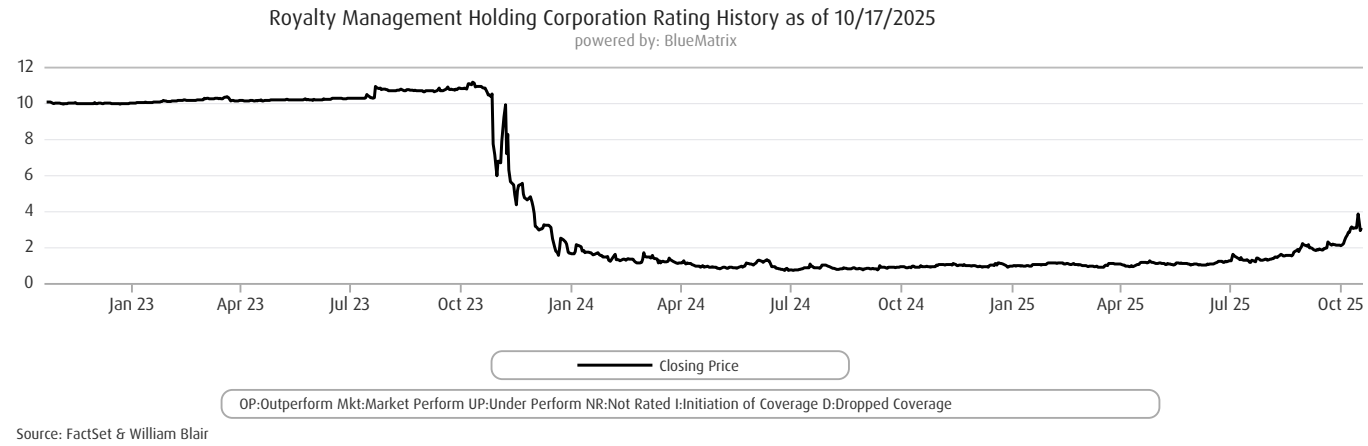

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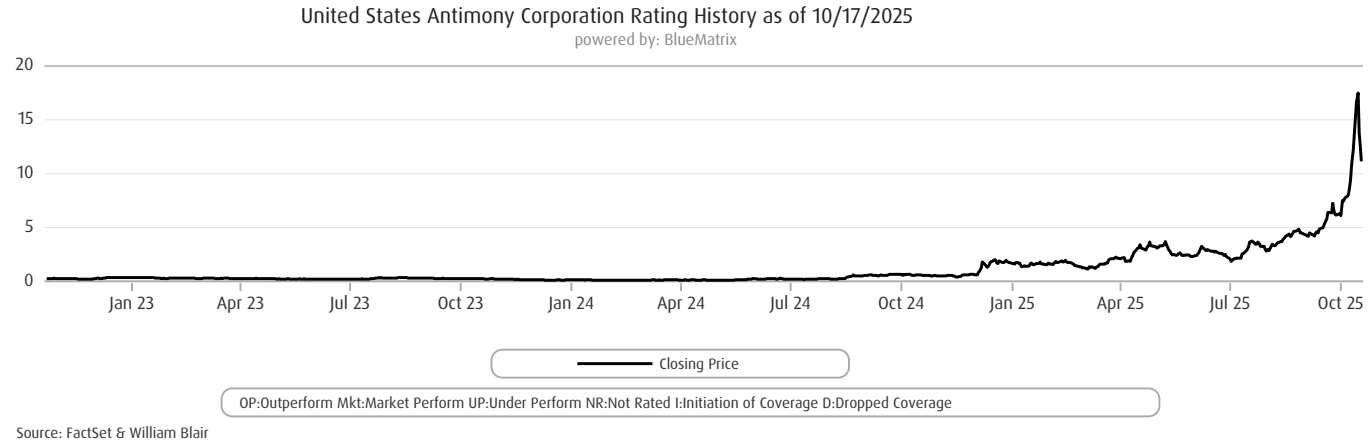

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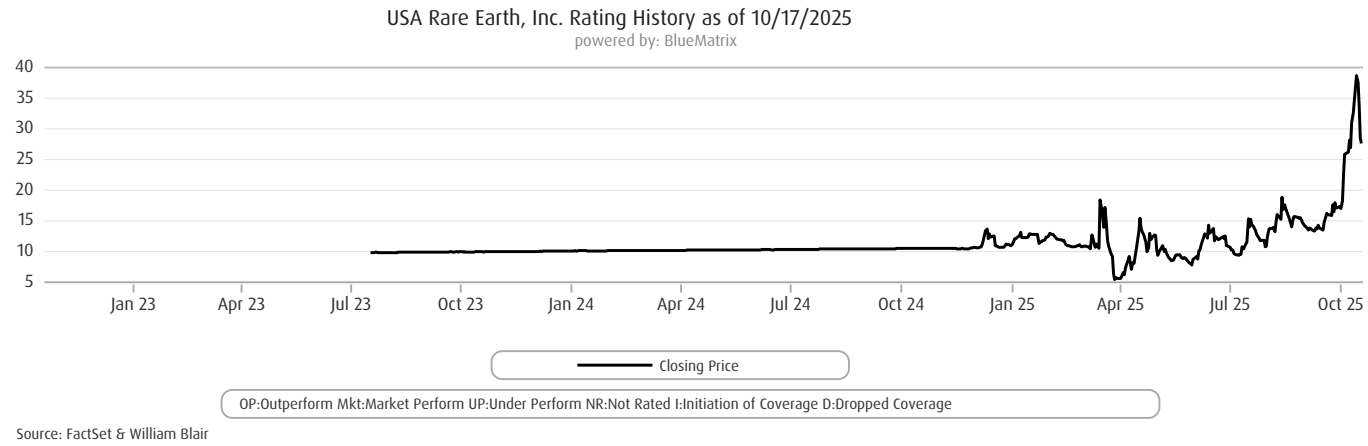

Source: FactSet & William Blair

Additional information is available upon request.

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