Critical Mineral Supply Chains: Risks, Dependencies, and Diversification

Center Forward Basics
March 2026

Overview - What are Critical Minerals?

Critical minerals are nonfuel minerals or materials that are essential building blocks of many technologies and industries that drive economic growth and national security. However, the supply chains that deliver them are often vulnerable to disruptions due to scarcity or restricted access, lack of domestic production, environmental changes, or geopolitical risks. This Basic outlines the importance of critical minerals to innovation and examines the current state of supply, market concentration, associated risks, and opportunities to diversify supply chains.

As of 2025, the U.S. Geological Survey has classified 60 minerals as critical. Among this list, cobalt, graphite, lithium, manganese, and nickel are integral components of batteries and high-end defense capabilities. Copper is foundational to electricity infrastructure, and gallium is a key input for semiconductors, renewable energy technology, and advanced defense technologies. After these minerals are located and mined, they must undergo complex processing and refining to become valuable inputs.

Rare-earth elements (REEs) are a subset of 17 critical minerals that are especially difficult to extract, given they are not typically found in concentrated deposits. These minerals are important in the aerospace, defense, renewable energy, and healthcare technology sectors. Critically, some REEs are used in permanent magnets for precision-guided munitions and radar systems.

Critical Mineral Market Concentration

Despite possessing some domestic resources, the United States relies heavily on a global network of countries to supply the critical minerals that power modern technologies and energy systems. Many of the world's most significant deposits lie outside U.S. borders; for example, Argentina, Bolivia, and Chile – the "Lithium Triangle" – hold over half of global lithium reserves, and the Democratic Republic of the Congo contains the world's largest cobalt reserves.

China remains the leading mining country globally and accounts for approximately 60–70 percent of worldwide processing of key battery minerals. This outsized capacity reflects decades of coordinated domestic industrial policy and strategic foreign investment as part of its expansive Belt and Road Initiative. Since the early 2000s, China has provided almost $57 billion in aid and subsidized credit to fund mining and refining projects in mineral-rich countries. This has significantly expanded China's role in critical mineral and emerging technology supply chains.

While the U.S. remains a major producer of some critical minerals, it is entirely import-dependent for a dozen minerals and more than 50 percent reliant on foreign sources for dozens more, underscoring the extent to which U.S. supply chains are intertwined with global producers.

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Key Definitions:

- **Supply Shock**: sudden changes in the availability of a commodity that cause shifts in price and output. These shocks can be negative, reducing supply and increasing prices, or positive, increasing supply and lowering prices. Common causes of such shocks include natural disasters, pandemics, war, or technological advances.

- **Offtake Agreement**: a contract in which a producer promises to sell a significant portion of a project's future output to a specific buyer. These agreements are often used to secure project financing by proving market demand and guaranteeing future revenue.

Supply Chain Risks in Concentrated Critical Mineral Markets

Many policymakers and analysts argue that China's significant role in refining and processing could pose economic and geopolitical risks to the U.S. and its allies. China's state-led industrial policies and influence over large companies enable it to affect prices and supply levels in global markets. These non-market-based actions make it increasingly difficult for American or allied competitors, focused on profitability, to enter the market. In response to trade or geopolitical disputes, China has also demonstrated its willingness to impose export controls restricting shipments of critical minerals and REEs. Some experts have raised concerns that continued Chinese export controls could raise prices and disrupt supply chains in critical sectors, especially defense manufacturing. Experts have also expressed concern over a sudden reduction in Chinese export controls. This could flood the market, reduce prices, and undermine non-Chinese investment.

Because critical minerals supply chains are highly concentrated, the market is increasingly vulnerable to **supply shocks**. These could have dramatic price effects – some have estimated that a sustained supply shock of critical minerals used in batteries could raise global battery pack prices by 40–50 percent. Highly concentrated market power increases investment risks, weakens supply chain security, and complicates efforts to diversify supply chains.

Critical Minerals and Automotive Supply Chains

The rapid rise of lithium iron phosphate (LFP) batteries, which power nearly half of the global electric vehicle (EV) market, is reshaping automotive supply chains. Key inputs in LFP battery production are highly concentrated in the Chinese market, creating risks for automotive manufacturers and raising concerns among some policymakers. China dominates not only upstream mineral processing – exploration and extraction – but also intensive processing and refining of battery component manufacturing. Even when minerals are mined elsewhere, they are very often processed in China before becoming battery-grade materials. This creates structural supply chain dependencies that are challenging and capital-intensive to untangle. To mitigate the risks associated with these dependencies and ensure eligibility for domestic EV incentives, some automakers have pursued direct investments with mineral producers. These investments were premised on strong projected EV demand and supportive federal policy.

However, the tax credit for electric vehicle purchases elapsed in October 2025, and in February 2026, the Trump Administration rolled back several automotive emissions regulations that had encouraged electric vehicle adoption. Some analysts expect automakers to increase production of hybrids and internal combustion vehicles in response to the regulatory change. While still requiring significant lithium and graphite, among other inputs, this policy change significantly reduces the sector's demand for certain critical mineral components. The policy reversal also introduces investment uncertainty for long-term mining, refining, and battery manufacturing projects. Projects partially supported by previous federal incentive structures could now struggle to secure the necessary capital. Regardless of whether domestic EV production slows, global demand for EVs is likely to continue growing. Some experts posit this could further China's dominance in critical mineral processing and battery manufacturing.

Critical Minerals Diversification: A Look Ahead

Global demand for critical minerals is projected to increase. This can be attributed to the rise of artificial intelligence and data centers, advances in defense and national security infrastructure, and the demand for renewable energy technology, among other advanced technologies. The Trump Administration has implemented measures to diversify critical minerals supply chains and meet rising demand. The One Big Beautiful Bill Act allocated $7.5 billion for critical mineral development, supporting the Administration's goal of building a critical mineral stockpile valued at approximately $12 billion. The following section outlines other policy mechanisms that could further diversify the supply chain while ensuring that new investments do not inadvertently increase dependence on China.

Boosting Domestic Production:
Increasing domestic production of critical minerals has become a key focus of U.S. industrial and national security policy. In February 2025, President Trump issued an executive order to establish the National Energy Dominance Council. The council advises the President on strategies to diversify critical mineral supply chains and increase domestic production, from mining to refining and processing. Subsequently, in March 2025, President Trump issued another executive order, "Immediate Measures to Increase American Mineral Production," directing federal agencies to increase mining, processing, and refining "to the maximum possible extent." To support this directive, the order expedites permitting for mining projects on federal lands.

The Administration has met these directives with targeted investments. In July 2025, the Department of Defense (DoD) announced a $400 million investment in MP Materials, which operates the country's only active rare earth mine. In an effort to build infrastructure for sustained domestic production, the investment includes equity financing, a guaranteed **offtake** of rare earth magnets equal to roughly 40 percent of recent U.S. demand, and price supports above current market rates. The DoD has also invested $150 million in a Louisiana-based gallium company to reduce reliance on Chinese production of materials integral to defense technologies. Then, in August 2025, the Department of Energy (DoE) announced almost $1 billion in new funding to support domestic production, by-product recovery, and the commercialization of critical mineral processing technologies. This laid the foundation for the September 2025 announcement of DoE's deal with Lithium Americas Corp. – with support from General Motors – to support domestic lithium extraction in Nevada.

Despite these significant investments, experts caution that scaling domestic supply could be difficult. The United States still lacks sufficient refining and processing capacity for many battery and defense-related inputs. Domestic cobalt and nickel resources are limited and require capital-intensive hydrometallurgical refineries, which the U.S. does not currently possess at scale.

Friendshoring:

Friendshoring offers a pathway to diversify critical minerals supply chains by shifting sourcing, processing, and investment toward politically aligned, resource-rich partners rather than competitors. Both the Biden and Trump Administrations have leaned into friendshoring. The Minerals Security Partnership (MSP), launched in 2022 under the Biden Administration, provides a multilateral framework to promote supply diversification and environmentally responsible mining. In 2024, the MSP introduced a finance network to scale sustainable investment in critical minerals mining through development finance institutions. The Trump Administration's Project FORGE, launched in 2026, was created to serve as the successor to the MSP. Through FORGE, which will be chaired by the Republic of Korea through June 2026, partner countries will collaborate at the policy and project levels to advance initiatives that strengthen diversified, resilient, and secure critical minerals supply chains.

In 2025, the Trump Administration pursued agreements intended to secure preferential access to future mineral projects in Ukraine and the Democratic Republic of the Congo. The Administration also launched a critical minerals security initiative with its Quad partners – Australia, India, and Japan – to develop resilient supply chains and reduce shared dependence on China. Continued friendshoring presents an opportunity to coordinate strategic investments, standardize environmental and labor standards, mitigate national security risks associated with concentrated market power, and increase supply chain stability.

Market Regulation and Tariffs:

Many experts believe that diversifying critical minerals supply chains will also require market regulation mechanisms and targeted trade policies. New mining and processing projects in the U.S. and allied countries often face capital costs roughly 50 percent higher than those of incumbent producers like China, a major deterrent to investment. Some experts say that while public financing can help launch projects, market interventions are needed to sustain them. Tools such as price floors and ceilings can reduce investment risk, and policies such as strategic reserve purchases of specific minerals can create premium market segments that support diversified producers. The U.S. Export Import Bank's February 2026 announcement of Project Vault seeks to create a stockpiling mechanism for critical minerals to support the U.S. commercial sector, and several bills have been introduced in Congress that would develop other avenues for stockpiling alongside strategic allies.

The Trump Administration has used tariffs and trade enforcement actions to encourage domestic production and diversify supply chains. In July 2025, the Administration imposed a 160 percent tariff on Chinese graphite anode material, which is critical for batteries, and a 50 percent tariff on copper products. While these measures can be effective in countering China's market dominance, tariffs can also prompt retaliatory trade policies that negatively impact domestic markets. China has responded to earlier American tariffs with export controls on multiple critical minerals and REEs, contributing to price increases.

Collaborative Frameworks for Supply Chain Integration

Continued diversification and reduced reliance on China will require partnerships between resource-rich countries and countries with the capital and capacity for refining and processing. These partnerships can take form as co-investments, **offtake agreements**, or coordinated market regulation. In early February 2026, the U.S. and Mexico announced a 60-day plan to coordinate trade policies to solidify North American critical mineral supply chains. Similar action plans have been drafted with Japan and the EU. The policies are expected to include price floors for specific minerals. Looking ahead, similar collaborative frameworks – such as those under consideration by USTR – could codify plurilateral alignment on regulatory standards, foreign investment screening, geological mapping, and mineral stockpiling.

Conclusion

While American efforts to expand domestic production, strengthen partnerships with allied producers, and employ trade and market tools are ongoing, the global critical minerals market remains characterized by significant uncertainty and structural concentration, primarily in China. Diversification strategies may also introduce trade-offs, including higher costs, environmental permitting challenges, and geopolitical risks in new supplier countries. As global demand continues to grow across advanced technologies, defense systems, and energy infrastructure, American efforts to foster supply chain resilience and bolster diversification will impact economic competitiveness and geopolitical influence for years to come.

Link to Additional Resources

- Associated Press: Trump administration invests in another US rare earth miner to loosen China's grip on supply
- Atlantic Council: A US framework for assessing risk in critical mineral supply chains
- Council on Foreign Relations: The U.S. Critical Minerals Dilemma: What to Know
- The Economist: America's dangerous pursuit of critical-mineral dominance
- The Economist: Europe risks a rare-earths crunch between China and America
- Financial Times: Pentagon invests $150mn in US gallium company to secure strategic supplies
- International Energy Agency: World Energy Outlook 2025
- Resources for the Future: Resource Nationalism and the Resilience of Critical Mineral Supply Chains
- Reuters: US, Mexico to develop coordinated trade policies on critical minerals
- The Wall Street Journal: Trump Administration to Create $12 Billion Rare-Earth Stockpile to Counter China
- U.S. Geological Survey: Global Maps of Critical Mineral Production in 2023