



Statement before the Senate Finance Committee

“Trade in Critical Supply Chains”

A Testimony by:

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May 14, 2025

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Chairman Crapo, Ranking Member Wyden, and distinguished Members of the Committee, I am honored to share my views with you on this important topic. CSIS does not take policy positions, so the views represented in this testimony are my own and not those of my employer.

My name is Dr. Gracelin Baskaran. I'm a mining economist and currently serve as the founding director of the Critical Minerals Security Program at CSIS, where I lead a team that works on advancing the development of resilient minerals supply chains needed for national security, economic competitiveness and energy resilience. Over the past 12 years, I have worked extensively on critical minerals policy both in the United States and internationally—bringing firsthand expertise in navigating the geopolitical, economic, and security dimensions of this rapidly evolving space.

The race for critical minerals

Critical minerals security stands as a deeply bipartisan priority in Washington today—but it is far from a new concern. For nearly a century, geopolitical tensions and war have driven United States policymakers to prioritize access to these vital resources. At the onset of World War II, the United States enacted the Strategic and Critical Materials Stockpiling Act of 1939, recognizing that low commercial reserves of critical raw materials posed a direct threat to national security. President Franklin D. Roosevelt, in a letter to Congress, warned that “in the event of unlimited warfare on sea and in the air, possession of a reserve of these essential supplies might prove of vital importance.” By 1942, the urgency was so great that the United States government restricted non-essential gold mining, redirecting industrial capacity toward the extraction of minerals critical to the war effort. Less than a decade later, the Defense Production Act of 1950 was passed in response to the Korean War, granting sweeping authority to secure strategic minerals essential for defense technologies. History makes one thing clear: access to critical minerals is not just an economic issue—it is a cornerstone of national security. And as today's geopolitical rivalries intensify, the stakes are higher than ever.¹

The United States faces a severe level of vulnerability in its access to the minerals that underpin national defense, economic competitiveness, and energy security. It is entirely import-dependent for 12 of the 50 minerals designated as critical by the United States Geological Survey and relies on imports for more than half of its needs for another 29. China stands as the leading producer for 30 of these critical minerals.² However, it did not establish this position of dominance by operating alone. Over the past 30 years, China has emerged as a critical player in the mineral supply chains crucial for national and energy security. Despite producing just 10 percent of the world's lithium, cobalt, nickel, and copper (Figure 1), China imports and controls the processing of an astonishing 65 to 90 percent of global supply for these metals (Figure 2).³ This level of control is the direct result of decades of calculated domestic industrial strategy, foreign policy, and trade policy.

¹ Baskaran, G. (2025). *Introduction*. In Baskaran, G. & D. Wood (Eds.), *Critical Minerals and the Future of the United States Economy* (pp. 1-9). Center for Strategic and International Studies.

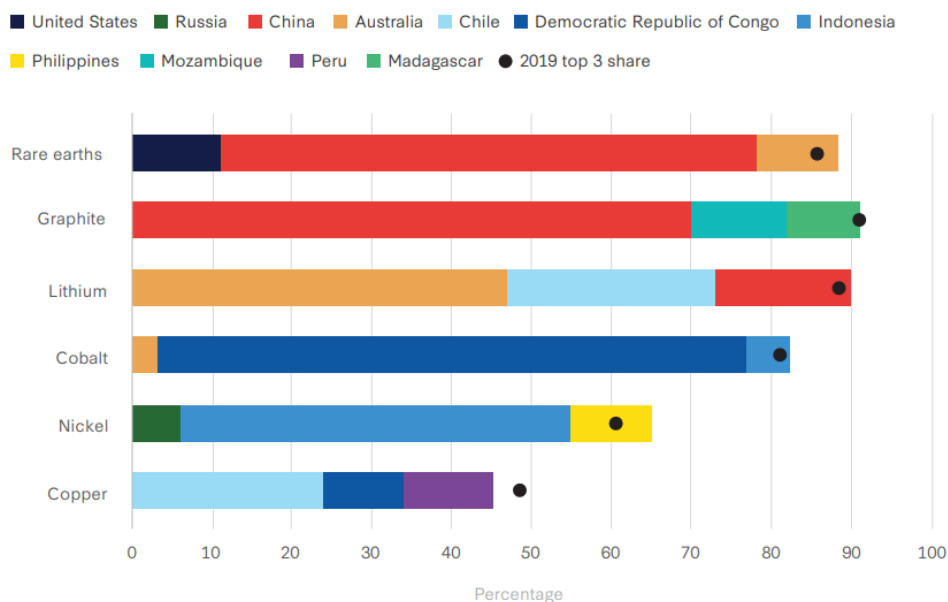
<https://www.csis.org/analysis/critical-minerals-and-future-us-economy>

² National Mining Association. "China Minerals Dominance a Persistent Threat to U.S. Economy, USGS Report Shows." January 31, 2025. <https://nma.org/2025/01/31/china-minerals-dominance-a-persistent-threat-to-u-s-economy-usgs-report-shows/>

³ Baskaran, G. (2025). *Introduction*. In Baskaran, G. & D. Wood (Eds.), *Critical Minerals and the Future of the United States Economy* (pp. 1-9). Center for Strategic and International Studies.

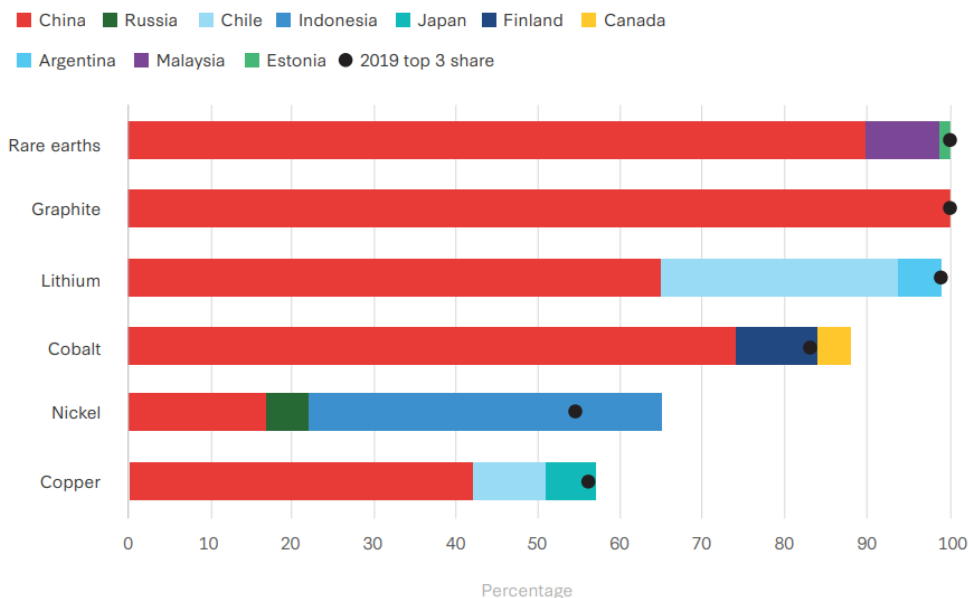
<https://www.csis.org/analysis/critical-minerals-and-future-us-economy>

Figure 1: Share of Top Three Producing Countries in Mining of Selected Minerals, 2022



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Figure 2: Share of Top Three Processing Countries of Selected Minerals, 2022



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China's dominance presents a serious challenge to the United States for two key reasons. First, as geopolitical tensions rise, China has actively weaponized critical minerals—restricting exports of materials such as gallium and germanium, essential for semiconductor production; graphite,

critical for electric vehicles; and antimony and rare earth elements, which are vital to many defense technologies. Second, China uses its market power to manipulate commodity prices, making it increasingly difficult for Western companies to compete and secure private investment. By ramping up production and flooding markets, China has created surpluses that drive down prices, forcing Western firms to shutter operations. For example, a surge in Chinese-backed nickel production in Indonesia led BHP to close its Nickel West operations and the West Musgrave project in Australia, while Glencore shut down its Koniombo Nickel SAS operation in New Caledonia due to financial losses. Chinese companies, meanwhile, remain active in these markets, backed by substantial state support.⁴

The United States needs a strategy for reducing dependency and strengthening mineral supply. The last two administrations have set out to improve supply through better exploration, production, recycling, and reprocessing of critical minerals. In 2017, President Donald Trump issued Executive order 13817, to facilitate better management of critical minerals to strengthen energy security and executive prosperity. An output of this was an inter-agency report from the Secretaries of Commerce, Defense, Interior and Energy and the United States Trade Representative on critical minerals. One of the six calls to action in the report was to, “Enhance International Trade and Cooperation Related to Critical Minerals: [Identify] options for accessing and developing critical minerals through investment and trade with America’s allies, discusses areas for international collaboration and cooperation.”⁵

While ramping up domestic mining will be crucial, the uncomfortable truth is that the United States cannot solve this crisis alone—not for lack of political will, but because of the simple reality of geology. For example, the United States holds less than 1% of global reserves of cobalt, nickel, and graphite, and only 1.3% of rare earth reserves. To reduce dependence and secure critical mineral supply chains, the United States must lead a global coalition of like-minded allies—leveraging shared resources, coordinating investments, and forging new trade and processing partnerships. This is not just a strategic option—it is an economic and security imperative.

The good news is that many resource-rich countries want to work with the United States and its partners to develop mineral resources if they can bring tangible benefits to host jurisdictions. Resource-rich countries want to diversify partners because they have realized that relying on a single country for investment and offtake is a risk. Additionally, Western companies are generally more responsible, environmentally conscious, and attentive to human rights and labor conditions, which can reduce the friction between communities, workers, firms, and the government. The bad news is that the United States government cannot command the efforts of mining companies, which are private companies accountable to shareholders. Instead, the United States must create an environment that will enable the private sector to compete with state-owned enterprises and offer more benefits to resource-rich countries. The result should be a new model of mining that is mutually beneficial for companies, resource holders, and consumers.

⁴ Baskaran, G. (2025). *A Strategy for Minerals Diplomacy in Emerging Markets*. In Baskaran, G. & D. Wood (Eds.), *Critical Minerals and the Future of the United States Economy* (pp. 90-100). Center for Strategic and International Studies. <https://www.csis.org/analysis/critical-minerals-and-future-us-economy>

⁵ US Department of Commerce. A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals.

The United States possesses an arsenal of tools to better advance its minerals diplomacy and enhance trade. Although concessional financing often dominates the conversation, the United States has a much wider set of instruments at its disposal. Success will depend on the country's ability to move beyond handshake diplomacy and take decisive action to boost mineral inflows to the United States—leveraging strategic financing, securing off-take agreements, providing targeted investment incentives, investing in critical infrastructure, and building partnerships. The ultimate objective is clear—secure reliable access to new sources of critical minerals.

Policy Recommendations

1. The United States should take a more strategic and pragmatic approach to determining which countries are mineral allies

One shortcoming of the Inflation Reduction Act's (IRA) Section 30D provision for “friendshoring” critical minerals is its overly narrow definition of what constitutes an ‘ally.’ To qualify for the EV tax credit, minerals must be sourced from the United States or countries with which it holds a free trade agreement (FTA). While intended to boost domestic production and reduce reliance on adversaries, this rigid requirement effectively sidelined key allies and some of the world's most important mineral-producing nations—including Argentina, Brazil, India, Indonesia, Namibia, Saudi Arabia, South Africa, Vietnam, and Zambia. The United States must move beyond legacy alliances and adopt a resource-driven approach to securing its mineral future. Most FTA partners are not substantially benefiting from the IRA due to their limited resource reserves, and mineral-rich countries that could benefit are excluded. Strategic alignment today means partnering directly with nations that control the world's most vital mineral reserves—whether or not a formal trade agreement exists. Despite China imposing export restrictions on rare earths, countries like Vietnam and Brazil—which together hold more rare earth reserves than China—remain ineligible under Section 30D's incentives.⁶

Given the significant capital requirements and specialized expertise involved, the United States cannot expect to process all critical minerals domestically. Instead, it should build partnerships with trusted allies that are expanding their midstream processing capabilities, including Japan, Australia, Canada, and Saudi Arabia. The most suitable international partners for developing mineral processing hubs will have reliable access to feedstock, strong infrastructure, abundant and affordable energy, a commitment to research and development, low operating costs, political stability, and supportive regulatory environments. Saudi Arabia, for example, aims to become one of the world's top seven mineral processors by 2030, leveraging its vast financial resources, some of the lowest energy costs globally, and direct access to extensive underexplored mineral reserves. The Kingdom also hosts the world's lowest-cost wind and solar PV projects, giving it a competitive advantage in energy-intensive mineral processing—especially for complex materials like rare earth elements. Saudi Arabia has a proven history of partnering with Western companies

⁶ Baskaran, G. & Schwartz, M. (2025). *An Evaluation of the Inflation Reduction Act*. In Baskaran, G. & D. Wood (Eds.), *Critical Minerals and the Future of the United States Economy* (pp. 40-49). Center for Strategic and International Studies. <https://www.csis.org/analysis/critical-minerals-and-future-us-economy>

to unlock mineral resources, including collaborations with Canada's Barrick and American aluminum giant, Alcoa.⁷

The Foreign Entities of Concern (FEOC) provision under the IRA should be a standard component of all future mineral partnerships, incentives, and financing programs. As defined by the Bipartisan Infrastructure Law, an FEOC is any entity "owned by, controlled by, or subject to the jurisdiction or direction of a government of a foreign country that is a covered nation," specifically China, Russia, Iran, or North Korea. In December 2023, the Department of Energy further clarified that an entity qualifies as an FEOC if a covered nation holds 25 percent or more of its voting rights, board seats, or equity interest, or if it is effectively controlled by an FEOC through licensing agreements or contracts. Under these rules, vehicles must not contain any minerals mined or processed by an FEOC. The United States should not be providing support for FEOC-sourced mineral.

2. Utilize tariffs judiciously to incentivize mineral imports

Ronald Reagan once said, *"If you want more of something, subsidize it; if you want less of something, tax it."* When it comes to critical minerals, the United States doesn't just want more—it urgently needs them. America's economic strength, technological leadership, and national security all depend on it. Yet poorly designed tariffs risk doing the exact opposite of what's required—undermining efforts to build resilient domestic and allied supply chains.

First and foremost, indiscriminate tariffs threaten the fragile growth of American mineral processing capacity. Smelting and refining typically operate on razor-thin—or even negative—profit margins, making cost competitiveness critical. If tariffs drive up feedstock costs by 10 to 25 percent (or more), domestic processors will struggle to be competitive, rendering domestic refining economically unviable. Instead of encouraging investment, such tariff policies will deter it—pushing critical processing capacity offshore and leaving the United States more dependent on adversarial supply chains.

For instance, as the United States works to rebuild its uranium enrichment capabilities, poorly designed tariffs could jeopardize access to the raw uranium needed to fuel them. While boosting domestic uranium production is important, the reality is that the United States reserves are limited—it has just 59,400 tons, or one percent of global supply. In contrast, Canada holds nearly 10 times that amount, with 588,500 tons, making it the largest supplier of uranium to the United States and meeting roughly 25 percent of United States demand. Although Canada does not enrich uranium, it plays a critical role by supplying America's emerging enrichment capacity. Imposing tariffs would threaten this vital supply chain precisely when the United States is trying to reclaim leadership in nuclear energy.⁸⁹

⁷ Center for Strategic and International Studies. "Previewing President Trump's Trip to the Middle East." May 8, 2025. <https://www.csis.org/analysis/previewing-president-trumps-trip-middle-east>.

⁸ Baskaran, G. "Canadian Tariffs Will Undermine U.S. Minerals Security." *Center for Strategic and International Studies*, January 31, 2025. <https://www.csis.org/analysis/canadian-tariffs-will-undermine-us-minerals-security>.

⁹ Baskaran, G. & Schwartz, M. "Fueling the Future: Recommendations for Strengthening U.S. Uranium Security." *Center for Strategic and International Studies*, February 5, 2025. <https://www.csis.org/analysis/fueling-future-recommendations-strengthening-us-uranium-security>.

Second, tariffs can drive trade diversion – and U.S. industries may lose access to vital mineral inputs. For example, zinc is the backbone of the American steel industry, and its refining also produces germanium and gallium—two materials essential for advanced semiconductors. When China banned exports of germanium and gallium in 2023, Canada stepped in as a vital alternative, supplying 25% of the United States germanium imports through Teck Resources, the sole Canadian producer. However, in March 2025, Teck CEO Jonathan Price warned that, in response to proposed United States tariffs, the company may redirect its zinc exports to Asian markets to avoid punitive costs. Such a shift would have severe economic consequences, undermining the competitiveness of America’s steel industry and choking off vital inputs for semiconductor production—precisely when secure supply chains are most needed.¹⁰

3. Integrate US-offtake requirements into US government funded projects

When the United States government provides financing—whether through the International Development Finance Corporation (DFC) or the Export-Import Bank (EXIM)—it should require offtake agreements that prioritize American firms. Japan offers a powerful example of how state-backed investment, combined with strategic minerals diplomacy, can lock in long-term resource access to support critical industries. Through the Japan Organization for Metals and Energy Security (JOGMEC), Japan mandates that any project receiving its financing must allocate a portion of production to Japanese companies. In equity deals, offtake is typically secured in direct proportion to Japan’s ownership stake.

This strategy has delivered tangible results. JOGMEC holds a 51% equity stake in the Lofdal rare earths project in Namibia, securing preferential access to one of the world’s largest heavy rare earth reserves. In 2023, Japan further deepened its position by signing a bilateral agreement with Namibia to explore rare earth resources and assess the country’s potential as a future hub for rare earth separation and processing—granting Japan access to raw materials in exchange for its expertise and investment. Japan replicated this approach in Tanzania, investing in Lifezone’s Kabanga nickel project—one of the largest and highest-grade undeveloped nickel sulfide deposits globally. In 2024, JOGMEC signed an offtake agreement to guarantee nickel supplies for Japan’s battery sector, directly tied to its financial backing.¹¹

The United States should adopt this model to secure critical mineral supplies essential for defense, energy and advanced manufacturing industries. Passive financing is no longer sufficient—strategic investment must be paired with enforceable offtake commitments to strengthen America’s industrial base and economic security.

4. Establish broad-based industry incentives to encourage mineral investment in allied nations

¹⁰ Baskaran, G. & Schwartz, M. "Rebuilding U.S. Zinc Capacity in an Era of Global Competition." *Center for Strategic and International Studies*, May 5, 2025. <https://www.csis.org/analysis/rebuilding-us-zinc-capacity-era-global-competition>.

¹¹ Baskaran, G. & Schwartz, M. "G7 Cooperation to De-Risk Minerals Investments in the Global South." *Center for Strategic and International Studies*, May 7, 2025. <https://www.csis.org/analysis/g7-cooperation-de-risk-minerals-investments-global-south>

Although the IRA introduced important incentives to support mineral investments for the electric vehicle sector, a broader, cross-industry approach is needed. The government should create a comprehensive incentives package focusing on minerals production and processing for vital industries, including defense, semiconductors, EVs, and energy. Tax incentives can encourage companies to make the necessary investments in critical minerals production and refining facilities amid uncertain and volatile market conditions in resource-rich allied nations. Without these incentives, Western companies have little reason to pursue costly and complex projects abroad, and resource-rich countries have every reason to keep selling to China—a reliable and ever-present buyer.¹²

Without targeted incentives for mineral sourcing, supply chain disruptions across critical industries remain a significant risk. Although the CHIPS and Science Act allocated \$280 billion to boost advanced semiconductor manufacturing and workforce development, its focus was almost entirely on downstream production. Major funding went to companies like Intel and Micron to expand fabrication facilities, but the Act provided no resources for securing the minerals essential to semiconductor production. As a result, the United States remains highly dependent on China and Russia for key inputs such as germanium, gallium, palladium, and polysilicon. China alone supplies 98 percent of the world's refined gallium and 68 percent of its germanium.¹³¹⁴ This vulnerability has already materialized; in August 2023, China imposed export restrictions on gallium and germanium, triggering concern across the domestic semiconductor sector. Currently, the United States produces no gallium and accounts for less than 2 percent of global refined germanium output. According to the United States Geological Survey, a 30 percent disruption in gallium supply could reduce the United States economic output by \$602 billion—equivalent to 2.1 percent of GDP—posing a serious economic threat.¹⁵¹⁶

5. Prioritize Vertical Integration from the Start

To secure its economic future and national security, the United States must work proactively with allies to ensure that every stage of the critical minerals supply chain—from exploration and production to processing and manufacturing—remains under the control of trusted partners. China's dominance in this space is no accident; it is the direct result of a deliberate, decades-long strategy of vertical integration, backed by state financing and strategic foreign investments. China doesn't just mine resources—it ensures those resources flow straight to its domestic refineries and

¹² Baskaran, G. & Wood, D. (2025). *Conclusion*. In Baskaran, G. & D. Wood (Eds.), *Critical Minerals and the Future of the United States Economy* (pp. 124-131). Center for Strategic and International Studies.

<https://www.csis.org/analysis/critical-minerals-and-future-us-economy>

¹³ Ali, S.H. "Sourcing Gallium for American Semiconductor Supremacy." *Forbes*, August 15, 2023.

<https://www.forbes.com/sites/saleemali/2023/08/15/sourcing-gallium-for-american-semiconductor-supremacy/>.

¹⁴ https://www.researchgate.net/figure/Production-of-germanium-worldwide-in-2016-according-to-USGS-2017-report-6-7-adapted_fig1_319230307

¹⁵ Funaiolo, M.P, Hart, B & Powers-Riggs, A. "The Need to De-Risk Gallium Material Supply Chains." *Microwave Journal*, December 13, 2023. <https://www.microwavejournal.com/articles/41212-the-need-to-de-risk-gallium-material-supply-chains>

¹⁶ Baskaran, G. & Schwartz, M. "From Mine to Microchip." *Center for Strategic and International Studies*, October 7, 2024. <https://www.csis.org/analysis/mine-microchip>.

manufacturing hubs, locking in control over the entire value chain and leveraging that control for geopolitical influence.¹⁷

This is not a theoretical concern; it is a strategic imperative. The Serra Verde project in Brazil serves as a cautionary example. Despite receiving support through the United States-led Minerals Security Partnership, Serra Verde—Brazil's first rare earth mine and the only large-scale producer outside Asia of four key rare earth elements critical for magnets—has already contracted most of its output to China.¹⁸ Why? Because at the time the agreements were signed, China was the only country with the processing capacity for two of Serra Verde's heavy rare earths. This failure to secure allied processing capacity has handed China yet another strategic advantage—despite western investment. Without a clear and coordinated focus on vertical integration, American efforts to strengthen critical mineral security will continue to fall short, leaving key industries vulnerable and geopolitical competitors in control of the materials that power the modern economy.

6. Invest in the entire ecosystem – not just the mine

China's dominance in critical minerals is the direct result of a deliberate, long-term strategy that goes far beyond individual mining projects. It has mastered an ecosystem approach—financing not just mines, but the entire web of infrastructure needed to bring resources to market, including power plants, transportation networks, and port facilities. Between 2013 and 2022, China poured \$679 billion into infrastructure across 150 countries, much of it strategically targeted to support mining operations in resource-rich nations like Chile, Bolivia, and Indonesia.¹⁹ This approach has locked in access to critical materials and established China as the gatekeeper of global mineral supply chains.

The Lobito Corridor offers a powerful blueprint. This landmark project is a strategic victory for the United States, creating a vital trade artery that will connect Angola, Zambia, and the Democratic Republic of the Congo to global markets through the Port of Lobito. Once completed, it will dramatically cut transport times and costs for critical minerals such as copper, cobalt, rare earths, and lithium, making it faster, cheaper, and more reliable to move these resources to the United States and Europe. By reducing logistics bottlenecks and transportation risks, the Lobito Corridor will lower the cost of doing business for mining companies and enhance the resilience of allied supply chains.²⁰ This is exactly the kind of ecosystem-focused investment model the United States and its partners must scale globally—prioritizing not just resource extraction, but the full infrastructure backbone required to unlock and secure critical mineral supplies for the future.

¹⁷ Baskaran, G. & Schwartz, M. "G7 Cooperation to De-Risk Minerals Investments in the Global South." *Center for Strategic and International Studies*, May 7, 2025. <https://www.csis.org/analysis/g7-cooperation-de-risk-minerals-investments-global-south>

¹⁸ Nicas, J. & Ionova A. "Brazil Bets on Rare Earths to Counter China's Market Dominance." *The New York Times*, April 16, 2025. <https://www.nytimes.com/2025/04/16/world/americas/brazil-mine-rare-earths-china.html>.

¹⁹ U.S. Government Accountability Office. "China's Foreign Investments Significantly Outpace the United States. What Does That Mean?" October 16, 2024. <https://www.gao.gov/blog/chinas-foreign-investments-significantly-outpace-united-states.-what-does-mean>

²⁰ Baskaran, G. & Schwartz, M. "G7 Cooperation to De-Risk Minerals Investments in the Global South." *Center for Strategic and International Studies*, May 7, 2025. <https://www.csis.org/analysis/g7-cooperation-de-risk-minerals-investments-global-south>

Investing in energy infrastructure is essential to help emerging markets develop local mineral processing capabilities, rather than relying on China to refine their raw materials. Mineral processing is highly energy intensive. By building energy infrastructure and refining capacity closer to the source, resource-rich countries can process minerals locally and sell directly to global markets—reducing dependence on China’s refining dominance and reshaping the balance of economic power in these supply chains. This is not just an economic opportunity; it’s a strategic move to create a more diversified and resilient global minerals market.

Conclusion

The United States is at a critical inflection point. The competition for control over the minerals that power our economy, fuel our technologies, and secure our national defense is intensifying—and the rules of engagement are being written now. Securing America’s mineral future demands an all-in strategy—responsible mining at home and abroad, investment across the upstream and midstream, and a simultaneous build-out of both primary production and recycling.

Today’s testimony focuses on how we leverage trade. To compete and win in this new era of strategic resources, the United States must work with our allies. We cannot outcompete China or build more resilient supply chains on our own; we simply do not have the necessary capital scale, technical expertise, or, most importantly, mineral reserves to do it alone. If we fail to collaborate, we will be forced to follow in a world shaped by the industrial strategies of our competitors. Together with our allies, we can build a more secure and resilient supply of minerals.

Thank you for the opportunity to testify today. I look forward to your questions.