Building Larger and More Diverse Supply Chains for Energy Minerals

By Joseph Majkut, Jane Nakano, Maria Krol-Sinclair, Thomas Hale, and Sophie Coste

Introduction

In the past 30 years, the United States has become increasingly import dependent on the minerals used to manufacture electric vehicle (EV) batteries and motors, solar panels, wind turbines, and defense technologies. Simultaneously, many U.S. firms have exited the upstream and midstream stages of mineral supply chains, just as mineral demand for clean energy may need to quadruple to build a net-zero energy system.

Over the same period, China has come to dominate mineral supply chains. China is the largest source of U.S. imports for 26 of the 50 minerals that are currently classified as critical by the United States Geological Survey (USGS). Such concentrated supply chains are vulnerable to physical, economic, or political disruption. Of particular concern to U.S. policymakers, China has used export controls and embargos for minerals as tools of economic coercion in the past and may do so again in the future.

Developing large and diverse critical mineral supply chains is of bipartisan interest. U.S. strategy to develop mineral supply chains should strive to uphold high environmental standards, respect human rights and community needs, and work closely with strategic allies. Such supply chains would both compete with and complement existing supply chains. They will have to be built nearly from scratch in markets that are opaque, volatile, and vulnerable to manipulation. That will require the coordination of U.S. government initiatives with both foreign governments and the private sector.

The last three administrations published critical minerals strategies (by the Department of Energy in 2010, Department of Commerce in 2019, and the White House in 2021). In the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), Congress created spending programs and subsidies to reclaim mineral supply chains by investing in better surveys of domestic
resources, manufacturing subsides, and tax credits for domestic production (notably for EV materials). Looking internationally, the U.S. government has established international partnerships and bilateral trade agreements with strategic allies to diversify and grow mineral supply chains.

This paper reviews the challenges that the United States and its partners face in building robust supply chains for minerals. It then surveys the mechanisms that the U.S. government has created to improve supply chains. The paper concludes with immediate recommendations for complementing and augmenting existing efforts to better characterize the risks of supply disruptions and grow larger and more diverse supply chains for the minerals that will fuel the energy transition.

**Critical Minerals in the Energy Sector**

A variety of non-fuel mineral commodities are important for the energy system. Lithium, nickel, cobalt, copper, graphite, and rare-earth elements (REEs) warrant a particular focus, as they are vital components of energy technologies and are expected to be needed in significantly greater supply. Lithium, nickel, cobalt, and graphite play a key role in a battery’s longevity and energy density. Rare-earth permanent magnets are also vital inputs to wind turbines, electric motors, and advanced military equipment. REEs are divided into heavy (HREE) versus light (LREE) based on atomic weight. HREEs are less abundant than LREEs and thus more valuable. HREEs, such as dysprosium and terbium, and LREEs, such as neodymium and praseodymium, are essential to several energy transition technologies. While currently not qualified as a critical mineral in official assessments, copper underpins electrification efforts given its high electric and thermal conductivity.

This paper refers to energy minerals as the subset of critical minerals designated by the USGS that are essential to the energy transition, the supply chains of which will need to be expanded and diversified to accommodate demand growth and reduce disruption risks.

The Energy Act of 2020 defines a critical mineral as a “non-fuel mineral or mineral material essential to the economic or national security of the U.S. and which has a supply chain vulnerable to disruption.” The law requires the USGS to update its list of critical minerals at least every three years, which informs federal agencies’ use of funds dedicated to strengthening supply chains, awarding tax credits, and setting strategy for increasing and diversifying supply.

The USGS determines criticality based on three components of supply risk: “the likelihood of a foreign supply disruption, the dependency of the U.S. manufacturing sector on foreign supplies, and the vulnerability of the U.S. manufacturing sector to a supply disruption.” Evaluations of these criteria rely on recent market conditions (i.e., the 2022 USGS Critical Mineral List relies on data from 2018 to 2021). Thus, minerals that may grow in economic importance or become more vulnerable under shifting supply and demand (e.g., copper) might not be considered critical.

Evaluations can also be forward-looking. The Department of Energy (DOE) assesses which materials are critical to energy and decarbonization technologies in the short and medium term based on several scenarios, including one of rapid decarbonization. Demand induced by energy transition can exacerbate the criticality of minerals. Across the scenarios covered by the DOE report, the number of critical materials doubles from the short term (2020-2025) to the medium term (2025-2035) due to rising demand or increasing risk of supply disruption.
Table 1: Energy Minerals Critical to the Energy Transition

<table>
<thead>
<tr>
<th>Mineral</th>
<th>High-Risk Energy Technology</th>
<th>USGS Critical Mineral?</th>
<th>DOE Critical Mineral?</th>
<th>Import Dependence (percent)</th>
<th>U.S. Primary Production (metric tons)</th>
<th>Global Consumption (metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>Various batteries (EVs and storage)</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>76</td>
<td>800</td>
<td>190,000</td>
</tr>
<tr>
<td>Gallium</td>
<td>LED lighting</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>100</td>
<td>0</td>
<td>550</td>
</tr>
<tr>
<td>Graphite</td>
<td>Various LIBs (EVs and storage)</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>100</td>
<td>0</td>
<td>1,300,000</td>
</tr>
<tr>
<td>Iridium</td>
<td>PEM electrolyzers</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>Insufficient information</td>
<td>Insufficient information</td>
<td>Insufficient information</td>
</tr>
<tr>
<td>Dysprosium (HREE)</td>
<td>Wind turbines; EVs</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>&gt;95</td>
<td>43,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Neodymium (LREE)</td>
<td>Wind turbines; EVs</td>
<td>Yes</td>
<td>Yes (2020-2035)</td>
<td>&gt;95</td>
<td>43,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Praseodymium (LREE)</td>
<td>Wind turbines; EVs</td>
<td>Yes</td>
<td>Yes (2025-2035)</td>
<td>&gt;95</td>
<td>43,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Lithium</td>
<td>Various batteries (EVs and storage)</td>
<td>Yes</td>
<td>Yes (2025-2035)</td>
<td>&gt;25</td>
<td>Withheld</td>
<td>130,000</td>
</tr>
<tr>
<td>Nickel</td>
<td>Various LIBs (EVs and storage)</td>
<td>Yes</td>
<td>Yes (2025-2035)</td>
<td>56</td>
<td>18,000</td>
<td>3,300,000</td>
</tr>
<tr>
<td>Platinum</td>
<td>PEM electrolyzers</td>
<td>Yes</td>
<td>Yes (2025-2035)</td>
<td>66</td>
<td>3.3</td>
<td>190</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Lightweighting alloys</td>
<td>Yes</td>
<td>Yes (2025-2035)</td>
<td>&gt;50</td>
<td>Withheld</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Copper</td>
<td>Vehicles; wind</td>
<td>No</td>
<td>No</td>
<td>41</td>
<td>1,300,000</td>
<td>22,000,000</td>
</tr>
</tbody>
</table>


1 Data not available for individual REEs; reflects overall rare-earth metals data from USGS *Mineral Commodity Summaries*
2 LIB = lithium-ion battery
3 PEM = polymer electrolyte membrane
4 Excludes U.S. production

**Understanding Risks**

The United States cannot presently supply key energy minerals for itself, let alone the world. This creates economic and security risks for the United States and could challenge the pace and cost of the energy transition. It also means that the United States cannot create deeper economic, diplomatic, and strategic relationships with countries that have resources, manufacturing capacity, or their own domestic markets for energy minerals. Understanding the risks imposed by overly concentrated supply chains is important to building resilience and calibrating efforts to diversify the production of minerals.
GEOPOLITICAL VULNERABILITY

The extractive landscape for energy minerals is shaped by the combination of their geographic distribution and the economic and political priorities of resource-rich countries. Top upstream producers of different minerals are globally distributed. In 2021, Australia accounted for about 50 percent of global lithium mining, the Democratic Republic of Congo (DRC) for 70 percent of cobalt, and Indonesia for almost 40 percent of nickel. Yet, equity concerns between a supplier country and an importer country, as well as between resource-holding local communities and their national government, could still fuel uncertainties over supply access. Sixty-eight percent of metals market participants polled by the law firm White & Case earlier this year concluded that resource nationalism is on the rise, creating market uncertainty for traders and project developers.

Export bans and limitations are being used by countries attempting to capture the higher-value processing and manufacturing segments of mineral supply chains. For example, Zimbabwe has extended its 2022 ban on the exports of raw lithium to all raw mineral ores. The ban would force new projects to process minerals locally. Indonesia, one of the world’s biggest producers of nickel, banned exports in 2020. Under the ban, foreign buyers must invest in smelters in Indonesia to process materials locally before export. A similar ban was announced for the country’s bauxite exports in June 2023. In April 2023, Chile announced plans to nationalize the country’s lithium reserves, and its government passed a bill for new royalties on copper and lithium sales a month later. Export limitations can increase uncertainty for private mining and processing companies seeking to develop their activities abroad as well as increase costs for downstream consumers.

Critical minerals are processed almost entirely in China, including 60 to 70 percent of lithium and cobalt, close to 60 percent of nickel, and 90 percent of REEs. For many of those minerals, China requires upstream inputs from around the world, though China does control 60 percent of REE production. In contrast, the global supply chain for lithium is less concentrated, with meaningful extractive activities in several countries, including Australia, Chile, China, Argentina, and Brazil. In the processing and separation stages, Central and South America account for nearly 40 percent of the global capacity, while China accounts for about 60 percent. Mineral supply chains are concentrated in China at the processing stage, meaning that Chinese firms have significant market power as buyers of upstream ores and the Chinese state can exert geopolitical influence through exports controls on downstream materials.

SUPPLY CHAIN RISKS

The economic and energy security risks for non-fuel minerals are different than for fuel. For fuel, shortages are felt immediately in prices and consumption of services. They can also be relieved quickly after increases in supply. For non-fuel minerals, shortages express themselves in the prices of manufactured goods and slowed sales. Both can have large economic effects. During the Covid-19 pandemic, shortages in chips led to shortages of new vehicles, which increased prices for used vehicles and contributed significantly to inflation. This shortage cost the United States an estimated $240 billion in 2021, and its effects on the automotive industry lasted until the end of 2022.

These risks are dynamic, as manufacturers retool supply chains in response to potential shortages or technology developments. And minerals for energy have other uses in the economy with different levels of price sensitivity and fungibility of inputs. Researchers at the National Mineral Information...
Center (NMIC), which is responsible for the collection and analysis of commodity consumption and production statistics, have developed a model to assess industry vulnerability and project economic losses from a given commodity supply disruption. Their estimates show that a 20 percent reduction in the supply of lithium, graphite, nickel, cobalt, or REEs into the U.S. economy would result in up to a 2 percent reduction in GDP.

While risks are dynamic, current assessments are not. Modeling tools that quantify the economic risks of supply chain disruption are still at an early stage. These models need better input data to assess criticality for different minerals and inform U.S. prioritization for mineral supply. The NMIC model relies on industry-by-industry inputs and U.S. Census Bureau statistics reported every five years, with a six-year delay. The model also does not account for mineral substitution or competition with other sectors. Drawing clear conclusions on the economic risks of mineral supply disruptions without updated data is therefore difficult.

INVESTMENT CLIMATE
Growing supply chains for energy minerals will require significant additional investment. The International Energy Agency estimates that global investment in critical mineral mining will need to reach $360–450 billion over 2022–2030 to enable a net-zero energy transition by 2050. Within the same period, global investment in critical mineral processing will need to reach $90–210 billion. Currently anticipated investments in mining account for nearly half of the investment needed, while anticipated investments in processing account for around two-thirds of the investment needed. Here again, China has a commanding presence, with its share accounting for nearly 70 percent of the anticipated global investments in processing (although its share is limited to 5 percent on the mining side).

Low price transparency and the illiquid nature of critical minerals markets is likely affecting investment decisions and keeping private capital on the sidelines. Minerals markets are small and opaque, which limits both investor opportunity and confidence. There is no organized market on which to trade all forms of one mineral, making production and trade flows difficult to trace and mineral markets small. Even with an anticipated increase in demand, investors are faced with declining investment quality and high uncertainty. There are numerous examples of mineral traders buying worthless cargoes or being victims of fraud. Ore grade decline, the advent of recycling ventures, and continual battery technology innovation also likely deter investors from investing with demand forecasts in mind.

The high degree of uncertainty in minerals markets deters investment from international firms and skews opportunities toward state-backed firms. Other factors such as “price volatility, long project lead times, complex ESG factors,” and ever-higher “standards of accountability” from investors are also challenges for private project finance. This contrasts with Chinese firms. As the United Kingdom’s 2023 critical mineral strategy put it: “state-subsidised companies can operate globally with greater agility, at lower margins and with longer investment timeframes, creating a disadvantage for those not subsidised.”

Concentration in mineral supply chains extends to investment. The financial backing for many operations in resource-rich developing countries is dominated by Chinese firms. While the DRC is the leading producer of cobalt, 15 of the 19 large cobalt operations in the DRC were owned or financed by Chinese entities in 2020. These entities enjoy significant backing from the Chinese government, with
billions in credit available from Chinese state banks. Likewise, China has poured $14.2 billion over the last decade into two Indonesian islands that have the largest known nickel reserves in the world. In contrast, these Indonesian reserves attracted a combined total of $1.5 billion from Australia, Canada, South Korea, and the United States over the past decade.

**Strengthening Supply Chains**

There are two primary policy goals related to energy minerals: (1) to make them less critical by enabling domestic production, developing more robust global supply chains, and reducing their vulnerability to supply disruptions; and (2) to establish markets that will allow for enough investment to meet global demand under the energy transition.

This section describes existing spending programs, diplomatic engagements, and trade tools that can help realize a minerals strategy. These activities can be grouped into prospecting and safeguarding. Prospecting tools allow the United States to find and coordinate activities to establish new projects and link supply to demand through finance, technical assistance, and diplomatic engagement. They work on a project-by-project basis to develop human and physical capital and secure the supply necessary for U.S. demand. Safeguarding tools help build market conditions for growing supply chains that will meet high standards and attract private capital to help supply reach the scale necessary for the global energy transition.

**PROSPECTING**

*Defense Production Act*

The Defense Production Act (DPA) is a federal government tool to mobilize the nation’s industrial base to meet national needs, including in energy systems. The DPA can support capacity and supply expansion of goods to meet U.S. requirements through incentives such as loans and loan guarantees, purchases and purchase commitments, and grants and subsidies. The Department of Defense used the DPA to support facilities to process \textit{LREEs} and \textit{HREEs} in Texas. President Biden issued a \textit{determination} that the DPA could be used to develop \textit{mineral supply chains} for EVs and clean energy components and \textit{expanded} the number of critical minerals production projects that may receive DPA funding. In mid-June 2023, Jervois Mining received $15 million for resource drilling that could expand the known resource base for cobalt as the U.S. government seeks to revitalize domestic cobalt production.

DPA Title III awards are available to both U.S. and Canadian entities. Canada is considered a domestic source for the purposes of DPA funding because of its economic integration and strong security relationship with the United States. The White House \textit{wants} Congress to include Australia as DPA eligible given the country’s vast deposits of several critical minerals, including 21 of the 35 on the U.S. list of critical minerals released in 2018, and Australia’s extensive REE mining and processing capacity.

*DOE Loan Program Office*

The DOE’s Loan Program Office (LPO) makes public investments in the commercialization of key technologies that reduce mineral requirements or increase the domestic supply of critical minerals and downstream projects. In July 2022, the DOE closed a $102 million loan to a subsidiary of an Australian mining company in Louisiana to expand its manufacturing capacity of anode materials for lithium-ion batteries. Additional examples of LPO funding include a $107 million loan for the production
of graphite-based active anode material in Vidalia, Louisiana; a $2.0 billion loan for the expansion of a battery materials facility in McCarran, Nevada; a $700 million loan for the development of lithium carbonates in Esmeralda, Nevada; and a $9.2 billion loan for the construction of EV battery manufacturing plants in Tennessee and Kentucky.

**Infrastructure Investment and Jobs Act**

The IIJA, which passed in Congress in November 2021, provides $7.9 billion for battery manufacturing, recycling, and critical minerals initiatives, including $3.0 billion toward a grant program for battery processing and manufacturing, another $3.0 billion toward a grant program for battery manufacturing and recycling, $140 million toward the establishment of a full-scale integrated rare-earth extraction and separation facility and refinery, and $320 million toward the modernization of the nation’s mapping of critical mineral resources.

**U.S. Development Finance Corporation**

The U.S. Development Finance Corporation (DFC) can provide funding for energy projects abroad as part of its wider mission to promote economic development in low- and lower-middle-income countries. The DFC can issue loans, loan guarantees, equity investment, political risk finance, and technical assistance to selected projects. It can also finance supportive infrastructure such as ports and roads. Thus far, the $30 million equity investment in TechMet to support its nickel and cobalt operations in Brazil is the only DFC investment in the critical minerals space.

**Partnership for Global Infrastructure and Investment**

The Partnership for Global Infrastructure and Investment (PGII) was officially launched at the Group of Seven (G7) summit in Germany in June 2022. The G7 initiative aims to mobilize $600 billion in loans and grants, both public and private, from the member countries to projects in developing countries. Developing supply chains for clean energy is one of four pillars of the partnership, including “mining of metals and critical minerals” and developing “new global refining, processing, and battery manufacturing sites.” The PGII’s focus on sustainability and the quality of energy-related infrastructure in developing countries serves as an implicit contrast to energy-related infrastructure that is financed through China’s public finance institutions under the Belt and Road Initiative, which has traditionally been dominated by emission-intensive projects. In its first year, the PGII helped facilitate a partnership between TechMet, partially owned by the U.S. government through the DFC, and Life Zone Metals, which had entered into a framework agreement with the Tanzanian government to open a new facility to process nickel and other critical minerals.

**Mineral Security Partnership**

The Minerals Security Partnership (MSP) is a multilateral forum launched in June 2022 by the United States, the European Union, and nine partner countries to “ensure that critical minerals are produced, processed, and recycled in a manner that supports the ability of countries to realize the full economic development benefit of their geological endowments.” It has since grown to include 13 governments, most of which are import-dependent for minerals. The MSP is a platform for solving the coordination problems between investors, developers, and consumers in partnership countries. The MSP is not designed to make bulk purchases on behalf of its members and will not function as a buyer’s club. It also is not a standard-setting organization. Instead, the forum’s aim is to advocate for high environmental, social, and corporate governance (ESG) standards, but enforcement would be set by participating countries and their institutions.
Prospective projects are put forward by private companies and then evaluated by the MSP based on mineral needs and commercial investment potential. MSP countries can then support a company’s efforts to attract investments and secure financing in various forms, including political support, technical guidance, loans, financing through export promotion banks or export credit agencies, and political risk insurance. As of January 2023, the MSP had “zeroed in” on 16 overseas mining, refining, and recycling projects out of over 170 that were evaluated.

**SAFEGUARDING**

*Bilateral Trade Agreements*

Sectoral trade agreements have emerged as another international arrangement to safeguard markets for minerals. Under the IRA Clean Vehicle Tax Credit (30D), half of a $7,500 tax credit is available if battery minerals are extracted or processed in a country that has a free trade agreement with the United States. But several key allies with EV battery mineral processing capacity, such as Europe and Japan, do not have a free trade agreement with the United States. The Office of the U.S. Trade Representative (USTR) announced a mineral-specific *bilateral arrangement* with Japan in mid-March, which hosts one of the major rare-earth processing and manufacturing industries outside of China. Under this sectoral agreement, the two governments will not levy export duties on the critical minerals they trade with one another. This agreement was designed to allow minerals exported from Japan to the United States to qualify for IRA tax credits. The European Union, which accounts for 20 percent of global cobalt processing capacity, has been negotiating a similar agreement with the United States since March 2023, but progress has so far been limited.

**Recommendations**

Existing global mineral supply chains are highly concentrated at the processing stage, with the United States becoming more import dependent over time. Poorly regulated and opaque mineral markets further discourage private capital investments and leave them vulnerable to fraud and manipulation. The lack of institutional capacity and reliable markets is a key barrier to the United States articulating a strategy to develop a supply chain that relies appropriately on domestic and international resources and that is larger, more diverse, or more responsible than today’s.

The U.S. government has developed various instruments to scale up and de-risk its energy mineral supply chains. Prospecting tools take a project-by-project approach to secure access to minerals. These initiatives depend on a unique set of project selection and funding requirements from U.S. agencies and their partners. But the United States lacks a portfolio of safeguarding tools that can improve the transparency of mineral markets, increase investor confidence, and enable private firms to compete with state-backed companies. Without these instruments, growing secure and diversified mineral supply chains will be limited to a project-by-project approach, which could slow the energy transition and leave markets vulnerable to fraud and manipulation.

**Improve data collection for risk analysis and scenario planning.**

Rapidly changing demand, uncertain technology outlooks, and limited market data make assessing the economic and energy security risks of the mineral supply chains particularly challenging. While the risks are highly dynamic, existing modeling tools and analysis are strained by poor access to timely
and robust data. Risk analyses also need to be applied to multiple market and technology scenarios to understand the range of future risks from supply disruptions and to inform the extent of public investment appropriate to hedge such risks. These activities could be supported through the existing agencies but may warrant more centralized authority within the federal government.

- Authorize the USGS’s National Minerals Information Center, or another appropriate federal agency, to collect data on a continuous basis and apply scenario analysis to different supply chain pathways. This authority could be accompanied by increased appropriations to support analysis and staffing.

- Empower a federal entity to coordinate strategic priorities for energy minerals and coordinate multi-agency initiatives. This could be a senior position within the White House. It could also be through reestablishing a minerals-focused agency, such as the Bureau of Mines, with a domestic and international remit.

**Add flexibility to prospecting tools.**

China holds significant market power over mineral supply chains. The country has vertically integrated its supply chains by heavily subsidizing its mining and processing industries and gaining access to mineral reserves abroad through strategic finance engagements. U.S. policymakers should reimagine how government instruments can be deployed without undermining U.S. institutional norms and values if it is to successfully lead the global effort to diversify critical mineral supply chains. U.S. diplomatic prospecting tools should be honed to respond efficiently and fairly to equity concerns in or from resource-holder countries by ensuring a more equitable distribution of societal and economic benefits from the expanding energy mineral value chains.

- Expand the scope of DFC investments to allow financing of public entities through efforts such as the MSP.

- Expand the scope of “domestic source” under DPA Title III to include Australia. The country has vast mineral reserves and a strong mining and processing industry and is a close security partner to the United States. U.S. financial support for mining and processing activities in Australia has the potential to grow mineral supply chains that are not reliant on China and to secure access to minerals for the U.S. market.

**Safeguard markets for growth.**

Fractured, unreliable mineral markets hinder the United States’ ability to deploy private capital to build out mineral supply chains. Establishing reliable price benchmarks should be a priority. This can be accomplished by innovating market technology and requiring traders to provide more information about their over-the-counter trades. Before this can be accomplished, market regulators in the European Union, United Kingdom, United States, Australia, and Japan should decide on common goals for market transparency and where these goals fit with ESG concerns.

- Commission a multilateral study on how to facilitate openness and transparency in mineral markets. The United States and MSP partners, such as the United Kingdom, could convene commodity exchange executives and regulators and task them to formulate a practical pathway to increase transparency and price discovery in mineral markets.
• Engage the Commodities Futures Trading Commission and utilize their connections with business leaders to understand how U.S. companies are successfully (or unsuccessfully) using derivatives markets to hedge risks.

• Investigate the role of state-sponsored market participants in critical minerals markets through agencies in the federal government and congressional hearings.

Conclusion

The U.S. government is mobilizing significant resources to address vulnerabilities in the nation’s supply chains for energy minerals. Those efforts are working against decades of increased dependence on imports, the exit of U.S. companies from the global supply chain, and strategic efforts by China to develop its own supply chain.

Politically durable and economically sound policy prescriptions should emphasize growing and diversifying the global supply chain. Meeting its future domestic consumption in energy minerals only from domestic sourcing is an unviable objective for the United States. However, in terms of meeting U.S. and global demand, defining a role for U.S. domestic production and refining should be a priority. In funding mining and processing projects, the United States will benefit from focusing on projects that emphasize existing capacities, such as the processing and extraction of REEs, and readily available resources.

Lastly, diplomatic instruments to secure mineral access may be realigned to focus on where the United States can contribute to the global supply of minerals for decarbonization. Many multilateral and bilateral mineral engagements are mapping resources—geological, industrial, and financial—to understand how to develop a robust and secure market for growth. The United States can use its heft in the global financial sector and regulatory standards to help improve the transparency and quality of markets. Safeguarding those markets for growth will encourage private capital to build upon the prospecting efforts of the United States and like-minded allies to build a more robust supply of minerals for the energy transition and, ultimately, national security.

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The authors benefited greatly from the expertise of speakers and discussants at the CSIS workshops, including Frank Fannon (CSIS/Fannon Global Advisors), Michelle Foss (Rice University), Thomas Haslett (U.S. Development Finance Corporation), Cullen Hendrix (Peterson Institute), Ian Lange (Colorado School of Mines), Adam Simon (University of Michigan), Hiroyuki Suzuki (Japan Bank for International Cooperation), and Craig Weichel (Embassy of Canada).

This report was made possible by funding from ClearPath.