

## A Critical Minerals Policy Option for the U.S.

by Baba Freeman

### Why critical minerals are critical

In 2014, more than \$298 billion of revenue, about 530,000 jobs, and \$33 billion in payrolls came from economic activities that required critical mineral inputs (Chapman, 2018). The International Energy Agency (IEA) forecasts that the proliferation of end products such as batteries, wind turbines, and solar cells would lead to a 200 to 400 percent increase in global demand for critical minerals by 2040 relative to 2000. (IEA 2011, 2021). (See Figure 1 below.)

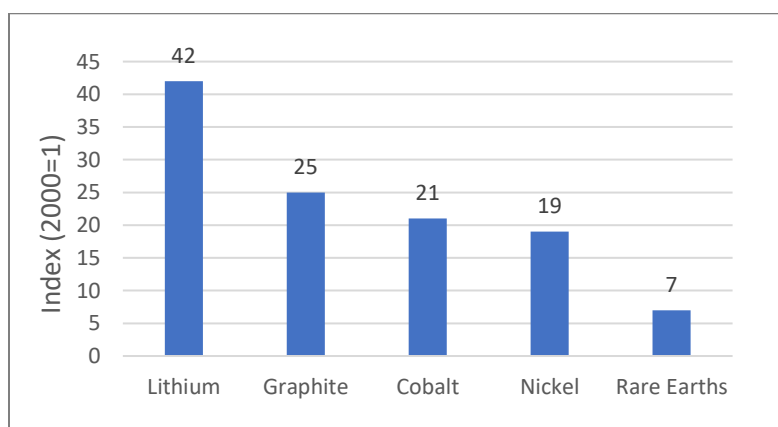


Figure 1: 2040 demand for critical minerals relative to 2000<sup>1</sup>

On the other hand, by 2021, the U.S. was completely dependent on imports for 14 of the 35 critical minerals on its list and substantially dependent on imports for most of the others (DOE 2020). Yet, there are no widely available substitutes for most critical minerals in many of today's industrial processes. Furthermore, critical mineral resources are concentrated in a small number of geographical locations and mineral ores with lower costs and higher profit potential have

<sup>1</sup> [www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions](http://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions)

been largely extracted. In addition, it takes up to sixteen years to mature a project from exploration success to initial production.<sup>2</sup> These trends further raise the risks of potential supply chain disruptions from both variations in market conditions and geopolitical competition. In response, the U.S. enacted new policies to protect its access to critical minerals.

#### A review of U.S. critical minerals policies

Between 2017 and 2020, the U.S. government issued two executive orders targeted at the critical minerals sector, Executive Order 13817 (2017) and Executive Order 13953 (2020). These were followed by the Energy Act of 2020 and a third Executive Order, 14017 in 2021.

#### Overview of current policies

- Executive Order 13817 solidifies the notion that taking action to mitigate risks associated with U.S. minerals import dependence is consistent with the National Security Strategy of 2017. It identifies supply chain risks as a “strategic vulnerability” for the U.S. economy and its military capabilities. The report, *“A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals”*, an offshoot of Executive Order 13817 contains the following calls to action:<sup>3</sup>
  - Advance transformational R&D and deployment across mineral supply chains.
  - Strengthen America’s critical mineral supply chains and defense industrial base.
  - Enhance international trade and cooperation related to critical minerals and improve understanding of domestic critical mineral resources.
  - Improve access to domestic critical mineral resources on federal lands.
- Executive Order 13953 (2020), *“Addressing the Threat to the Domestic Supply Chain from Reliance on Critical Minerals from Foreign Adversaries and Supporting the Domestic Mining and Processing Industries”* established that the U.S.’s overwhelming reliance on the PRC for its critical minerals supply, “constitutes an unusual and extraordinary threat....to the national security, foreign policy, and economy” of the U.S. It declared “a national emergency” to deal with this threat. Some major thrusts of the order are to:
  - Increase executive branch insight into the status of mineral sub-sectors.
  - Generate policy recommendations to achieve the aims of the executive order.
  - Optimize existing legal authority to fast-track permits and complete projects.
  - Enhance the government loans and grants process to support projects.
- Executive Order 14017 (2021), *“Americas Supply Chains”* directs a “whole-of-government” approach to address supply chain vulnerabilities and strengthen the resilience of the critical minerals sector. It directs government agencies to:
  - Attain better policy outcomes through improved coordination and consultation with other government agencies and stakeholders.
  - Increase the effectiveness of policy thrusts and transparency through cabinet-level supply chain assessments and policy recommendations.

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<sup>2</sup> The IEA (2021) estimates that three countries account for more than two-thirds of the global supply of certain key minerals.

<sup>3</sup> U.S. Department of Commerce.

- Ensure quality of, and follow-through on policy recommendations.

In addition to the executive orders, the U.S. Congress also passed the Energy Act of 2020. Title VII of the Act addresses the critical minerals sector, and its thrust is largely congruent with the policy initiatives laid out in the executive orders. Moreover, to accelerate the adoption of low-carbon energy, the Biden administration has committed to strengthening the Energy Resource Governance Initiative (ERGI) to promote and support the expansion of sustainable, transnational mineral supply chains that will be essential for a successful energy transition.

#### A critique of current policies

An assessment of critical mineral policies reveals a potential limitation, i.e., they lack accountability regarding the attainment of the aims of the overarching critical minerals strategy which is to “reduce the Nation’s vulnerability to disruptions in the supply of critical minerals” (Executive Order 13817). The executive orders and the Energy Act (2020) do not take direct action to ensure the uptake of investment opportunities in the critical minerals sector. Secondly, they are devoid of specific and direct action to boost the domestic production of critical minerals and the protection of its supply chain. They focus primarily on raising R&D spending, and on identifying opportunities within existing statutes, to deregulate and fast-track permitting for mines and related projects. In addition, they emphasize support for unspecified entities through various reviews and evaluations and financial assistance through loans and grants. They also direct government agencies to report on the progress of administrative milestones.

Moreover, the policies restrict the agency of government to enacting enabling laws that may or may not attract private capital into the critical minerals sector. Consequently, their passing suggests that attaining the goals of the U.S. critical minerals supply chain strategy has been outsourced to investors that are yet to emerge at scale. Thus, the underlying assumption appears to be that private enterprise will act in accord with economic nationalism when the level of deregulation crosses an unknown threshold.

While there is little in the recent policies that raises confidence that the U.S. critical minerals supply chain will become more resilient or less vulnerable, it should be noted that the possible passage of the proposed Build Back Better bill (BBB) may partially compensate for the limitations of these policies by directing substantial funds to clean energy and climate initiatives.

#### The U.S. policy environment

The current U.S. policy environment is more favorable to government participation in the economy relative to the past. The historical consensus favoring limited government intervention amongst policymakers seems to have yielded some ground to notions of increased government intervention in recent years. Extensive supply chain disruptions during the coronavirus pandemic in 2019-21 exposed the extent to which the U.S. was dependent on overseas manufacturers for essential items such as personal protective equipment (PPE), ventilators, and medical chemicals. The U.S. federal government’s response included the enactment of the Defense Production Act and the creation of Operation Warp Speed Vaccine Initiative (OWSVI), a public-private partnership (PPP) to which the government allocated

\$10bn in funds.<sup>4</sup> Both actions were viewed favorably by the public and helped to promote broader acceptance of government intervention for the time being. Furthermore, ideas such as the “green new deal”, which calls for direct government action and greater funding for the energy transition, have gained added mainstream approval pointing to a shift in public perception.

Several policies of the current administration reflect this changing consensus. Some go further to support the rejuvenation of the U.S.’s critical minerals supply chain. The Infrastructure Bill of 2021 allocates \$7.5bn to building 500, 000 electric vehicle (EV) charging stations while a portion of the \$42bn planned spend on ports and waterways will be dedicated to electrification and support for low-carbon technologies. Under the proposed Build Back Better bill (BBB), about \$555bn would also be dedicated, through government procurement, grants, tax credits, and loans to supporting the domestic supply chain for lower-carbon technologies such as wind turbines, solar panels, and electric cars. The mandate for greater adoption of EVs in the government’s transportation fleet, for instance, is likely to encourage private investment in domestic (or ally-controlled) minerals production, the discovery of substitutes, and the development of high-efficiency extraction processes. At the time of writing, the BBB has not been passed into law. Its chances of passing and its final form are uncertain and may be subject to the outcome of the 2022 midterm elections. Thus, the pace of U.S. critical minerals innovation and the strengthening of its related supply chains are at the mercy of near-term electoral politics and the possibility that the BBB may not pass into law lies within the range of credible scenarios. Nevertheless, there is another policy option for the U.S. to consider in its bid to increase the resilience of its critical minerals supply chain and minimize dependence on overseas suppliers. This option calls for the adoption of the PPP framework.

#### Public-Private Partnerships and the U.S critical minerals supply chain

Policymakers can take advantage of the present favorable political window of opportunity to implement bolder policies. Under a PPP framework, the U.S. government can take direct financial interests alongside private sector partners, in exploration, production, and processing activities on a commercial basis. Public-private partnering opportunities should also be open to private companies involved in pioneering research into alternatives to critical minerals inputs in industrial applications.

#### A PPP case study

Operation Warp Speed Vaccine Initiative (OWSVI), the PPP framework deployed by the U.S. to combat the coronavirus pandemic, provides a template that could influence the design of future PPPs in the critical minerals sector. OWSVI was a partnership between the Department of Health and Human Services (HHS), the Department of Defense (DOD), and six private drugs and vaccine manufacturers - Moderna, Pfizer/BioNTech, Janssen, AstraZeneca, Sanofi/GSK, and Novavax. The main objective of OSWVI was to accelerate the development, manufacture, and distribution of coronavirus vaccine candidates. OWSVI’s main approach was to fund different technology platforms (mRNA, Replication-defective live vector platform, and recombinant-subunit-adjuvanted protein platform) in the early stages of development. It should be noted that, at that stage, there was a significant probability of failure, exposing both the U.S. taxpayers and their private sector partners to a substantial risk of financial loss. Yet, the U.S.

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<sup>4</sup> OWSVI was subsequently renamed the “Countermeasures Acceleration Group”.

government's purchase guarantee for millions of doses of vaccines acted as a risk-mitigation mechanism for private sector partners in the vaccine development effort.

Slaoui and Hepburn (2020) highlight the key principles of OWSVI which could be easily incorporated into the design of future PPPs in the U.S. critical minerals sector. These are:

1. Build diversity into the portfolio of sponsored projects to minimize the risk of failure.
2. Accelerate approvals and permitting processes without compromising the safety, quality, and efficacy standards of both product and environmental management.
3. Grant financial support to participating companies to facilitate the scaling up of manufacturing and other technical capabilities.

#### Equity and efficiency considerations in adopting the PPP framework

The success of policies often rests on political acceptance by the citizens and interest groups in any given jurisdiction. Amongst potential challenges to policy acceptance are issues and perceptions related to equity and efficiency (Stone, 2011). Thus, the question of equity may arise with the adoption of the PPP framework for the critical minerals sector. Managing this challenge would require the establishment of processes to ensure merit-based access to government partnerships and equity of opportunity. A policy whereby the government participates in all funding requests would be impractical, inefficient, and politically contentious. Process transparency and clear criteria-setting can thus help to demonstrate equity, say by establishing auditable processes for soliciting and receiving funds. Also, administrative processes should not place significantly higher burdens on some participants than on others. In addition, the criteria for receiving funding should be publicly accessible, transparent, and written in language that facilitates both understanding and audits.

It is widely held that government intervention in the market harms efficiency by steering capital away from the most productive uses toward less productive ones. Opponents of direct government participation in the production of critical minerals would justify their position by citing the possibility of a loss of taxpayers' money in commercial ventures. The concern over the potential loss to society whereby public expenditure does not yield the desired benefits is important, substantial, and valid. Yet for the analysis to be complete and credible, analysts must compare the costs of intervention with costs that would be incurred in a "do-nothing" scenario. Noting that the loss-making entity is the economy at large, other types of costs that should be considered are:

1. Cost of scarcity to the economy: Economic costs that arise due to a lack of access to minerals as supply is curtailed relative to demand. The resulting price increase could be passed on to end-users or lead to a loss of profit for companies along the supply chain, a loss of government tax revenue, and a decline in public services.
2. Cost of developing and switching to substitutes: An alternative response to rising costs is substitution. Research and development of viable substitutes will require an unknown amount of investment capital for an unknown length of time. The level of investment required to adapt production processes to substitutes is also unknown beforehand.

Without these analytical inputs, the case for non-intervention is weaker and belies the political consensus that the current state of the U.S.'s critical minerals supply and the concentration of key nodes of the minerals supply chain in adversary nations constitute a strategic vulnerability and a threat to national security.

## Conclusion

The critical minerals policies of the U.S. are likely to be insufficient to achieve its strategic goals because they are, to a large extent, based on expectations that the private sector will increase investments in response to the national interest irrespective of commercial considerations. Whereas policymakers' preference for non-intervention may have precluded considerations of further government action in the past, the current political environment is more accommodating of higher levels of government intervention when market outcomes are perceived to be insufficient. Accordingly, the U.S. government and other stakeholders now have a window of opportunity to decrease the nation's dependence on adversary nations by expanding the policy toolkit to include bolder and more creative policy instruments and frameworks. The Biden administration's proposed Build Back Better bill reflects a greater willingness to proactively use government policy to encourage investments in the minerals sector by reducing market risk. However, given the uncertainty surrounding its passing, further consideration should be given to the adoption of Public-Private Partnerships to directly promote exploration, production, and processing activities within the critical minerals sector.

## Reference List

- Chapman, Bert. “The geopolitics of rare earth elements: Emerging challenge for U.S. national security and economics” *Journal of Self-Governance and Management Economics* 6, no. 2 (2018): 50–91. <https://doi.org/10.22381/JSME6220182>.
- Energy.gov. “DOE Invests Nearly \$1 Million for Projects to Create a Sustainable Supply Chain of Critical Minerals.” <https://www.energy.gov/fecm/articles/doe-invests-nearly-1-million-projects-create-sustainable-supply-chain-critical-minerals>.
- IEA. “The Role of Critical Minerals in Clean Energy Transitions – Analysis.” <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>.
- Slaoui, M., and M. Hepburn, 2020, Developing Safe and Effective Covid Vaccines — Operation Warp Speed’s Strategy and Approach: *The New England journal of medicine*, v. 383, no. 18, p. 1701–1703, doi:10.1056/NEJMp2027405.
- Stone, Deborah. *Policy Paradox: The Art of Political Decision Making*. Third edition. New York: W. W. Norton & Company, 2011.
- United States: National Archives and Records Administration: Office of the Federal Register. “Federal Register. Vol. 85, No. 193.” Office of the Federal Register, National Archives and Records Administration, October 5, 2020. <https://www.govinfo.gov/app/details/FR-2020-10-05>.
- U.S. Department of Commerce. “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals.” <https://www.commerce.gov/data-and-reports/reports/2019/06/federal-strategy-ensure-secure-and-reliable-supplies-critical-minerals>.
- U.S. Senate Committee on Energy and Natural Resources. “Murkowski, Manchin, House Colleagues Reach Agreement on Energy Package for Year-End Appropriations Bill,” December 21, 2020. <https://www.energy.senate.gov/2020/12/murkowski-manchin-house-colleagues-reach-agreement-on-energy-package-for-year-end-appropriations-bill>.

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