

Report Summary

Critical Minerals

Biotechnology creates new paths to reduce reliance on China for critical minerals.

Congress established the National Security Commission on Emerging Biotechnology (NSCEB) to assess biotechnology's national security impact and recommend strategies to ensure American leadership.

Critical minerals are integral to modern life and national security, powering everything from cell phones and medical devices to semiconductors and nuclear reactors. Despite their importance for U.S. national and economic security, substantial quantities of critical minerals sit untouched in the United States because, in many cases, they are mixed with vast amounts of mining waste and considered unusable.

The United States is dangerously reliant on foreign sources of critical minerals. The United States is almost entirely reliant on China for over half of its annual consumption for 31 of 35 critical minerals. The Chinese Communist Party (CCP) has already shown a willingness to restrict the supply of these minerals to its strategic competitors. In late 2024, China cut off U.S. access to gallium and germanium, jeopardizing U.S. semiconductor production, and in April 2025, China tightened exports of six rare earth metals, effectively restricting U.S. access.¹

Biotechnology offers a new path forward.

Biotechnology companies are creating enzymes that specifically target and extract critical minerals from complex mixtures, such as mining waste and disused electronics. Using custom-designed proteins that act like microscopic robots, biotechnology allows us to separate high-purity rare earth elements and other critical minerals with unprecedented selectivity. At scale, this new method of sourcing could help meet our domestic demand for critical minerals, while mitigating the economic and national security risk of our overreliance on China.



1. <https://www.nytimes.com/2025/04/13/business/china-rare-earths-exports.html>

Recommendations

The Commission has identified several key steps that Congress should take to strengthen our critical mineral supply chains.

2.2a: Congress must establish and fund an Independence Investment Fund, led by a non-governmental manager, that would invest in technology startups that strengthen U.S. national and economic security.

Government can act as a powerful signal to private investors about the importance and viability of a company or technology. Congress should establish the Independence Investment Fund at the Department of Commerce (DOC) to support high-priority areas of national security technology that are left unaddressed by current initiatives, such as biomining to strengthen critical mineral supply chains.

2.2d: Congress should improve the effectiveness and reach of the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs to support early-stage innovation.

The SBIR/STTR programs comprise one of the largest hard tech seed funds in the world. Yet there is no overarching, coherent strategy for deploying its over \$3 billion of annual funding. Congress should ensure that grants are strategically allocated and that funding reaches biotechnology companies that have high commercialization potential and are critical to U.S. national security interests, such as those working on biomining.

2.3a: Congress must authorize and fund the Departments of Energy (DOE) and Commerce to develop a network of manufacturing facilities across the country for precommercial bioindustrial product scale-up.

Congress must authorize the DOC and the DOE to create facilities that companies and researchers can use to prove that their lab inventions work at pilot and demonstration scale before moving to full commercial scale production. These facilities would make it easier for biomining companies to transition their technology from the lab into mines and recycling centers.

2.5a: Congress must require public companies to disclose single points of supply chain vulnerability located in foreign countries of concern.

To maximize profits and minimize costs, companies have long sought out single-source suppliers for key materials and processes. For critical minerals, many of these single-source suppliers are headquartered or have manufacturing facilities in China—creating a strategic vulnerability in times of global instability and conflict. Congress should direct the U.S. Securities and Exchange Commission (SEC) to require publicly held securities and companies of a certain size to file annual reports with the SEC disclosing the existence of single-source suppliers located in foreign countries of concern.

3.2a: Congress must direct the Department of Defense (DOD) to work with private companies to build commercial facilities across the country to biomanufacture products that are critical for DOD needs.

Congress should support the commercialization of national security related biotechnologies by appropriating at least \$762 million over the next five years to fund its Distributed Bioindustrial Manufacturing Program (DBIMP), which helps fortify defense supply chains by supporting private industry to develop commercial scale biomanufacturing facilities. For DBIMP to succeed in the long run, DOD must also clarify its requirements and timelines, communication with industry partners, and plans for aligning industry outputs with the needs of defense purchasers. Sustained support for these and other programs is critical to continue de-risking some of the nation's most innovative companies as they field mission-critical products at the intersection of national security and emerging biotechnology, including for the purposes of securing U.S. access to critical minerals.

Examples of DOD's Biotech Programs

The DOD's Distributed Bioindustrial Manufacturing Program (DBIMP) awarded over \$60 million to 34 companies to plan bioindustrial facilities to produce defense products. Soon, the DOD plans to award follow-on funding to some of these companies to build full-scale commercial facilities. Awardees could include U.S. companies working to develop and expand biomining capabilities to more efficiently extract critical minerals.

The DOD's Tri-Service Biotechnology for a Resilient Supply Chain (T-BRSC) program leverages biotechnology to help address the Department's supply chain vulnerabilities.² This program matures technologies from the lab to commercial viabilities. For example, the program could advance research that uses biomolecules to extract rare earth elements from mining waste streams.

2. https://www.usito.gov/publications/332/journals/jice_recovering_rare_earth_elements_from_e_waste.pdf