National Counterintelligence and Security Center

CRITICAL MINERALS SUPPLY CHAIN RESILIENCE

What are Critical Minerals?

- Executive Order (E.O.) 13817[1] defines a "critical mineral" as a mineral identified by the Secretary of the Interior to be 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.
- Critical minerals are also characterized as **serving an essential function in the manufacturing of a product**, e.g., lasers, magnets, semiconductors, batteries, the absence of which would have significant consequences for the economy or national security.

National Security Nexus

- The US is heavily reliant on imports of several critical minerals for manufacturing advanced technologies. **The global supply chains for many of these minerals are vulnerable to adverse foreign government actions, which introduces a counterintelligence risk to US national security goals.**[2]
- A counterintelligence strategic objective is to protect critical technologies, which must include protecting critical mineral supply chains.
- Protecting critical technologies maintains the US's technological advantage and advances our commitment to combat global climate change.
- Achieving 100% clean electricity by 2035 and a net-zero emissions economy by 2050 will involve a massive domestic build-out of clean energy technologies requiring a scale-up in critical mineral supply chains, both domestically and globally.[3]

Clean Energy Critical Minerals

Clean energy technology crucial to our transition away from fossil-fuels includes solar photovoltaic (PV) plants, wind farms, and electric vehicles (EV), which require significantly more minerals than their fossil fuel-based counterparts.[4]

The types of mineral resources used vary by technology.[4]

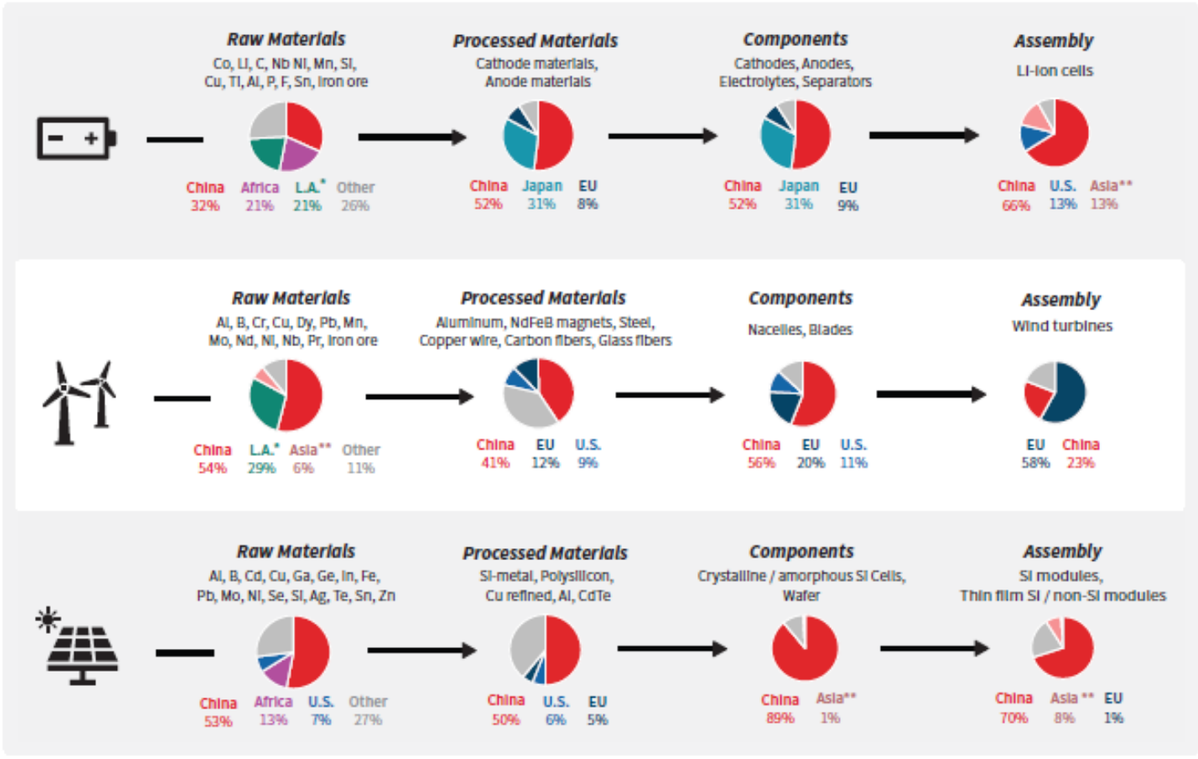
- Lithium, nickel, cobalt, manganese and graphite are crucial to batteries.
- Rare earth elements (REEs) are essential for permanent magnets that are vital for wind turbines and EV motors.
- Electricity networks need a huge amount of copper and aluminum, with copper being a cornerstone for all electricity-related technologies.

Sourcing and processing of many energy transition minerals is concentrated geographically.[4]

- The Democratic Republic of the Congo (DRC) and People's Republic of China (China) were responsible for some 70% and 60% of global extraction of cobalt and REEs respectively in 2019.
- The level of concentration is even higher for processing operations, where China has a strong presence across the board. China's share of refining is around 35% for nickel, 50-70% for lithium and cobalt, and nearly 90% for REEs. Chinese companies have also made substantial investment in overseas assets.

Clean Energy Mineral Supply Chains and Top Global Suppliers[5]

Batteries, Wind, and Solar PV



* Latin America
** Excluding China and Japan

Source: Created by Ian Barlow based on data from European Commission, *Critical materials for strategic technologies and sectors in the EU - a foresight study, 2020* (Brussels: European Commission, 2020).

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Federal Actions to Build Resiliency in Supply Chain

Under Executive Order (E.O.) 14017, *America's Supply Chains,* the Department of Defense (DOD) launched a 100-day review and strategy development process to address vulnerabilities in the supply chains of US strategic and critical materials. DOD's June 2021 Critical Materials Supply Chain 100-Day Review[6] and the Department of Energy's (DOE) February 2022 one-year supply chain review "America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition"[3] assessed the resilience of supply chains for critical minerals. Both reports provided several recommendations including:

- Expand sustainable domestic production and manufacturing capabilities;
- Improve end-of-life energy-related waste management and recycling; and
- Work with allies and partner nations to promote diverse, secure, and socially responsible foreign supply chains

References

- [1]Executive Order 13817, A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals, December 20, 2017
- [2]U.S. Government Accountability Office, GAO-22-104824: Critical Minerals – Building on Federal Efforts to Advance Recovery and Substitution Could Help Address Supply Risks, June 2022
- [3]U.S. Department of Energy, America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition, U.S. Department of Energy Response to Executive Order 14017, "America's Supply Chains", February 24, 2022
- [4]International Energy Agency, The Role of Critical Minerals in Clean Energy Transitions, March 2022
- [5]Center for Strategic & International Studies (CSIS), CSIS Energy Security and Climate Change Program, The Geopolitics of Critical Minerals Supply Chains, Jane Nakano, March 2021
- [6]The White House, Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth, 100-Day Reviews under Executive Order 14017, June 2021