The War for Critical Minerals and Capital Resources: Technology Metals on the Front Lines of Global Power

written by Tracy Hughes | November 5, 2024

"To lead the global market, a nation must command not only the most advanced technologies but also the critical minerals that make them possible. By relinquishing control of these essential resources, we've given China a strategic edge—one that extends beyond economics and into global power. At the **Critical Minerals Institute**, our mission is to shine a light on this urgent issue, connect with leading experts, and equip stakeholders with the knowledge needed to reclaim control over these essential resources and secure a balanced future in the race for global power." – Tracy Hughes, **Critical Minerals Institute (CMI)**

The idea that always resonates deeply with me is this: for a nation to lead in the global market, it must command the most advanced technologies known to humankind. But as powerful as these technologies are, they are useless without the materials necessary to build them. The crucial materials I'm referring to—rare earths like Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy), and Terbium (Tb) —are among the critical minerals that enable everything from the latest smartphones to electric vehicles, aircraft, and cutting-edge defense systems. These rare earth elements are crucial in manufacturing permanent magnets, a core component of numerous modern technologies and one of the prioritized categories on the Critical Minerals Institute's (CMI) Hit List.

Over time, we have inadvertently handed China the reins to

control the flow of these minerals, placing ourselves in a precarious position. By securing these crucial resources, China has gained not only access to these materials but also the means to advance its technological capabilities, positioning itself as a global leader. These minerals are aptly named "Technology Metals"—a term coined by CMI's Co-Founder and Co-Chair, Jack Lifton—because they are indispensable to the high-tech industries of today and the future.

In my work and conversations with peers, industry experts, and colleagues, it's clear that the struggle over these critical minerals has become a new kind of frontline in the race for global power. This isn't just about trade or market dominance; it's about which nations will hold the future in their hands.

The **Critical Minerals Institute (CMI)** is at the forefront of this effort, helping to bring clarity and strategy to the discussion. CMI maintains a "Hit List" of 20 essential minerals deemed critical for sustaining economic growth. This curated list draws from a careful review of 10 international lists, which track a total of 51 critical minerals worldwide. By prioritizing these minerals based on their role in key industries and vulnerabilities in supply chains, CMI helps countries and companies alike to understand where their strategic efforts must focus.

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CMI gives special priority to the top five Critical Minerals on its Hit List:

1. **Copper (Cu):** A fundamental material for electrical applications, copper is crucial for both renewable energy systems, like solar and wind power, and conventional energy infrastructure. Its excellent conductivity and

durability make it indispensable in wiring, power generation, and transmission.

2. **Lithium (Li):** Central to the production of rechargeable batteries, lithium powers electric vehicles, grid storage, and portable electronics. As the world transitions to renewable energy, lithium's role in energy storage solutions makes it vital for a sustainable future.
3. **Platinum Group Metals (PGMs):** These metals, including platinum, palladium, and rhodium, are essential for reducing emissions in catalytic converters, enabling clean hydrogen production in fuel cells, and supporting various industrial processes. Their unique catalytic properties make PGMs irreplaceable in modern green technologies.
4. **Rare Earth Elements (REEs):** Used in high-performance permanent magnets, REEs like Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy), and Terbium (Tb) are essential for electric vehicle motors, wind turbine generators, and advanced defense systems. Their magnetic strength and resistance to demagnetization are critical for the efficiency and durability of these applications.
5. **Uranium (U):** The primary fuel for nuclear energy, uranium provides a reliable, low-carbon power source that supports energy independence and stability. Its ability to generate vast amounts of energy from a small amount of material makes it crucial for meeting global energy demands.

To select the minerals included on this list, CMI tracks global lists highlighting those deemed essential for economic and technological advancement. Minerals that appear on at least seven of the 10 international lists are prioritized. CMI's Executive Director, Alastair Neill, P.Eng., oversees this monitoring process.

The Full CMI Hit List (in alphabetical order) includes:

- Antimony (Sb)
- Cobalt (Co)
- Copper (Cu)
- Fluorspar (Fluorspar is the mineral form of calcium fluoride, CaF_2, rather than a standalone element)
- Gallium (Ga)
- Germanium (Ge)
- Graphite (Graphite, an allotrope of Carbon, is represented by the symbol C)
- Lithium (Li)
- Magnesium (M)
- Nickel (Ni)
- Niobium (Nb)
- PGMs (Platinum Group of Metals)
- Rare Earth Elements (REEs)
- Silicon (Si)
- Tantalum (Ta)
- Tellurium (Te)
- Titanium (Ti)
- Tungsten (W)
- Uranium (W)
- Vanadium (V)

CMI has identified the global supply sources for many of the critical minerals, with China dominating production in numerous cases:

- Gallium: China 98%
- Germanium: China 94%
- Magnesium: China 88%
- Graphite: China 77%
- Tungsten: China 81%
- Antimony: China 48%, Tajikistan 25%
- Silicon (Silicon Metal): China 69%

- REEs (Rare Earth Elements): China 69%
- Vanadium: China 68%
- Indium: China 66%
- Fluorspar: China 65%
- Tellurium: China 59%
- Titanium (Titanium Metal): China 36%, Mozambique 19%
- Nickel: Indonesia 50%
- PGMs (Platinum Group Metals): South Africa 49%, Russia 30%
- Lithium: Australia 48%, Chile 24%
- Tantalum: DRC 41%, Rwanda 22%
- Cobalt: DRC 74%
- Copper: Chile 23%, Misc. 14%, Peru 12%
- Uranium: Kazakhstan 45%, Namibia 12%
- Niobium: Brazil 90%

By monitoring these materials, CMI focuses on securing supply chains, addressing market volatility, and fostering innovation within the critical minerals market. The U.S. Department of Defense has taken strides in funding domestic supply chains for military applications, but there remains an urgent need to expand these efforts to meet consumer market demand. CMI continues to guide nations in preparing for a future where access to technology metals will determine not just market strength, but global leadership.

The battle over critical minerals is more than an economic struggle; it’s a fight for the ability to lead in an era defined by innovation and high-stakes competition.

The **Critical Minerals Institute (CMI)** compiles its Hit List by analyzing and synthesizing data from prominent international sources that track essential minerals for economic resilience and technological advancement. CMI’s list is derived from key references, including the USA DOE Critical Minerals List (2023), the USA USGS Critical Minerals List (2022), the Canadian

Critical Minerals List (2024), Australia's Critical Minerals List and Strategic Materials List (2023), the Australian Critical Minerals Prospectus (2024), and New Zealand's Critical Minerals List (2024). Additionally, it incorporates insights from the UK Critical Minerals List (2022), the European Critical Minerals List (2023), Japan's Critical Minerals List (2020) alongside Japan's 2024 addition of uranium to its critical minerals, the South Korea Critical Minerals List (2023), and the Indian Critical Minerals List (2023). These sources collectively inform CMI's strategic prioritization of minerals that are fundamental for sustaining economic growth and reducing supply chain vulnerabilities.

About Critical Minerals Institute (CMI)

The Critical Minerals Institute (CMI) is a global organization committed to addressing the challenges and opportunities within the critical minerals sector. CMI equips businesses, governments, and stakeholders with comprehensive resources, offering deep insights into the value, sustainability, and strategic significance of critical materials essential for technological and industrial advancement.

CMI Offerings: Our offerings include exclusive Masterclasses and the weekly Technology Metals Report (TMR), which provide pivotal industry insights. The theme for our 2025 summit, "The War for Critical Minerals and Capital Resources," focuses on uniting industry leaders to address the pressing issues facing the global critical minerals market. This premier event, CMI Summit IV, is set to take place on May 13-14, 2025, at the National Club in Toronto, Ontario, Canada. The CMI Summit aims to foster strategic partnerships and develop actionable solutions that support the growing demand for critical minerals, crucial for the advancement of clean energy, technology, and national security.

To secure a **CMI Membership**, click here or to secure a **CMI Summit IV** 2-day Delegates Pass, click here