

The Critical Minerals Challenge: A Look at the Elements Powering the Future

written by InvestorNews | October 8, 2024

As the world transitions toward a more sustainable and technologically advanced future, critical minerals are emerging as the essential building blocks of modern economies. From electric vehicles and renewable energy technologies to advanced electronics, a range of elements—Copper, Lithium, Rare Earth Elements (REEs), and more—play pivotal roles. However, the geopolitical landscape of critical mineral production raises complex questions about supply security, global dependence, and the strategic challenges of maintaining growth in the Western world.

[Alastair Neill](#), P.Eng MBA, a respected figure in the critical minerals sector and an Executive Director for the [Critical Minerals Institute \(CMI\)](#), has spearheaded the [CMI Watchlist](#). Identifying the top 18 critical minerals of the 51 being monitored by the the US, Canada, Australia, UK, Europe and Japan. This list highlights the minerals that are fundamental to sustaining Western economic growth while also reflecting the concentration of their production in just a few countries.

The Heavyweights: Lithium, Rare Earths, and Copper

Three of the most talked-about minerals today—Lithium, Rare Earth Elements (REEs), and Copper—form the backbone of the clean energy transition. Lithium, essential for battery storage in electric vehicles (EVs) and renewable energy systems, is

dominated by Australia (48%) and Chile (24%). The race to secure lithium supplies has intensified as nations scramble to meet aggressive EV production targets. Yet, the concentration of lithium reserves in a few countries creates a significant risk of supply disruption.

Rare Earth Elements, vital for producing permanent magnets used in EV motors, wind turbines, and defense technologies, are overwhelmingly controlled by China, which supplies 69% of global demand. This dominance has triggered alarm bells in Western economies, driving efforts to diversify supply chains and reduce dependency on a single source.

Copper, long considered a reliable indicator of economic health, remains crucial for electric grids and the expansion of renewable energy infrastructure. Chile is the world's largest copper producer, accounting for 23% of global supply, but new projects in other parts of the world are still needed to meet growing demand.

China's Stranglehold on Strategic Materials

A closer look at Neill's [CMI Watchlist](#) reveals a staggering reality: China dominates the global supply of numerous critical minerals, posing a substantial risk to Western economic resilience. China produces 98% of the world's gallium, 80% of bismuth, and 77% of graphite, all materials vital to modern technologies. Its monopoly extends to more than half of the world's production of magnesium, tungsten, vanadium, and tantalum, among others.

While Western nations, particularly the U.S. and Europe, have recognized the need to develop domestic supply chains for critical minerals, they remain highly vulnerable to supply disruptions from China. The strategic challenge lies in

balancing the need for rapid technological advancement with the geopolitical risks of mineral dependency.

The Rare Metals Game: PGMs, Cobalt, and Nickel

Platinum Group Metals (PGMs), which include platinum, palladium, and rhodium, are critical in catalytic converters and hydrogen fuel cell technologies. South Africa leads global PGM production, responsible for 49%, followed by Russia with 30%. In the case of cobalt, another crucial component in EV batteries, the Democratic Republic of the Congo (DRC) controls a staggering 74% of global supply, raising concerns about ethical mining practices and long-term availability.

Nickel, essential for high-performance batteries, is increasingly sourced from Indonesia, which now produces 50% of the world's supply. With demand skyrocketing due to the EV revolution, securing diversified nickel sources will be vital for Western economies to maintain production targets without falling into a supply chokehold.

The Case for Diversification

As Neill points out, for a mineral to be included on the [CMI Watchlist](#), it must be critical to Western economic growth, appear on at least eight of the eleven global priority lists he tracks, and have enough data available for governments and industries to prioritize action. While the world may be rapidly advancing toward a green and tech-driven future, the reality of supply constraints cannot be ignored.

Diversifying supply chains for critical minerals is essential for reducing dependence on a handful of countries, particularly China. Western nations have already begun exploring partnerships

in Africa, Latin America, and even within their borders to tap into underdeveloped mineral reserves. Projects in places like Brazil, Namibia, and Mozambique are becoming increasingly critical as governments and companies seek to secure a sustainable supply of these resources.

A Strategic Opportunity

The path forward will require significant investment, political will, and global cooperation. Developing new mines, improving recycling technologies, and fostering international partnerships will be critical steps in securing a reliable supply of the minerals that power the modern world.

The [CMI Watchlist](#) serves as a reminder that, while technology may hold the key to the future, it is the rare and often overlooked elements beneath the Earth's surface that will truly determine the fate of the global economy in the years to come. In a world where minerals like antimony, gallium, and niobium can dictate the trajectory of entire industries, securing the supply of these materials is not just an economic necessity, but a strategic imperative.

The question is: Will the West act in time to secure its future? Or will reliance on a few key players leave global growth vulnerable to geopolitical disruption? As the race for critical minerals intensifies, the stakes have never been higher.