

Over the past two decades, Europe's critical minerals sector has undergone significant transformation, reflecting the continent's evolving industrial needs and geopolitical strategies. As global demand for minerals such as lithium, copper, nickel, rare earth elements (REEs), and uranium has surged, Europe has grappled with the challenges of securing stable and sustainable supplies. This article examines Europe's position in the critical minerals landscape, its historical reliance on external sources, and the potential for adopting policies akin to those of the United States to bolster self-sufficiency.

Historically, Europe's industrial expansion has been underpinned by imports of essential minerals. This dependency has been particularly pronounced in the realm of REE, which are indispensable for a myriad of high-tech applications, including renewable energy technologies, electronics, and defence systems. China's dominance in the REE market has been a longstanding concern; as of 2023, China processed about 90% of the world's REEs and 60% of the world's lithium, leading to a near-total reliance of the European Union on Chinese imports for these materials.

**In response to these vulnerabilities, the European Union embarked on strategic initiatives to diversify and secure its mineral supplies. A landmark development in this endeavour was the Critical Raw Materials Act in 2023. This legislation establishes a framework for delivering a secure and sustainable supply of critical raw materials. The Act sets ambitious targets for 2030, including extracting at least 10% of the EU's annual consumption of strategic raw materials, processing at least 40%, and recycling at least 25%. Additionally, it stipulates that no single non-EU country should supply more than 65% of the EU's annual consumption of any strategic raw material.**

The past decade has witnessed notable shifts in the supply and demand dynamics of critical minerals within Europe. The burgeoning adoption of electric vehicles (EVs) and renewable energy technologies has exponentially increased the demand for lithium, nickel, and cobalt.

Europe's demand for lithium, a pivotal component of lithium-ion batteries used in EVs and energy storage systems, is projected to grow more than 40 times by 2040, underscoring the urgency of establishing secure supply chains. New projects in Germany, Spain and Portugal are all looking to fill the supply gap for locally sourced product. Ukraine has an advanced project, Dobra, in the centre of the country that could potentially be included in a US-Ukraine minerals deal.

Copper, renowned for its excellent electrical conductivity, remains fundamental to Europe's infrastructure, particularly in power generation and transmission. The transition to renewable energy sources and the expansion of electric grids have intensified copper consumption. However, global exploration investment in copper has decelerated in recent years. Despite a surge in spending earlier in the decade, overall exploration investment declined by 6% to US\$12.5 billion in 2024 reflecting investor caution and higher operational costs. Whilst there are advanced projects in Greece (Skouries) and Romania (Rovina Valley), these regions have had environmental activists impede development. New projects or expansions in Spain (Cunext), Portugal (Neves-Corvo) and Sweden (Zinkgruvan) appear the most likely to succeed.

Nickel, integral to stainless steel production and battery technologies, has experienced fluctuating demand. The rise of EVs has bolstered nickel consumption, given its role in battery cathodes. Nonetheless, projections for nickel demand by 2050 vary significantly, ranging from 24 to 100 million tonnes, influenced by

technological advancements and recycling initiatives. Kosovo (Gllavica) and Finland (Talvivaara) are both significant mines, however they, along with Australian producers have been impacted by the emergence and domination of low-cost Indonesian Nickel.

REE, encompassing 17 metallic elements, are critical for manufacturing permanent magnets used in wind turbines and electric motors. Europe's dependency on Chinese REEs has prompted exploration of alternative sources. Notably, in January 2023, Sweden's state-owned mining company LKAB announced the discovery of a deposit exceeding 1 million metric tons of rare earth oxides in the Kiruna area, marking the largest such deposit in Europe.

Uranium has remained a focal point for countries like France, which relies heavily on nuclear power. While Europe possesses some uranium resources, geopolitical factors and environmental concerns have influenced mining activities. The EU's strategy emphasises diversifying supply sources and enhancing domestic production, where feasible, however it is not clear where these new sources might come from as projects such as Kurišková in Slovakia have faced strong community opposition.

Under President Donald Trump 2.0, the United States has adopted assertive measures to secure critical mineral supplies, including imposing tariffs and forging international partnerships. In March 2025, President Trump implemented a 25% tariff on all steel and aluminium imports, prompting global retaliation and highlighting the complexities of trade dependencies. Additionally, the US has sought to establish agreements to access mineral resources in Ukraine, reflecting an aggressive stance in mitigating supply risks.

Europe faces a multifaceted challenge in emulating the US approach to restricting external ore sources. The continent's limited domestic reserves of certain critical minerals necessitate continued imports. For instance, Europe's aerospace sector remains heavily dependent on Russian titanium supplied by VSMPO-AVISMA. Despite efforts to diversify, the scarcity of high-quality titanium producers globally has perpetuated this reliance.

To mitigate such dependencies, Europe is investing in recycling and circular economy initiatives. By 2050, recycling could meet up to 77% of Europe's metal needs, particularly for cobalt, nickel, and lithium. However, challenges persist in scaling recycling capacities and establishing efficient collection systems.

Technological innovations also play a pivotal role in reducing reliance on specific minerals. The development of alternative battery chemistries, such as lithium-sulphur and sodium-ion batteries, may decrease dependence on nickel and cobalt. However, these technologies are still in nascent stages, and their commercial viability remains uncertain.

Environmental and ethical considerations further complicate Europe's critical minerals strategy. The extraction of minerals like lithium has sparked protests due to environmental concerns. In 2024, Rio Tinto's Jadar lithium project, backed by the EU, faced large-scale protests in Serbia, highlighting the need for sustainable and socially responsible mining practices. Moreover, issues related to conflict minerals persist, with reports indicating ongoing illicit trade funding conflicts, despite regulations like the EU's Conflict Minerals Regulation.

In conclusion, while Europe's critical minerals sector has made strides toward reducing external dependencies, achieving self-sufficiency may not be achievable, just as it is unlikely to be feasible in the US. Nevertheless, there will be numerous opportunities for resource companies and investors along the way.