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## China's dominance in the critical minerals supply chain:

Consequences and challenges

### Key points

- China's long-term policies have given it a dominant position in the mineral supply chain.
- Reducing dependency on China creates challenges for the green transition and risks for Norway's defense industry.
- Mineral resource planning in China is becoming less transparent.
- The US and EU have implemented strategies to reduce dependence on China.
- China is willing to impose *tit-for-tat export controls*, it *stockpiles mineral reserves* and is *diversifying its supply*.
- China enhances domestic production by *reducing waste* and implementing *new technologies*.



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## Background

Critical raw materials—such as rare earth elements (REEs), lithium, and graphite—are deemed essential for producing modern technologies and the “green transition.” Ensuring a stable long-term supply has become a key objective for policymakers in many countries, including the Nordic states.

This brief focuses on China’s perceived risks in these supply chains and its strategies for mitigating them, with an emphasis on materials used in permanent magnets and Electric vehicle (EV) batteries.

## China in Permanent Magnet and EV Battery Supply Chains

China dominates the global supply chains of permanent magnets, which are mostly made of an alloy of neodymium (an REE), iron, and boron, and its control over global production increases downstream the closer we get to the finished magnet. While China is the largest producer of REEs and holds the largest global reserves, it has become reliant on imports for parts of its supply due to domestic policies aimed at restricting mining and processing to conserve resources and reduce environmental pollution.

China relies heavily on imports of iron ore and boron. However, the risk of supply shortages affecting magnet production is low due to the large import volumes and the relatively small proportion of these materials used in magnet manufacturing.

Overall, China faces lower risks in permanent magnet production and is primarily focused on strengthening its dominant position in the global supply chain. By contrast, China faces a larger supply risk for battery raw materials, with this risk concentrated primarily upstream at the mining stage. The level of risk depends on the specific material in question.

While China’s dependence on ores and concentrates varies depending on the mineral, it dominates the processing of all battery raw materials as well as the manufacturing of the batteries

themselves. This is a key consideration for Chinese government planners and strategists. Controlling processing technologies and facilities means that it may not always be necessary to own overseas mining operations directly, as Chinese companies are uniquely positioned to handle the output even from overseas mines.

## China’s Policies to Address Risks

China faces a range of geopolitical, resource, and market-related risks in its efforts to maintain control of global value chains of raw materials for permanent magnets and EV batteries. China has implemented several strategies to address these risks.

China is concerned about markets of REEs, iron ore, and boron, which are critical for permanent magnet production. Through production quotas and stockpiles, China influences prices in the global REE market, but price fluctuations are still a challenge for China. Unstable demand, illegal mining, and stricter than before (sometimes stricter than EU) environmental regulations affect REE industry stability and profitability. China relies heavily on imports, especially for heavy REEs, iron ore, lithium, cobalt, and nickel. Additionally, efforts to develop substitute materials pose potential challenges for China’s dominance in supply chains in the long term.

China’s main concern is the inefficient use of its REE resources. Despite leading in REE processing technology, outdated methods are often used due to a lack of investment in extraction and processing technology. This leads to resource waste, lower-quality concentrates, high costs, and pollution. Resource depletion, particularly in lithium, poses challenges as reserves diminish faster than new deposits are discovered (China’s utilization rates for lithium still surpass the global average).

The greatest geopolitical challenges for China are the US efforts to lessen reliance on China through alliances like the Minerals Security Partnership and US legislative acts. Globally, there is growing skepticism towards Chinese

### Case study: Freyr

Founded in Norway in 2019, Freyr grew as a leading Norwegian battery company, using American 24M technology and employing Chinese, Korean and Japanese experts. By hiring overseas, they could gradually transfer their expertise and technology to Norway and Europe. The company has invested over four billion NOK in two factory facilities in Mo i Rana. However, due to competition from China and the US and high executive payouts, production in Europe became unprofitable, leading to downsizing and halting construction of its Mo i Rana Gigafactory. In response, Freyr moved to Delaware to benefit from US financial incentives offered by the Inflation Reduction Act (IRA). After acquiring a US solar plant from Chinese Trina Solar, which became Freyr's largest shareholder, it shifted focus to solar technology and battery solutions for AI data centers. This demonstrates faced by Nordic companies like Freyr and Northvolt: a lack of technology, reliance on Asian expertise, mismanagement, and competition from China and the US.

investment. Other concerns are friendshoring, forced divestment, and resource nationalism.

China has implemented several strategies to preserve its dominance in the supply chain.

First, China will continue to introduce export controls on minerals important in clean energy technologies through measures like the 2020 Export Control Law.

Second, China is increasing domestic production and stockpiles of strategic minerals to cushion against supply disruptions and price volatility. At the same time, China uses quotas to limit production of certain critical minerals, such as specific REE reserves to prevent their exhaustion.

Third, China is diversifying mineral imports and investing in countries where resources are concentrated. At the same time, China is increasing domestic exploration to secure new reserves. For REEs, China restricts domestic mining while encouraging imports of REE concentrates and discouraging exports of unprocessed REEs.

Fourth, China is recycling resources and reducing waste and developing new technologies.

Fifth, China is strengthening the regulatory framework for mining, increasing secrecy around mining planning, and improving governance and oversight. A case in point is the National Mineral Resources Plan (2021-2025), which unusually for an economic plan has not been made public.

## Impact on European Countries

Given China's impact on Western countries, the rationale behind de-risking critical mineral dependency is the fear that China may halt sales, delay deliveries, or significantly increase prices, thus impacting key industries. Geopolitical, market, and resource risks for Europe vary depending on the mineral, country, and time. For countries like Norway, this creates a dilemma between green transition and security needs. The impact of the US–Chinese trade war and security conflict on Norway is uncertain. There are examples of China restricting exports to the United States. Europe's dependency on China could lead to opportunities for coercion.

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