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COMMODITIES, FOOD & AGRI

Why the US rare earth supply chain remains vulnerable

The US has significant rare earth resources, but its supply chain remains heavily reliant on China. The biggest gaps do not sit in the mine, but rather in processing, heavy rare earth separation and magnet manufacturing



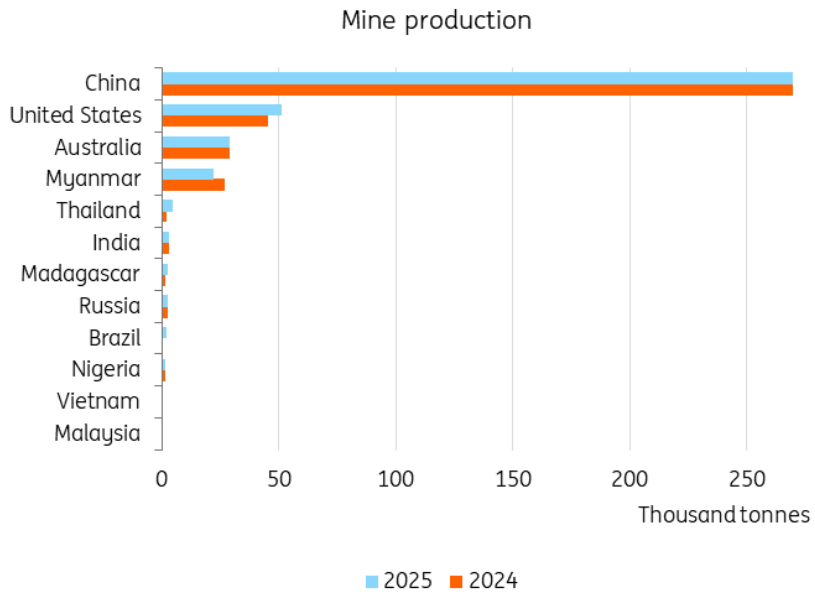
A rare earths mine in Mountain Pass, California

The US supply chain remains incomplete

Last year we wrote about how China could use its dominance of rare earth supply chains as political leverage. Although supply pressures eased after the US and China reached a framework agreement in June 2025, Beijing's subsequent expansion of rare earth export controls in October highlighted the persistent vulnerability of downstream supply chains.

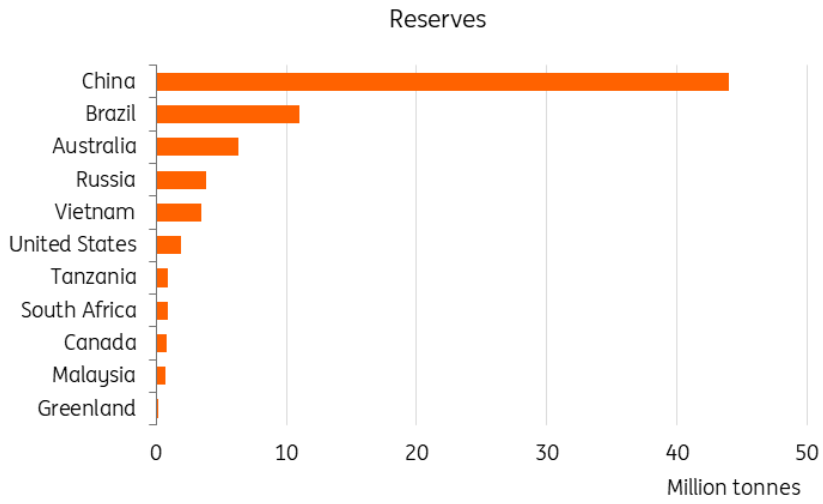
Headline import dependence tells only part of the story. The US is producing more rare earths, but it still cannot process enough of that output into the specialised materials and magnets needed by domestic industry. The main weakness emerges after the ore leaves the mine.

US rare earth production is growing, but China still leads



Source: USGS, ING Research

Resource availability is not the main challenge for the US



Source: USGS, ING Research

Mining is only the first step

Once ore is mined, it must be concentrated and separated into individual oxides. These are then converted into metals and alloys before being manufactured into magnets. China dominates these value-added stages.

Mountain Pass shows both the strength and weakness of the US position. MP Materials produced a record 50,692 tonnes of rare earth oxide in concentrate in 2025 and expanded production of separated neodymium-praseodymium oxide. The company also began manufacturing neodymium-iron-boron magnets in Texas in December 2025.

These are important steps towards a domestic mine-to-magnet supply chain. But one mine, increasing light rare earth separation and limited magnet production, cannot yet supply the full range of products needed by US industry.

The US rare earth capacity weakens further down the supply chain

Supply-chain stage	US status
Mining	Established, but concentrated
Concentrate production	Established
Light rare earth separation	Operating and expanding
Heavy rare earth separation	Early-stage and limited
Metallisation	Limited
Alloy production	Limited
Magnet manufacturing	Early-stage and limited
End-use manufacturing	Strong

Source: ING Research

The real choke points are downstream

US vulnerability increases further down the chain. According to the International Energy Agency (IEA), China accounts for 60% of mined magnet rare earths, 91% of refined output and 94% of permanent magnet production. Two decades ago, it produced only about half of the world's permanent magnets.

Mining capacity is growing in the US, but China retains an overwhelming advantage where most of the value is added. That position was built over decades through state support, integrated supply chains, technical expertise and proximity to downstream manufacturers. Together, these factors created economies of scale that are difficult for new entrants to replicate.

Separating individual rare earths is difficult because their chemical properties are so similar. Plants are expensive, technically complex and often tailored to a particular ore body and product mix. Processing can also generate toxic and, in some cases, radioactive waste.

Heavy rare earths are the weakest link

The US gap is widest in heavy rare earths. Dysprosium and terbium are added in small quantities to neodymium-iron-boron magnets to help them perform at high temperatures. This makes them particularly important for electric-vehicle motors, aerospace systems and defence equipment.

US output is concentrated in light rare earths such as neodymium and praseodymium. Commercial-scale domestic separation of dysprosium and terbium is only beginning.

MP Materials is developing a heavy rare earth separation line at Mountain Pass designed to produce around 200 tonnes of dysprosium and terbium a year. This would be an important domestic step, but it will not close the gap on its own. Domestic metallisation and magnet-making capacity also remain limited.

New separation facilities will also need reliable feedstock. Heavy rare earth production is concentrated in China and Myanmar, leaving US processors exposed even if domestic separation expands. Alternative deposits exist, but developing them and connecting them to metals, alloys and magnet production will take time.

Magnet dependence is the most immediate risk

For many strategic applications, the critical import is not an oxide but a qualified magnet or a component containing one. High-performance magnets must meet precise requirements for strength, heat resistance and durability. New suppliers must be tested and certified, making it difficult to switch during a disruption.

US magnet capacity remains small compared with domestic demand and China's industrial base. The IEA estimates that, even after announced projects, diversified magnet output outside China would meet well below 20% of demand outside China in 2035. The project pipeline is strongest in mining and weakest in magnets.

Demand is also rising across electric vehicles, wind turbines, robotics, data centres and defence. This increases the risk that diversified capacity will struggle to keep pace, even if announced projects proceed.

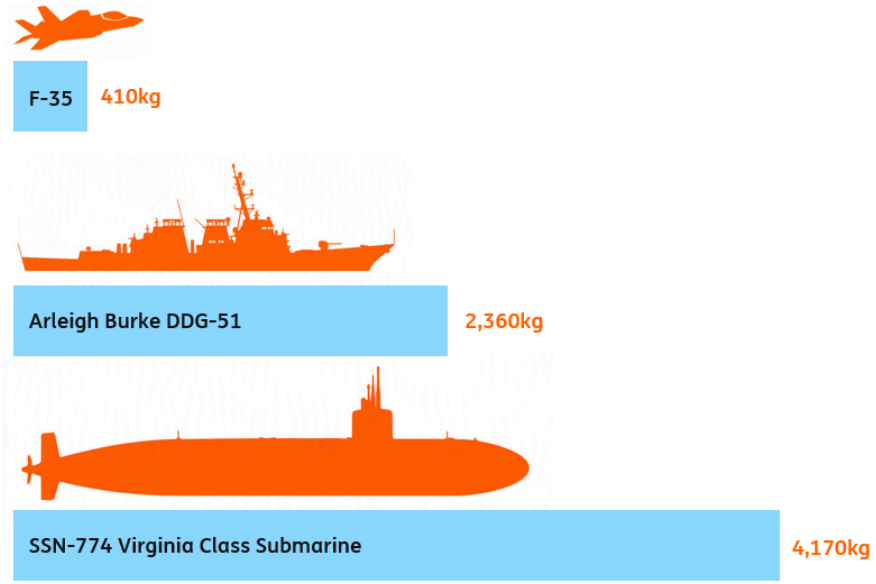
The defence deadline adds urgency

Rare earths are used in small quantities, but they are difficult to replace in advanced defence systems. The US Department of Defence estimates an F-35 requires more than 400kg of rare earth elements, an Arleigh Burke-class destroyer around 2.4 tonnes and a Virginia-class submarine around 4.2 tonnes.

The deadline is approaching. From 1 January 2027, US defence procurement restrictions will

extend across the supply chain for neodymium-iron-boron and samarium-cobalt magnets originating in China, North Korea, Russia or Iran, subject to limited exceptions.

Rare earth materials are essential to US defence systems



Source: US Department of Defense, ING Research

Figures converted from pounds and rounded

The US rare earth challenge is industrial rather than geological. Its vulnerability lies in the difficult stages between the mine and the finished component. The second article in this series examines how Washington is trying to close those gaps through domestic investment, friend-shoring and recycling.

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