VanEck®
Access the opportunities.

Why rare earths are the new oil

These strategic metals are essential for engineering tomorrow's green economy, and their specialist miners are preparing for growth.

- Rare earth metals are critical for the energy transition, meaning that demand is likely to grow significantly over the next 25 years until 2050.
- But the supply of these strategic metals is uncertain, as they are caught in a geopolitical great game between China and the west.
- Rare earth mining companies look likely to benefit from long-term secular growth – they are improving their operating efficiency and trade at a discount to previous years' valuations.

"The Middle-East has oil and China has rare earths", Chinese leader Deng Xiaoping, 1987.

There's a global race on to secure access to the world's rare earths. While hydrocarbons have been the main source of energy since the Industrial Revolution in the 18th century, the energy transition aims to replace them with electricity. But that will not be possible without rare earths.

Currently, though, there's insufficient supply to meet the likely growth in demand. What's more, China has with great foresight grown to dominate the supply of these strategic metals over the last 50 years. They are now in the middle of today's great game of geopolitics.

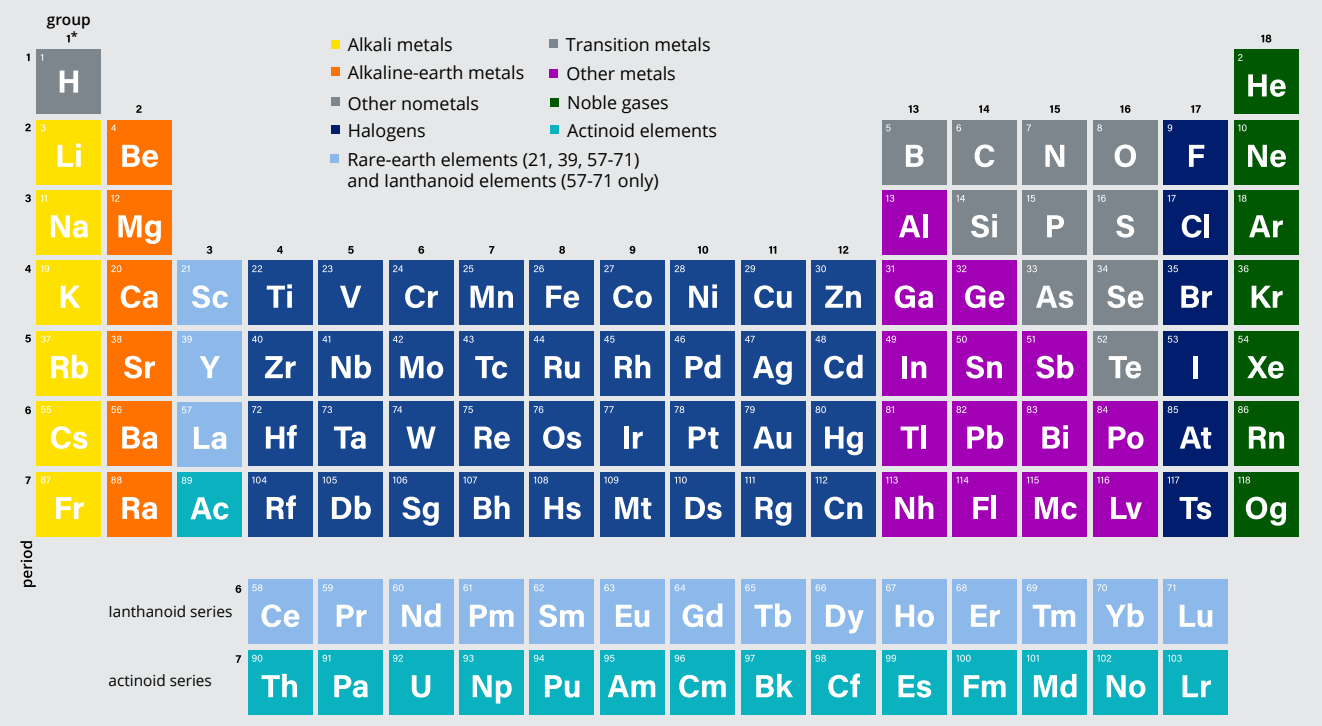
Against that backdrop, there's a long-term secular story of growing demand for rare earths yet unreliable supply. The demand is mainly for the energy transition's critical components, chiefly the magnets for wind turbines and electric vehicles (EVs). Beyond the green transition, though, there's also demand for electronic devices and advanced weaponry. Supply is set to grow too as western nations step up mining and production at home, or in friendly states. Yet that takes time.

If rare earths are the new oil, might their miners become the new oil companies? That might be over-stating the case but they have a fair wind of surging demand and problematic supply.

What are rare earths?

Rare earth metals are not in fact rare. A set of 17 chemical elements, which have similar properties and are found in the same ores (see periodic table). They are relatively abundant but not often in sufficiently high concentrations for mining to be economic. Moreover, they are generally mixed with other elements, sometimes radioactive ones, which creates challenges separating and processing them.

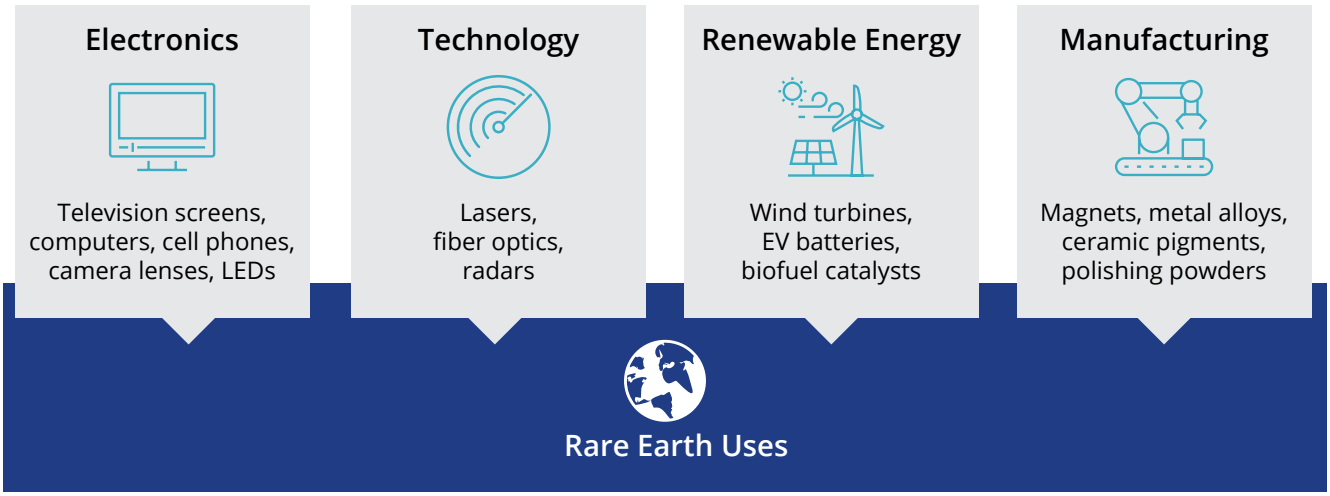
Rare earths in the periodic table



*Numbering system adopted by the International Union of Pure and Applied Chemistry (IUPAC).
Source: Encyclopedia Britannica

Because of four notable chemical properties, rare earths are critical for many applications spanning electronics, renewable energy and manufacturing. These are:

1. **Magnetic properties:** rare earths like neodymium (Nd), dysprosium (Dy) and samarium (Sm) store large quantities of magnetic energy. They are used as magnets for applications including computer hard drives, EV batteries, microphones, speakers, medical devices and wind turbines.
2. **Luminescent properties:** rare earths like europium (Eu), yttrium (Y), erbium (Er) and neodymium (Nd) give off light when stimulated in certain ways. They are used in LEDs and lasers.
3. **Catalytic properties:** rare earths like cerium (Ce) and lanthanum (La) accelerate chemical reactions.
4. **Electric properties:** rare earths like cerium (Ce), lanthanum (La), neodymium (Nd) and praseodymium (Pr) give batteries a higher energy density (or capacity to store energy). They are widely used in EVs.



There will be no green transition without a huge supply of rare earth metals. Notably, they are essential for the high-powered magnets that are critical for wind turbines and electric vehicles (EVs). The EU estimates that demand for rare earths used in magnets alone could increase tenfold by 2050.[1]

Take wind turbines. Each turbine uses four of these metals: neodymium, praseodymium, dysprosium and terbium. The first two provide magnets and the last two deliver resistance to demagnetization, especially at high operating temperatures above 160 degrees. Located in the center of the blades, the magnets increase power generation and reduce maintenance.

Turning to EV motors, rare earth magnets with opposite poles repel each other to power axles.

Showing the energy transition's huge requirements, if the Paris climate agreement's goals are on course to be met, by 2040 clean energy will account for 40% of demand (see chart). That compares with about 10% in 2010.

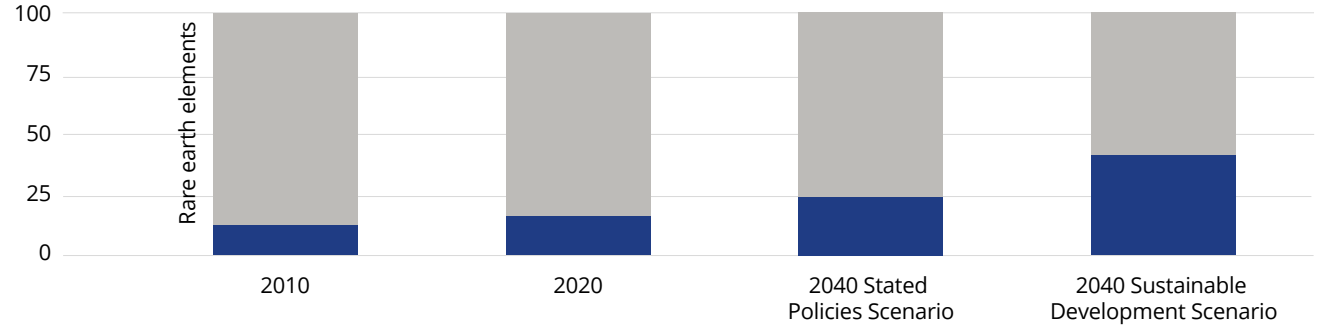
Forecasts predict strong demand. Over the 10 years from 2021, to 2030, the compound annual growth rate (CAGR) is estimated to be 9.1% globally, according to a report from Prescient Strategic Intelligence. Asia Pacific demand is expected to grow fastest, with CAGR of about 10%. Rare earths are critically important for China's ambitions for economic development. In terms of volume, magnets are expected to be the leaders, followed by catalysts.

The geopolitical race to control supply chains

From the 1970s, China's government subsides, low wages and poor environmental practices enabled it to flood the market with cheap rare earths. Other producers were no longer competitive. The country dominates production of these metals, with 65% of supply. While it has a significant presence in the mining, it accounts for 85% of processing and 92% of magnet production.[2]

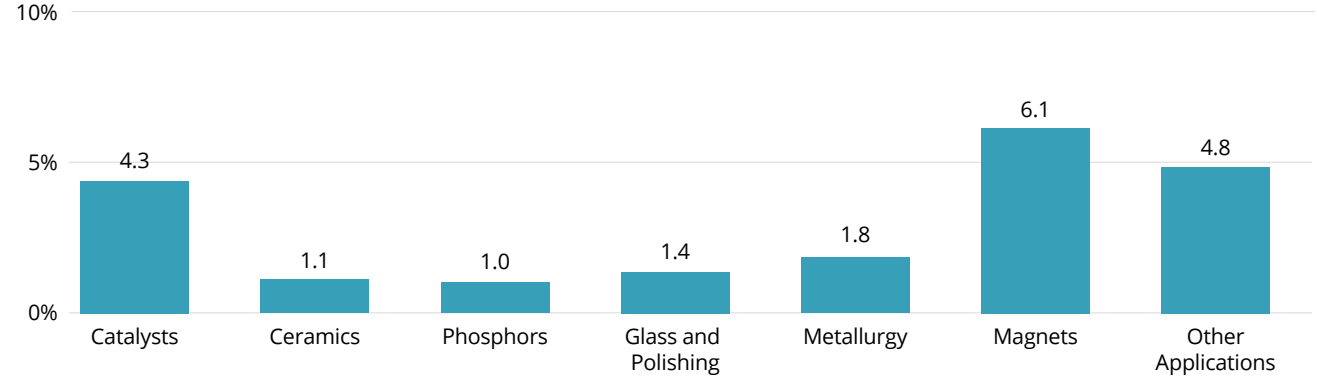
At present there are only two rare earths processing facilities outside China: in Malaysia and Estonia. Two others are being built, in Norway and the US, but will take some time to complete.

Clean energy to account for 40% of rare earth demand by 2040



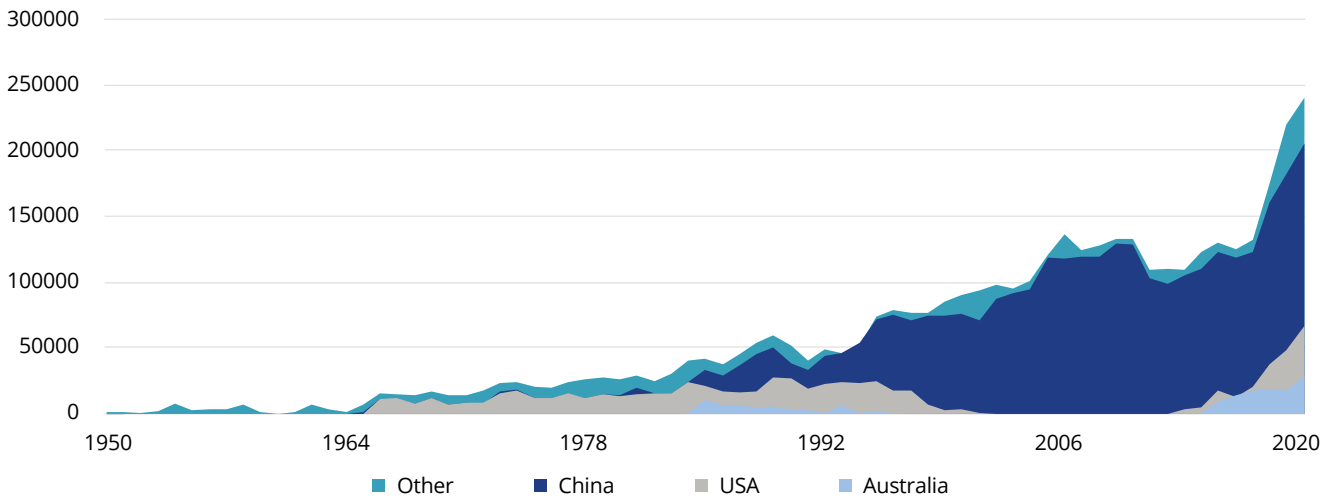
Source: IEA, share of clean energies in rare earth total demand, 2021

Rare Earth Elements Market, Volume CAGR (%), by Application, Global, 2022-2027



Source: Mordor Intelligence, 2022

[1] European Commission
[2] US Department of Commerce



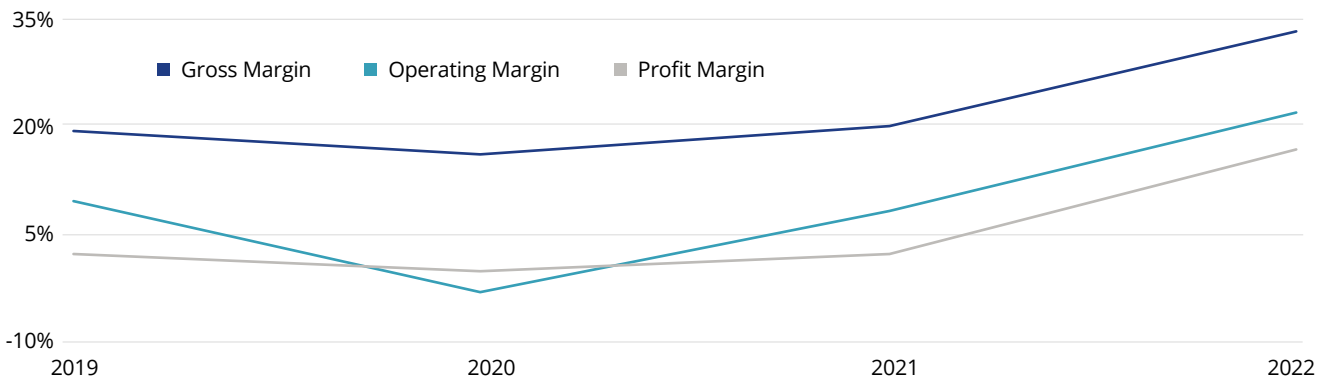
Source: Geology.com, rare earth production over time measured in metric tons

Western nations have woken up to the risk of letting China continue to dominate rare earth supply. The Biden administration is taking steps to build a US rare earths supply chain, with the 2023 Rare Earth Magnet Manufacturing Production Tax Credit Act designed to incentivize production through tax credits. California's Mountain Pass mine has been reactivated, producing about 15% of global supply. MP Materials, its operator, wants to become the sole fully vertically integrated rare earth magnet producer, performing all stages of the process, and is investing in the separation and purification processes. Currently, extracted materials are shipped to China for processing – a lengthy and slow process. Turning to Europe, the EU Green Deal announced in 2020 identified rare earths as the commodity with the highest supply risk, recognizing them as necessary to meet the EU's energy transition targets. China currently supplies 98% of EU needs.[3] In January 2023, Europe's largest deposit of rare earths was discovered in Sweden, exceeding 1 million tons of rare earth oxides. Other deposits have been found in Norway and Finland. Indeed, a rare earth cluster appears to be developing in Scandinavia, including the world's third commercial-scale rare earth processing facility outside China. The geopolitical race for the control of rare earth supply chains has started. Western nations are striving for independence, although this will take time to achieve.

Rare earth mining companies: rising to the challenge

Just as the demand for rare earths looks set to ramp up, so the mining companies extracting them from the ground and processing them are improving their operations, as can be seen from their rising operating margins and returns on equity (ROE) / returns on assets (ROA). At the same time, valuations have eased back to more realistic levels (see charts). As rare earths embark on their journey to become the new oil, so the industry these companies belong to is beginning a long period of growth.

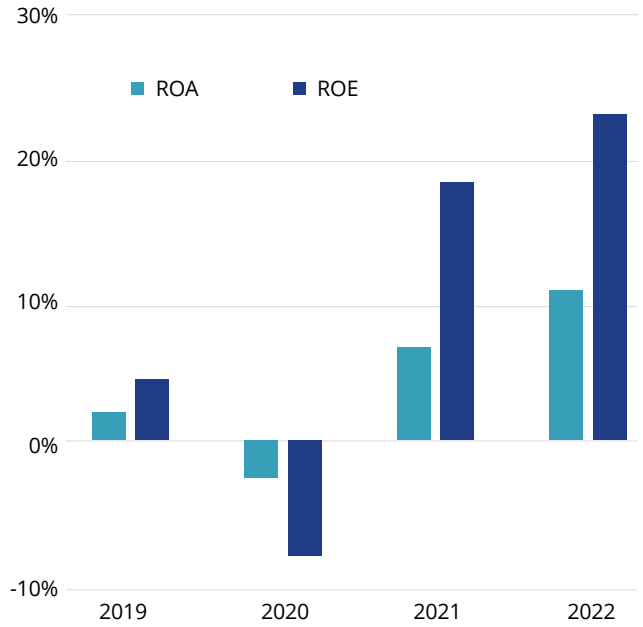
Healthy margins with positive momentum



Source: Bloomberg, VanEck, data calculated on the MVIS Global Rare Earth/Strategic Metal Index

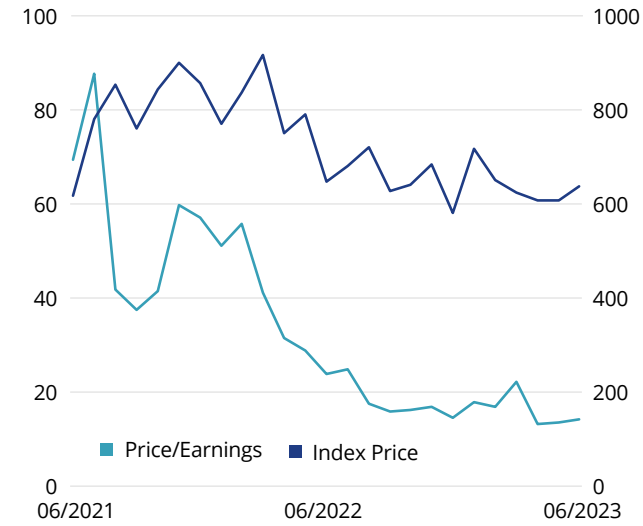
[3] European Commission

Improving financial returns



Source: Bloomberg, VanEck, data calculated on the MVIS Global Rare Earth/Strategic Metal Index

Attractive valuations



Source: Bloomberg, VanEck, data calculated on the MVIS Global Rare Earth/Strategic Metal Index

(Note: P/E = price/earnings ratio)

Valuations appear much more attractive than previous years. The index is in fact trading at a significantly lower multiple. The P/E drop in 2021 was due to an upside revision of earnings and not to a drop in index price.

A brief timeline:

Rare earths have a long history. They were discovered more than 200 years ago in Sweden, since when they have evolved to become invaluable to the modern economy.

1. **In 1787,** the chemist Carl Axel Arrhenius discovered the first rare earth: a black and dense mineral that he named ytterbite after the village of Ytterby, Sweden, where he found it.

2. **In the 19th century,** European chemists discovered more rare earths and developed the first commercial use. Carl Auer von Welsbach, a student at Heidelberg University, recognized luminescent properties in some rare earths, leading to development of a material used in cigarette lighters and ignition devices.

3. **Turning to the 20th century,** huge deposits were found at the Mountain Pass mine, California. Notably, europium was used to produce red phospors for color televisions. During the Cold War, rare earths began to be used in defense systems.

4. **In the 1970s,** China began to mine and process rare earths, growing to control almost the entire supply by 2010. Western nations reacted by increasing production and re-shoring supply chains.

Author

Alessandro Rollo

Product Manager, VanEck

Important Disclosures
For informational and advertising purposes only.

This information originates from VanEck (Europe) GmbH which has been appointed as distributor of VanEck products in Europe by the Management Company VanEck Asset Management B.V., incorporated under Dutch law and registered with the Dutch Authority for the Financial Markets (AFM). VanEck (Europe) GmbH with registered address at Kreuznacher Str. 30, 60486 Frankfurt, Germany, is a financial services provider regulated by the Federal Financial Supervisory Authority in Germany (BaFin). The information is intended only to provide general and preliminary information to investors and shall not be construed as investment, legal or tax advice. VanEck (Europe) GmbH and its associated and affiliated companies (together "VanEck") assume no liability with regards to any investment, divestment or retention decision taken by the investor on the basis of this information. The views and opinions expressed are those of the author(s) but not necessarily those of VanEck. Opinions are current as of the publication date and are subject to change with market conditions. Certain statements contained herein may constitute projections, forecasts and other forward looking statements, which do not reflect actual results. Information provided by third party sources are believed to be reliable and have not been independently verified for accuracy or completeness and cannot be guaranteed. All indices mentioned are measures of common market sectors and performance. It is not possible to invest directly in an index.

MVIS® Global Rare Earth/Strategic Metals Index is the exclusive property of MarketVector Indexes GmbH (a wholly owned subsidiary of Van Eck Associates Corporation), which has contracted with Solactive AG to maintain and calculate the Index. Solactive AG uses its best efforts to ensure that the Index is calculated correctly. Irrespective of its obligations towards MarketVector Indexes GmbH ("MarketVector"), Solactive AG has no obligation to point out errors in the Index to third parties. The VanEck Rare Earth and Strategic Metals UCITS ETF is not sponsored, endorsed, sold or promoted by MarketVector and MarketVector makes no representation regarding the advisability of investing in the Fund.

All performance information is historical and is no guarantee of future results. Investing is subject to risk, including the possible loss of principal. You must read the Prospectus and KID before investing in a fund.