

WORLD

News analysis

Greenland might break China's rare earth grip – but not on the West's timeline



Critical Metals Corp chief executive Tony Sage holding a rock sample containing rare earth minerals. At full production, the Tanbreez mine in Greenland could produce about 50 per cent of the world's heavy rare earths, he said. ST PHOTO: NG SOR LUAN

Island's remoteness, lack of infrastructure, harsh climate and tiny labour force pose challenges, but potential rewards are a powerful draw



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Much of Greenland is covered by one of the world's largest ice sheets, up to 3km thick.

Yet along its ice-free edges lie some of the planet's largest deposits of rare earth minerals, a prize that the US and Europe want to secure to reduce their dependence on China.

US President Donald Trump's push for American control of the self-governing territory within Denmark, coupled with China's weaponisation of its rare earth dominance, has made Greenland's mineral wealth a strategic priority for the West.

China's grip on global rare earth production and processing is formidable.

It accounts for more than 90 per cent of refined output and about 60 per cent of mining, making it a critical supplier for military equipment such as fighter jets and radar, as well as electric vehicles and semiconductors.

Beijing has used this leverage to block or severely limit exports of a number of critical minerals in response to US tariffs and other penalties, prompting the Trump administration to seek alternative supplies from other nations, including Australia.

China's dominance has also sparked a push for the US and Europe to beef up processing of rare earths – a group of 17 metals indispensable to modern technology.

In the US and Europe's search for reliable alternatives, Greenland fits the bill: Situated between North America and Europe, it is geographically convenient for both.

Yet unlocking the island's mineral riches will not be easy or quick, and it will be costly – partly because of Greenland's remoteness, lack of infrastructure, harsh climate and tiny labour force.

Still, the potential rewards and the desire to reduce reliance on China are proving a powerful draw for investors.

TEST CASE

On the southern tip of Greenland, near the small town of Qaortoq, is the Tanbreez deposit, one of three large rare earth deposits in the area.

Tanbreez is owned by Nasdaq-listed Critical Metals Corp, which hopes to begin production by 2029.

If the timeline holds, it will be the first of possibly several large mines to eventually supply critical minerals, including rare earths, to the world.



Drilling at the Tanbreez deposit rare earths concession near the small town of Qaortoq in Greenland. Tanbreez is owned by Nasdaq-listed Critical Metals Corp, which hopes to begin production by 2029. If the timeline holds, it will be the first of possibly several large mines to eventually supply critical minerals, including rare earths, to the world. PHOTO: COURTESY OF CRITICAL METALS CORP

The firm has already raised more than US\$100 million (\$5128 million) in funding from investors, mainly US funds. It has an offer of a low-interest US\$120 million loan from the US government's EXIM Bank and hopes to get an additional grant from the government, chief executive Tony Sage told The Sunday Times.

An extensive drilling programme has confirmed the presence of highly sought-after minerals, including gallium and hafnium. Gallium is widely used in semiconductors, while hafnium is essential for nuclear power plant control rods, superalloys for aerospace applications, and advanced microchip manufacturing.

The deposit is also rich in heavy rare earths – minerals such as dysprosium, terbium and yttrium, which are critical for making powerful magnets used in wind turbines, electric vehicle motors, and missile guidance and targeting systems.

Analysis of drilling samples showed 27 per cent of the deposit consisted of these elements. Heavy rare earths are scarce,

with China producing about 98 per cent of the global supply.

At full production, the Tanbreez mine could produce about 50 per cent of the world's heavy rare earths, Mr Sage told ST during a recent visit to Singapore to attend a mining conference.

Ms Meredith Schwartz, associate fellow for the Critical Minerals Security Programme at the Center for Strategic and International Studies (CSIS) in Washington, said: "What makes Tanbreez more attractive is its large volume of heavy rare earths, which is where the US is most lacking in its own domestic production right now, and where China has its strongest chokehold."

LONG ROAD TO PRODUCTION

Investor interest in Greenland's mining industry has increased since Mr Trump's threat to annex the island, Greenland's minister for business and mineral resources, Ms Naaja Nathanielsen, told Reuters on March 2.

The interest has come mainly from Britain, Canada and the European Union.

The past two months have been "hectic", she said, adding that the government was easing the permitting process for exploration and mining, as well as tax laws to encourage mining investment.

But the surge in interest has created a bottleneck between early-stage exploration and actual exploitation, or mining.

Tanbreez remains the only rare earths project that has been granted an exploitation licence, which allows mining, Mr Sage said.

Getting that took years of work by the project's previous owner, he added.

The other two large rare earth deposits, Kvanefeldt and Motzfeldt, also hold significant potential as major suppliers of critical minerals, but they could be years away from production.

'FRONTIER AREA'
But with rare earth supplies already under pressure, time is short – and industry experts point to substantial challenges to overcome.

Global energy and resources

consultancy Wood Mackenzie noted that Greenland is estimated to rank eighth in the world for rare earth resources. However, maximising this potential involves three challenges: its geography and harsh weather; the need to meet high environmental and social standards to overcome local opposition; and geopolitics.

"While the Greenland government has made clear it favours Western partnerships, it has warned that hesitation could force the territory to seek development support from China," Wood Mackenzie said in a January note. That would likely trigger objections from Washington and Copenhagen.

China has shown interest in developing infrastructure in Greenland in the past, including airports, but not always with success.

A Chinese firm was originally shortlisted to build an airport near Qaortoq and the Tanbreez concession. But under US pressure, the Danish government rejected the Chinese bid and opted to fund the project instead.

In 2024, US and Danish officials lobbied the previous owner of the

Tanbreez deposit not to sell the project to Chinese interests, opening the way for Critical Metals Corp to acquire it in stages.

Yet, Greenland lacks large ports, and has less than 200km of roads and limited power supplies.

Further north, the brutal winter and sea ice block access. "It's going to take long-term infrastructure investment, and with the rare earth supply crunch we're looking at, we need short-term solutions," said CSIS' Ms Schwartz.

"Approving mining projects in Greenland has (also) been slow-going, and there's more mapping that needs to be done as well to really know where these deposits are," she noted.

Dr Diogo Rosa, senior researcher in economic geology at the Geological Survey of Denmark and Greenland (GEUS), said: "It's a frontier area and underexplored."

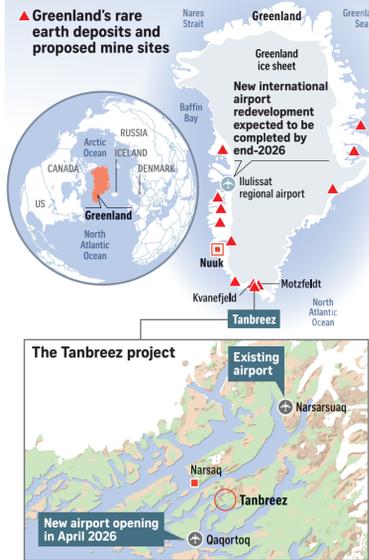
He noted that Greenland's full resource potential for rare earths and other materials, including gold, iron ore and gemstones, remains unknown. "Most places need more research and more

exploration," he told ST. GEUS estimates that the island contains 36.1 million tonnes of rare earth resources. However, the US Geological Survey estimates that only about 1.5 million tonnes are considered proven, commercially mineable reserves.

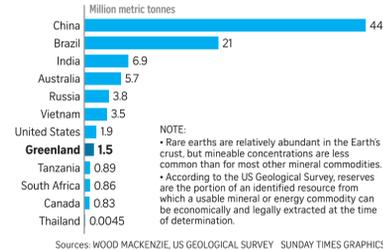
Further prospecting and testing could narrow that gap, and Greenland might become more attractive as easier to mine areas in other nations are exhausted, Dr Rosa said.

Greenland's rare earth bounty

Greenland has some of the world's largest rare earth deposits. Mining them at scale will be costly and time consuming, with the first major mine likely starting in 2029. But as demand for rare earths keeps growing, Greenland could eventually break China's stranglehold on these critical minerals.



Rare earth reserves by country or territory



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NEXT STEPS

For now, much depends on Greenland itself.

The government needs to deliver on its promises – such as prioritising critical mineral mining development, improving data on the island's resources and streamlining the permitting process – while respecting stringent environmental standards and consulting the local communities.

Attracting more investment for infrastructure is also vital. Without roads, ports and power, mineral deposits will be more

costly to reach and to mine. Yet Critical Metals Corp's Mr Sage is undeterred by the obstacles. "We're looking at between US\$300 million and US\$500 million to get up and running," he said.

The initial phase will develop an ore body adjacent to a deep fjord, which will allow the easy loading of mineral concentrates.

Concentrates, extracted from the rock, need further processing to separate the individual rare earth and non-rare earth metals.

Mr Sage said the next phase is to complete a pilot processing plant in Perth around June. The aim is to test the firm's processing technology.

His company has signed preliminary offtake agreements for 100 per cent of the concentrate production from the mine – a quarter will go to two US firms, half will go to a partner in Romania, and the remaining quarter to a Saudi company.

Once the concentrates are processed, the finished products will include high-purity rare earth oxides, metals and processing magnetites.

Half of the final production will go to the US and half to the EU, he said. None will go to China.

By mid-2029, the aim is to begin mining 500,000 tonnes of raw ore annually, producing up to 150,000 tonnes of heavy rare earth element concentrates.

Asked if he sees Greenland breaking China's rare earth monopoly, Mr Sage said: "100 per cent."

"While Greenland certainly holds a high-potential alternative rare earths supplier, the harsh reality is that developing a mine takes longer than Mr Trump and his team seem to believe, Mr Sage said.

Dr Rosa of GEUS added: "Mining is a high-risk, high-reward sort of business, and that takes time, especially in a remote place like Greenland."

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A woman taking a photo of an ice block in Nuuk, Greenland, on Jan 29. Greenland's ice sheet is melting quickly, contributing to global sea-level rise. PHOTO: AFP

Explainer

Slowing Atlantic current a global security threat

Greenland's location in the North Atlantic and its mineral riches make it increasingly vital for the defence and security of the US and Europe.

At the same time, warming in the Arctic is melting sea ice and opening northern shipping routes that cut travel times between East Asia and Northern Europe.

This makes Greenland and the Arctic even more important to security and global trade.

But there is another side to the story. A melting Arctic – where temperatures are increasing three to four times the global average – could create risks that become major security threats globally, scientists say.

Greenland's vast ice sheet is melting quickly, contributing to global sea-level rise.

The influx of freshwater into the North Atlantic is also contributing to a slowdown of a key Atlantic Ocean current that brings warmth to Europe and influences monsoon rains in Asia and elsewhere.

If this ocean current collapses, the consequences will be felt around the globe.

Here is a look at the risks and their implications.

HOW FAST IS GREENLAND MELTING?

Since the mid-1990s, the ice sheet has been shrinking each year, losing an average of about 140 billion tonnes of ice annually, the Geological Survey of Denmark and Greenland has said.

In 2024, it estimated that Greenland was losing 2.5 million litres of water a second – the equivalent of about three Olympic pools.

The ice sheet holds enough ice to raise sea levels by 7m, threatening the survival of coastal cities around the globe. At the current rate, it will take centuries to melt, but the worry is that increased warming will speed up ice loss.

The danger is that as temperatures keep rising, the current will slow further or stop altogether by the end of the century, recent studies say.

WHAT IS AT RISK?

The Atlantic Meridional Overturning Circulation (AMOC) is a slow-moving current that shifts huge amounts of warm water from the South Atlantic to the north.

This warmth gives much of Europe its milder climate.

The AMOC is part of a global network of currents that shift heat and nutrients around the world's oceans, playing a crucial role in regulating the planet's climate.

Imagine the Atlantic current as a giant conveyor belt. As it moves past northern Europe, the water cools. As cold water is denser than warm water, it sinks and moves southwards past Greenland.

The sinking water helps propel the current and maintain the flow of heat around the planet.

WHAT MIGHT HAPPEN?

Scientists say the current is at its slowest in more than 1,000 years. The concern is that global warming will continue to slow the current, possibly causing it to collapse by the end of this century.

"Warmer Arctic temperatures are already melting sea ice and warming the water less dense and less prone to sinking. At the same time, meltwater from Greenland is dilut-

ing saltier water in the North Atlantic. This also makes the current less prone to sinking to the depths, disrupting its flow.

Further heating of the Arctic and accelerated melting of Greenland's ice cap mean drastic changes to the current could occur within decades, scientists warn.

A collapse would cause temperatures to fall in Europe, especially in winter, and trigger more stormy weather. It would also shift global monsoon patterns, triggering widespread droughts in regions, including South Asia and Africa.

It could also hasten the melting of the West Antarctic ice sheet, pushing up global sea levels.

WHAT DO SCIENTISTS SAY?

A 2025 study published in the journal Environmental Research Letters found that the collapse of the current could no longer be considered a low-likelihood event. The more greenhouse gas emissions are produced in the coming years, the higher the chances of a collapse by 2100, the researchers said.

Separate research published in 2024 specifically pointed to meltwater from Greenland and Cana-

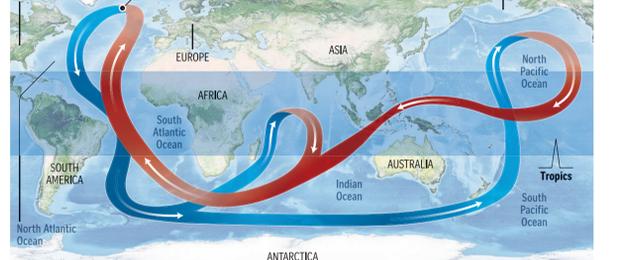
Melting ice, global impacts

The Atlantic Meridional Overturning Circulation (AMOC) is part of a network of ocean currents that distribute heat around the globe. Scientists say the AMOC is slowing down because of climate change, and that a collapse of the current would trigger devastating impacts globally.

HOW DOES THE CURRENT WORK?

• It functions like a conveyor belt, slowly moving vast amounts of warm water from the tropics to the North Atlantic, warming up the air and giving Europe its milder climate.

• Water cools as it moves towards the far north. This cold, salty water sinks to the bottom of the ocean and flows south, helping to propel the current.



WHAT ARE THE CONCERNS?

Global warming is disrupting the current in two ways:

• It is melting sea ice, warming the ocean and increasing rainfall in the far North Atlantic.

• Higher temperatures are melting Greenland's ice sheet, dumping huge amounts of fresh water into the ocean.

Both disrupt the sinking of cold salty water.

The danger is that as temperatures keep rising, the current will slow further or stop altogether by the end of the century, recent studies say.

WHAT ARE THE IMPACTS?

1. Temperatures will fall in Europe and the North Atlantic – but how much depends on the amount of global warming in the decades ahead.

2. The collapse of the AMOC will disrupt tropical monsoons in Asia and elsewhere, triggering worsening droughts.

3. Ocean temperatures will rise in the far southern Atlantic, leading to more melting of the West Antarctic ice sheet.

Sources: POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH, UNIVERSITY OF SOUTHAMPTON, UNIVERSITY OF NEW SOUTH WALES

PHOTO: ADOBE STOCK | SUNDAY TIMES GRAPHICS

dan glaciers as a major risk to the AMOC. The researchers estimated that at 2 deg C of global warming, the current would likely become a third weaker than it was 70 years ago. The world has already warmed 1.3 deg C on average since pre-industrial times.

In 2025, Iceland officially classified the potential collapse of the AMOC as a national security threat, viewing it as an existential risk to the nation's climate, economy and resilience.

"The destabilisation of AMOC is no longer a distant scenario – it's a national and global security risk," said Professor Johan Rockstrom, director of the Potsdam Institute for Climate Impact Research.

"We are entering a phase of climate change where uncertain but catastrophic risks can no longer be ignored," he said in February.

Professor Sybren Drijfhout from the University of Southampton, who is lead author of the 2025 study in the Environmental Research Letters, told The Sunday Times that the impacts will take time to be felt. "An AMOC shutdown is a slow process that takes about a hundred years to complete."

David Fogarty