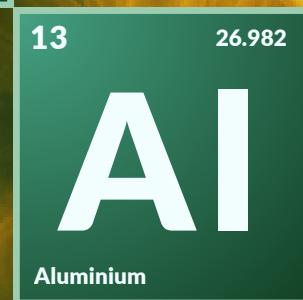
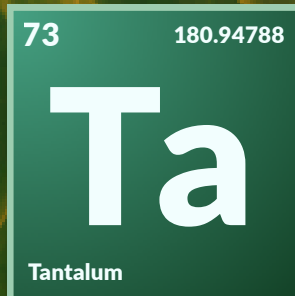


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FEATURED ARTICLES:

- Critical raw material clubs are forming, but what should they look like?
- The illusion of resource security: How refining and recycling are shifting the balance of power
- The missing link in critical minerals financing



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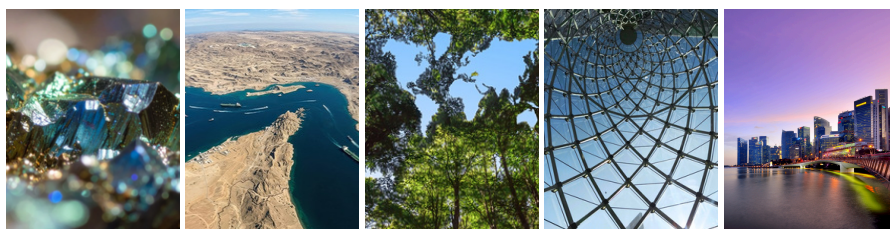
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FOREWORD

Metals and minerals

This decade, multiple forces – from the growing urgency of the energy transition and the rapid expansion of artificial intelligence (AI) and data centres to the tragic normalisation of wars and invasions – are causing critical minerals to become increasingly critical by the day.



Mahika Ravi Shankar
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Trade Finance Global (TFG)



Doğa Usanmaz
Reporter
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History is usually told as a story of human ingenuity, when in reality the technological revolution begins with the Earth's own geological endowment. From iron and magnesium to copper and calcium, our planet's crust is rich with raw materials. Civilisation, therefore, hinges on these metals and minerals that predate us by hundreds of millions of years.

The earliest account of mining dates back roughly 43,000 years. In the Ngwenya Mine in southern Africa, Stone Age humans mined hematite, an iron oxide compound, to make red pigment ochre.

In mines across France, Poland, England, and Hungary, prehistoric humans mined flint to make tools and weapons. Modern-day humans still use metals to make weapons – but in every other way, the nature of mining has changed, particularly in scale.

Global mining extracts roughly 19.4 billion metric tonnes of metals, minerals, and fuels every year. This figure from 2024 is nearly double the amount in 2000, when mining production accounted for around 11.3 billion tonnes. For critical minerals – metals and minerals deemed essential to country-specific economic needs – demand is growing exponentially.

The United Nations Conference on Trade and Development (UNCTAD) projects that for lithium and graphite – both metals that are essential for battery production – demand will increase by 353% and 131%, respectively, by 2040.

Possession of these materials relies on the Earth and its geology first, and second, on trade. If a country's natural reserves prove unlucky, bilateral trade agreements and, more recently, preferential trading blocs, determine who has access to whose resources. But what begins as the extraction of natural resources often develops into the exploitation of the environment and of the people connected to those environments.

This decade, multiple forces – from the growing urgency of the energy transition and the rapid expansion of artificial intelligence (AI) and data centres to the tragic normalisation of wars and invasions – are causing critical minerals to become increasingly critical by the day.

Some argue that the new decade has seen a move towards resource nationalism: Indonesia banned exports of nickel in 2020, China imposed strict restrictions on exports of minerals key to semiconductors and defence manufacturing, and Tanzania mandated that medium- and large-scale mining projects of 40 critical minerals lead to local value-addition.

Meanwhile, many countries whose reserves lack that natural endowment have been scrambling to form new partnerships as a means to secure access. The Group of Seven (G7) is increasingly seeking to diversify away from China (and its enduring dominance in the realm of critical minerals refining), embarking on new ventures, be it in Australia, Africa, or the Middle East.

China, however, maintains its stronghold over African mines, streamlining the metals and minerals it needs to uphold its commanding position in global manufacturing of electric vehicles (EVs) and energy transition technologies. The US' traditional allies such as the European Union (EU), who have been growing more and more cautious – and perhaps, somewhat at a loss for reliable allies – are relying on fresh free trade agreements (FTAs) to bring in the resources.

In addition to our ongoing coverage, we make this magazine largely thanks to Trade Finance Global's (TFG) venture into conferences in the trade and commodity finance space. A session – or two, or three – on critical minerals has become inevitable, but each tells a different story.

Be it one of financial innovation, environmental degradation, technological ambition, or supply chain reconfiguration, the race for critical mineral autonomy has in itself become national policy.

Essentially, this edition maps a shifting and nascently explored terrain. We begin by discussing the geopolitical scramble for resilience and diversification. Attaining these elements has become a point of national pride. Viewing through this lens, you can find Brussels' push towards friendshoring and 'conditional openness', and the emergence of critical raw material (CRM) clubs. The race for metals is not the zero-sum game that many think it is, but played as such has caused a rewriting of the very language of security – European defence spending is now entangled in its green ambition, and that knot is a persistent one.

Which leads to the environmental, social, and governance (ESG) concerns behind this new mineral order. Africa has long been victim to ruthless metal extraction, with remnants of devastating European colonial mining only decades away. Now, with China gaining access to sites in Botswana, Mali, and Tanzania, for example, African regulation is struggling to keep pace. It's certainly not the extractor-extracted dynamic we've seen – parliaments in the DRC and Mozambique have suspended illegal mining activity – but more international cooperation is essential to ensure African mining is carried out with ESG in mind.

We examine coal-fired power in Indonesia and Canada's Thor project, but a theme of Chinese dominance on supply chains pervades throughout this edition.

Finally, we'd go amiss without considering how to turn all of these into financeable projects. Banks have moved into a strategic intelligence role, spreading risk through blended finance packages and allowing more risk to be taken on. Across the globe, investors are learning over and over again that capital gravitates towards stability over liquidity, and this lesson is made intelligible when considered through the lens of minerals.

In the cartography of metals, minerals, mining, and more, we've uncovered two things. The first is that much of society operates under an anthropocentric worldview: the idea that human existence – in both a physical and spiritual sense – is the central and most important part of the universe and that we have more of a right to our planet and its abundance of resources than others.

The second, and perhaps the more enduring, is the role of multilateralism and multinationalism as almost a counterpoint to individual profit ambition. These minerals rarely benefit the countries where they are mined; an international perspective is essential for ensuring a fair distribution of wealth, or at very least, of intellectual capacity.

And collective thinking is the only way to avoid anthropocentrism, focusing instead on sustainable extraction – in the ESG sense, but also meaning we can sustainably (over a sustained period of time) extract these elements before they're all gone.

Happy reading!

And a short caveat: this edition doesn't discuss Los Pollos Hermanos; we just wanted to pay homage to the periodic table elements in the Breaking Bad poster.



CHAPTER

1

GEOPOLITICS



1.1

Critical minerals resilience and diversification

For resources so dependent on geography, there are only a few options: continue relying on concentrated and vulnerable supply chains, invest in domestic processing capacity to reshape market dynamics, or secure access at the source through partnerships.



Anis Nassar
Head of Critical Minerals
World Economic Forum (WEF)



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“Everyone talks about the minerals. There’s so many places [...],” US President Donald Trump said. “There’s no such thing as rare earth. There’s rare processing. But there’s so much rare earth, then to get to this rare earth, you have to go through hundreds of feet of ice.”

The Trump administration has intentionally moved to end the US dependence on foreign states for critical minerals. The US is 100% import-reliant on at least 15 critical minerals, with 70% of US rare earth imports coming from China.

Trump’s speech above, made at the World Economic Forum (WEF) in

Davos, Switzerland, in January 2026, came just a week before he announced Project Vault, a \$10 billion initiative to establish a US Strategic Critical Minerals Reserve.

But what are critical minerals? Are they really rare? And why are they such a sensitive subject geopolitically?

Trade Finance Global (TFG) recently hosted the inaugural TFG Singapore, where they sat down with Anis Nassar, Head of Critical Minerals at the World Economic Forum (WEF), to discuss what makes a mineral critical, the existing monopolies, and the economic difficulties of breaking into the supply chain.

What are critical minerals and are they rare?

There is no standard definition for critical minerals. The US government’s most recent list names 50, whereas the UK government lists just 22, excluding a group classed as rare-earth elements.

While each country is free to define a critical mineral, the definition broadly follows two main axes: application and supply chain resilience.

Firstly, critical minerals have strategic applications in sensitive industries, including technology, energy, semiconductors, aerospace, defence, and artificial intelligence (AI) data centres.

Secondly, critical minerals have vulnerable supply chains. That can be a lack of available volume in the short and long term, but it can also refer to concentration at the extraction, processing, or manufacturing stages.

A good rule of thumb is “if it’s used in strategic applications and supply is vulnerable, then it is often defined as critical,” said Nassar.

Rare-earth elements are a subset of critical minerals. There are 17 naturally occurring rare earth elements, the 15 lanthanides of the periodic table, plus scandium and yttrium. Though abundant throughout the Earth, they are widely scattered and rarely found in the necessary concentrations needed to make mining viable. That dispersion has given them the name ‘rare’.

Although they are often discussed as ‘minerals’, it is in their metallic forms that rare-earth elements are used for their distinct properties that have applications for lasers, glass, magnets, industry, and are found in everything from MRI machines to TV screens.

China’s geology dominates, having 48% of known rare-earth element reserves globally. Brazil follows with 23%, then India with 8%, Australia with 6%, Russia and Vietnam with 4%, and the US with 2%.

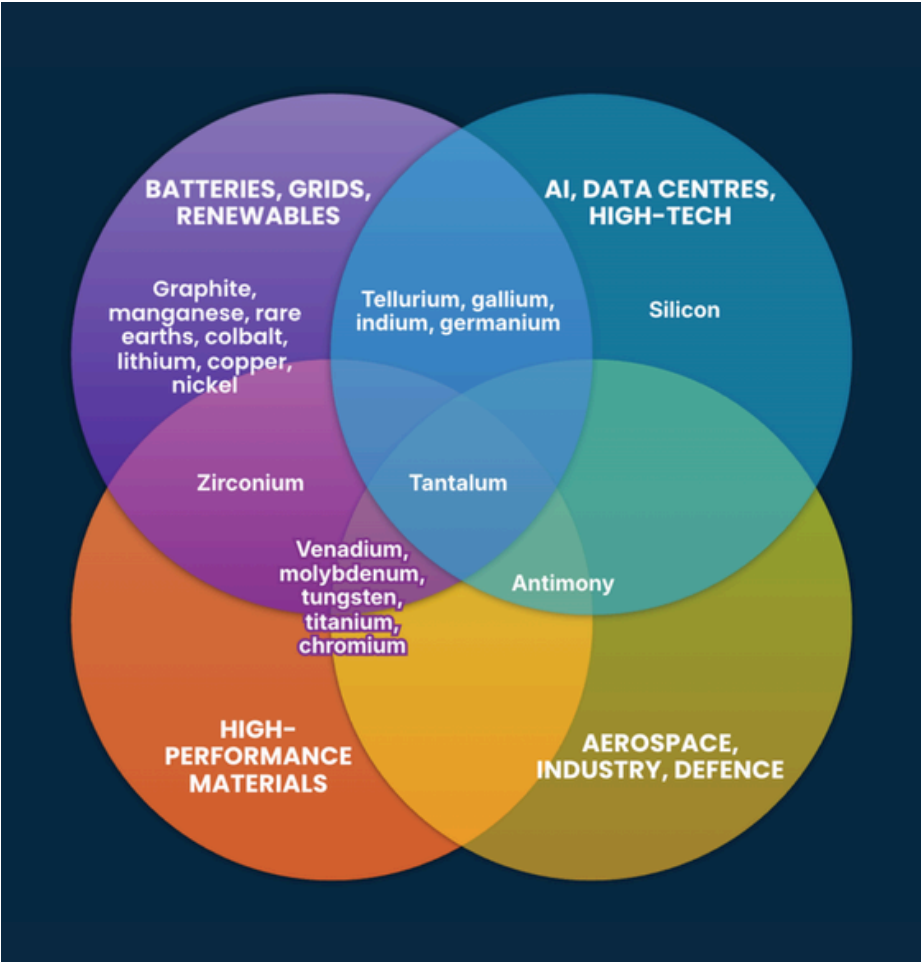
But China’s natural reserves pale in comparison with its production and refining facilities. The International Energy Agency (IEA) analysed 20 energy-related, multisectoral minerals that play a vital role across several crucial sectors. China is the dominant refiner for 19 of the 20 minerals analysed, with an average market share of 70%.

Given US geopolitical interests, it is reasonable to assume that efforts to diversify critical mineral supply chains are intended to reduce dependence on China.

In the global context, diversification can be understood as a strategy for building resilient value chains and minimising chokepoints. Given the complexity and specialisation of mineral value chains, it would be neither efficient nor practical for each and every economy to develop all stages of each mineral value chain domestically. Instead, the objective is to strike a resilient balance: strengthening supply chain security by increasing diversification while maintaining efficient and open international trade.

The flailing economics of critical minerals

The demand for critical minerals has soared. Electric vehicles (EVs), AI data centres, the rapid expansion of grid investment, and defence spending have all driven demand for critical minerals. The energy sector has accounted for 85% of all growth in demand for battery metals, which include lithium, nickel, cobalt, and graphite.



A diagram of some of the most common critical minerals and their industry usage. Designed by Trade Finance Global (TFG). Sources: IEA, WEF

In 2024, lithium demand rose by nearly 30% – compared with a 10% annual growth rate in the 2010s – and demand for nickel, cobalt, graphite, and rare earths increased by 6–8% in the same period. The energy sector accounted for 85% of the growth.

However, supply growth for battery metals has kept up with demand, leading to a decline in prices. Since 2020, supply growth has been twice the growth rates seen in the late 2010s. Following the sharp price surges in 2021 and 2022, prices for key energy minerals have continued to decline. Lithium has fallen by 80% since 2023.

“Currently, processing is very concentrated for many minerals, and prices do not always reflect the cost of processing. Many smelters and processing facilities are closing,” Nassar explained.

Investment momentum is not growing at the necessary speed

Spending for critical minerals rose just 5% in 2024, down from 14% in 2023. Real investment growth was even lower, at just 2% when adjusted for cost inflation.

For many minerals, risk profiles do not align with investor requirements. High upfront capital needs, policy uncertainty, long development timelines, and weak revenue make projects difficult to underwrite.

For instance, despite the projected copper supply shortfall of 30% by 2035, the subject of much discussion, investment will fall short first: projections indicate a \$250 billion gap by 2030.

The problem is that “different mineral markets have different economics,” as Nassar put it.

Most markets have to deal with a long lead time from exploration, finding the deposits, and bringing minerals to the market. That already makes the economics complex.

But emerging markets, such as the lithium market, have high price volatility on top of that, so price stabilisation tools like price floors or offtake agreements are helpful. In other, highly concentrated markets, such as rare earths, government procurement can bring stability and a long-term horizon to contracts.

Growth is occurring mainly in incumbent markets.

Despite the importance of diversifying the extraction and processing of minerals, growth is coming mainly from incumbent markets. For example, in 2024, the most recent growth from mining output stemmed from established producers: the Democratic Republic of the Congo (DRC) for cobalt, Indonesia for nickel, and China for graphite and rare earths.

The IEA’s 2025 report showed that the average market share of the top three mining countries for key energy materials rose from 73% in 2020 to 77% in 2024.

Market concentration in refining mirrored this pattern: the market share of the top three refining nations of key energy minerals rose from 82% in 2020 to 86% in 2024.

In fact, 90% of market growth for refiners is being led by the top supplier alone: Indonesia for nickel and China for cobalt, graphite, and rare earths.

That means the monopolies are big and getting bigger. And these market constraints make it extremely difficult for new entrants to step in.

This concentration, the capex intensity of the industry, and demand uncertainty “create barriers for new entrants to come in and to put money in a process that might actually be losing money,” said Nassar.

Without new entrants, the critical minerals market is vulnerable. For battery metals and rare earths, suppliers outside the dominant producer can, on average, only meet half of the remaining demand in 2035.

A sustained supply shock for battery metals could increase global average battery pack prices by as much as 40–50%.

Yet, the broken economics mean there is a lack of new entrants needed to diversify the industry away from narrow supply corridors.

However, it’s important to note that for countries already supplying critical minerals, growing demand represents a significant opportunity to expand industrial capabilities. This is particularly true for African nations such as DRC and Mozambique, where the supply of critical minerals is considered increasingly important, is being amended to meet the demands of external processing facilities, and states are reclaiming sovereign control over the mining and exports of minerals.

In Mozambique, for example, the state recently banned the export of raw and semi-processed minerals unless there is an illustrated commitment to refining locally. The ban came just after the introduction of a new law requiring the state to have at least 15% of ownership of all mining projects.

Can we trade our way out?

For resources so dependent on geography, there are only a few options: continue relying on concentrated and vulnerable supply chains, invest in domestic processing capacity to reshape market dynamics, or secure access at the source through partnerships.

Nassar explained that the geopolitical landscape surrounding critical minerals has shifted in recent years. Collaboration through multilateral institutions has increasingly given way to more agile, interest-based coalitions, with governments placing greater emphasis on economic security and supply chain resilience. A 2024 McKinsey study found that trade between ‘geopolitically distant economies’ is decreasing. Indeed, trade with ‘geopolitically distant economies’ fell 12.7%, 11.2%, and 9.6% for the US, China, and the European Union (EU)/ UK, respectively, in 2017–2025.

These trends are especially pronounced with minerals. For example, China has strengthened its oversight of these value chains by requiring foreign companies to obtain export licences for components and assemblies containing China-sourced rare earth materials.

The DRC announced a four-month export halt of cobalt in February 2025. The DRC’s initiative to curb falling cobalt prices drove a surge, which peaked at a 67% price increase since the announcement of the ban.

Zimbabwe, which has 9% of the global lithium market, imposed a ban on raw lithium ore exports in December 2022. Zimbabwe’s gambit to onshore refinery paid off, with a new lithium processing plant, backed by Chinese investors, nearing completion.

“Some countries have dominant or leading positions in certain aspects of those value chains, and they can use this leading position in any kind of economic negotiation, and this can create barriers to trade,” Nassar explained. He highlighted how, similarly, countries that are aiming to develop their processing industry may enact raw ore export restrictions. These conditions can create barriers to trade.

As governments increasingly intervene across mineral value chains, developing new extraction and processing capacity will require more than market forces alone. The WEF’s 2026 white paper on critical minerals bankability sets out six policy instruments necessary to bridge the gap between market needs and investable projects: upfront capital support, offtake and demand anchors, risk mitigation, and tax and royalty mechanisms.

These instruments can reduce investment risk and the fiscal burden for projects, which could enable market entrants to set up.

In March 2025, Trump’s executive order hammered the need for domestic supply chains, prioritising mineral production activities over other activities on federal lands that hold critical mineral deposits.

However, the order also set aside dedicated financing, loans, and investment support and a directive to collaborate with private industry to ensure a stable and resilient domestic supply chain.

The Group of Seven (G7) recently made similar recommendations in its communique.

Geology determines where critical minerals are found, but the value chain they support are global. While mineral deposits are fixed, processing capacity, investment, and industrial partnerships are not. The next chapter of the critical minerals race will be shaped not only by national resource endowments but by who builds the capabilities to transform raw materials into strategic inputs.

Avoiding a wave of resource nationalism and fostering international collaboration will be essential. By combining targeted public financing with international partnerships, governments, and industry have an opportunity to broaden participation in critical mineral value chains, reducing concentration risks while preserving the benefits of an interconnected global market.



Credit: whitehouse.gov



1.2

Brussels is betting on a new trading order of friendshoring and conditional openness



John Ferguson
Head of the Future of
Trade Initiative
Economist Impact

Trade is now increasingly an instrument of statecraft, with export controls, sanctions, and tariffs used for a variety of objectives. The European Union (EU) sits at the centre of geopolitical and trade dynamics as it deals with an unreliable US administration.

The post-war liberal trading system isn't simply fraying. It is being deliberately replaced, and Brussels is doing the replacing.

In globalisation's previous chapter, the prevailing logic was that trade should be liberalised. Goods flowed where costs were lowest, capital moved where returns were highest. The predictable, rules-based system that governed global trade is now over.

Trade is now increasingly an instrument of statecraft, with export controls, sanctions, and tariffs used for a variety of objectives. The European Union (EU) sits at the centre of geopolitical and trade dynamics as it deals with an unreliable US administration.

At the same time, in globalisation's newest chapter, the EU is attempting to craft a new trade order with like-minded partners.

EU-US trade relations are set to deteriorate further

The latest collapse of EU-US trade talks underlines just how dramatically the global trade landscape has shifted. The European Parliament voted in late March to advance a revised version of the framework deal agreed in July 2025, one that would see the EU accept a 15% blanket tariff and lower tariffs to zero on a range of American imports.

The EU trade commissioner, Maroš Šefčovič, also visited the US in late April and signalled that the EU could implement its side of the deal by June if talks went well.

This all changed in early May as US President Donald Trump threatened 25% tariffs on European cars and trucks. Trump accused the EU of not fully complying with the trade deal agreed last year, placing increasing uncertainty back into the trade relationship.

Ongoing trade uncertainty, combined with US threats over potential digital services taxes in Europe, will constrain investment and business sentiment in 2026 – at a time when growth is weakened by the conflict in the Middle East and the subsequent energy price shock.

For the EU, this is the latest sign that the US is no longer a reliable trade partner. Brussels, in response, is now building a new way of navigating global trade; with implications beyond the transatlantic relationship.

Friendshoring first

The centrepiece of the EU's response to today's trading system is diversification. Europe is expanding trade ties with both new and existing partners, reflecting a broader strategic shift.

Recent trade deals with Mercosur, India, and Australia show Brussels' determination to build a rules-based trading system, focused on deepening ties with like-minded countries.

The proposed Industrial Accelerator Act (IAA), a broad legislative programme intended to strengthen Europe's industrial base and speed EU countries' green transitions, would mark a significant shift. It would build preferential treatment for trade agreement partners. Its guiding principle is friendshoring: aligning supply chains and investment with trusted geopolitical partners.

The IAA's most consequential provisions concern local-content rules. Under Chapter 3, goods from countries with free trade agreements (FTAs) with the EU, or those that participate in existing origin-cumulation frameworks, would count as having 'union origin'.

In effect, goods from partner countries would be treated as European for the purposes of procurement and industrial policy; goods from non-partners would not. This may sound 'just' technical. In fact, it would fundamentally redefine what it means to stand inside or outside Europe's economic sphere.

These include joint ventures with EU firms, the sharing of intellectual property, and commitments to local research and development. The aim is not to exclude foreign capital, but to ensure it operates on European terms. Countries with existing trade agreements would be exempt.

Selectively protectionist, conditionally open

Brussels is accelerating negotiations with like-minded partners and exploring closer ties with Canada, in line with Canadian President Mark Carney's "middle-powers" strategy.



Credit: SALVATORE DI NOLFI / keystone-sda.ch

The IAA also tightens conditions on foreign direct investment. For projects worth more than €100 million in strategic sectors, such as electric vehicles (EVs), solar panels, batteries, and critical raw materials, investors from countries that account for over 40% of global production would have to meet at least four of six conditions.

If enacted, the IAA would make the benefits of trade-agreement status increasingly tangible: lower barriers, better procurement access, and greater freedom for investment. For mid-sized economies, the incentive to align with the EU would become harder to ignore.



This is not the open-market idealism of globalisation's previous chapter. It is something more pragmatic: a system built on shared rules, trusted partners, and the credible threat of exclusion for those that do not follow them.

The IAA's flexibility clauses are important here. Even countries with trade agreements could lose 'union origin' status if they fail to grant equal treatment to EU goods, or if Brussels judges their dependence on them to pose a supply chain risk.

The EU recognises the fragility of alliances and is building safeguards into the system accordingly. The IAA, therefore, amounts to a blend of protectionism and selective openness towards preferred partners.

The stakes beyond Brussels

None of this is happening in isolation. The weaponisation of trade and economic interdependence has made the old rules-based order increasingly untenable.

The world is not dividing into neat blocs; the reality is messier and more expensive. Instead, it is fragmenting along lines of trust and political alignment, and those divisions are hardening.

Companies that treat this as a temporary disruption rather than a structural shift risk being caught out.

What Brussels is constructing is less 'Fortress Europe' – where EU policies focus on strict border controls and self-containment – and more a preferential network: open to those that accept its rules, increasingly costly for those that do not.

The post-war liberal order rested on the premise that openness benefited everyone. The emerging order rests on a different assumption: one that champions that trust must be earned, and that alignment brings advantages.

The EU has decided it wants to shape those rules, rather than merely follow them.



1.3

Critical raw material clubs are coming, but what should they look like?

Policy makers have increasingly turned their attention to critical raw material (CRM) ‘clubs’: formal arrangements among groups of countries organised around access, production, processing, trade, and other aspects of critical commodities and associated value chains.

Critical mineral supply chains are globally concentrated. China’s dominant position in the mining, processing, refining, and manufacturing stages of several critical raw material value chains has long been recognised, and by many, feared.

In the West, China’s demonstrated willingness to use its dominant position through export controls and other trade measures has intensified concerns about economic security, supply chain resilience, and strategic dependence.

Against this backdrop, policymakers have increasingly turned their attention to critical raw material (CRM) ‘clubs’: formal arrangements among groups of countries organised around access, production, processing, trade, and other aspects of critical commodities and associated value chains. This can be seen in the European Union (EU) Minerals Security Partnership, the Group of 7 (G7) critical minerals initiatives, the US-Japan critical minerals agreement, and various free trade agreements (FTAs).



Simon Schropp
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Whether described as mineral security partnerships, friend-shoring arrangements, strategic supply chain alliances, or mineral security unions, the underlying idea is broadly similar: a heterogeneous group of countries – producers, refiners, processors, manufacturers, and consumers alike – commits to cooperate closely in order to reduce vulnerabilities associated with highly concentrated supply chains.

Why clubs?

The objectives behind CRM clubs are generally well understood. Governments seek to diversify sources of supply, encourage investment in mining and processing capacity, facilitate domestic and foreign direct investment, and reduce dependence on geopolitical rivals. They improve transparency across value chains, coordinate responses to disruptions, and strengthen long-term resilience.

In some cases, the ambition extends further to fostering entirely new CRM value chains among trusted partners. Possible metrics of success include reduced concentration by value chain stage, bankable non-dominant capacity, stockpile coverage, time to replace disrupted supply, or crisis-allocation reliability.

Most of the discussion to date has focused on why such clubs are needed. Comparatively little attention has been devoted to a more difficult and arguably more relevant question: what should these clubs actually look like?

The challenges faced by CRM clubs

This question of institutional design matters because different types of ‘clubs’ solve different problems. CRM clubs should therefore be understood as institutional responses to a set of economic and strategic challenges that arise when countries attempt to diversify supply, reduce dependencies, and build more resilient critical mineral value chains.

Consider the following – non-exhaustive – list of economic and strategic challenges that CRM clubs must solve.

These challenges reflect different underlying economic problems such as information failures, coordination failures, commitment problems, and distributional and collective action problems:

- A central challenge concerns the relationship between producer and consumer countries. Consumer countries seek reliable access to critical minerals at predictable prices and with minimal risk of disruptions. Producer countries, on their end, tend to seek investment, technology transfer, local value creation, and participation in higher-value stages of the supply chain. While both may support diversification and resilience in principle, disagreements over how costs, risks, and benefits should be distributed are pre-programmed.
- These tensions are compounded by the economics of CRM value chains. New mines, processing facilities, refineries, transportation infrastructure, and downstream manufacturing plants require substantial capital expenditures and long investment horizons. These investments are frequently interdependent. Mining projects may not proceed without processing capacity; processing facilities may not be viable without guaranteed feedstock; manufacturers may hesitate to commit without confidence in future supply. This vicious circle can result in underinvestment, even though all participants agree that diversification is desirable.
- Even where investment opportunities exist, participants face questions of credibility and commitment. Investors considering large, sunk investments are facing subsidised and sometimes state-driven price volatility that can push prices below breakeven. To make their efforts commercially viable, investors must thus rely on

certain concessions from host governments and customers alike. Private investors and firms must have confidence that contractual, regulatory, and market-access conditions – for example, in the form of price guarantees, minimum quantities, or pooled offtake – will be honoured.

However, investors must consider the possibility that governments alter policies after investments have been made. Host governments may promise cooperation during normal times but impose restrictions during shortages. Long-term supply arrangements may prove difficult to sustain when domestic political pressures intensify. Such risks can discourage investment and weaken efforts to establish alternative value chains.

- Resilience initiatives face distributional challenges. Strategic stockpiles, spare capacity, emergency procurement arrangements, and crisis-response mechanisms all require resources in exchange for protection against future disruptions. Countries may disagree over who should bear these costs. Similar questions arise during shortages: which members should receive priority access to scarce supplies, and according to what rules?
- Cutting across these challenges are additional information problems. Governments and firms along the CRM value chain frequently operate with incomplete information regarding future demand, project pipelines, processing capacity, stockpile levels, and emerging vulnerabilities. Individually rational decisions may therefore fail to produce collectively resilient outcomes.

A problem-based approach to institutional design

Looking at the information, coordination, commitment, and distributional problems that CRM clubs face, it is evident that not all of these challenges need to be addressed with the same degree of cooperation.

Nor do all challenges justify the same institutional commitments. Figure 1 develops a taxonomy of CRM clubs that links categories of economic failure to alternative institutional designs, policy instruments, and governance arrangements.

The central institutional-design question is therefore not how to create the deepest possible CRM club, but how to match the degree and type of cooperation to the economic problem being addressed.

Figure 1: Matching CRM club designs to economic problems
Functions, policy tools, and governance requirements

CRM club type	Typical tools	Economic problems addressed	Governance requirements
Transparency clubs	Geological surveys; market intelligence; supply chain mapping; early-warning systems; data-sharing platforms; regulatory dialogues	Information problems: Information asymmetries; poor visibility into supply chains; uncertainty regarding demand, supply, bottlenecks, and vulnerabilities	Data collection; reporting obligations; information-sharing protocols; secretariat functions
Coordination clubs	Investment facilitation; project pipelines; infrastructure planning; standards harmonisation; regulatory cooperation; preferential tariffs; customs cooperation; mutual recognition agreements; rules-of-origin frameworks; joint investment vehicles; subsidies discipline	Coordination problems: Underinvestment; resource nationalism and market fragmentation; coordination failures (for instance, infrastructural bottlenecks); missing complementary investments; fragmented value chains; trade and regulatory frictions	Monitoring; project oversight; financing coordination; priority-setting; regulatory coordination mechanisms
Assurance clubs	Strategic stockpiles; investment and supply commitments; long-term contracting; export-restriction disciplines; no-interruption commitments; quota exemptions; priority-access arrangements; voluntary crisis consultation procedures	Commitment problems: Hold-up and dynamic bargaining problems; policy uncertainty; export restrictions; supply insecurity; credibility and commitment problems	Verification; compliance monitoring; dispute settlement; enforcement mechanisms; crisis-management procedures

Strategic integration clubs	Joint procurement; collective stockpiles and shared reserves; common financing facilities; integrated value-chain planning; allocation mechanisms during shortages; coordinated export controls; common border measures and adjustments; common external tariffs; joint purchasing arrangements; emergency coordination and rules; crisis management mechanisms; collective response procedures	Distributional problems: Burden-sharing problems; crisis allocation; insurance failures; distributional conflicts; collective-action problems; free-riding; moral hazard	Joint decision-making; cost-allocation formulas; contribution requirements; conditional access rules; minimum preparedness obligations; delegated authority; voting rules; permanent institutions; governance of common assets
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The typology offered in Figure 1 highlights three broad implications.

First, different CRM clubs are not simply different levels of integration. They are responses to different categories of economic failure. Transparency clubs primarily address information problems. Coordination clubs address coordination failures, including underinvestment and missing complementary investments. Assurance clubs address commitment problems. Strategic integration clubs address collective-action and distributional problems.

The appropriate institutional design therefore depends less on the desire for cooperation itself than on the specific economic challenges members are seeking to tackle and overcome. And challenges may well differ by the countries involved, the mineral or product at issue, and/ or the value chain stage in need of support.

Second, the four club types correspond to progressively more demanding categories of economic failure that become increasingly consequential as value chains become more integrated and interdependent.

Information failures inhibit effective decision-making. Coordination failures risk impeding investment and value-chain development. Commitment problems may undermine confidence in future behaviour. And distributional and collective-action problems complicate crisis management and burden-sharing. These challenges are often compounding, meaning that more ambitious forms of cooperation must generally address a broader set of economic challenges than simpler arrangements.

Third, Figure 1 highlights the institutional consequences of this progression.

As countries seek to address increasingly complex economic problems, they must accept increasingly demanding governance arrangements – a catch-all term that includes legal, sovereignty, political, and administrative costs. Monitoring may require verification, verification may require enforcement, and enforcement may ultimately require joint decision-making.

In short, the more demanding the economic problem, the more demanding the governance arrangements required to address it. When it comes to CRM clubs, there is no one-size-fits-all institutional design.

The practical debate over CRM clubs should be less about whether countries should cooperate, and more about which economic problems they are meant to solve and the institutional commitments their members are prepared to sustain in order to solve them.



1.4

“Energy, security, and guns; that’s the new ESG”: Financing European defence spending



Flora Prideaux
Reporter
Trade Finance Global (TFG)

The Trump administration’s tariffs have sent a clear message to European suppliers: do not rely on the US anymore. Correspondingly, many European nations are looking to direct supply chain spending into Europe.

By 2035, European states will spend \$316 billion annually on defence equipment, marking an over 500% increase from 2014 levels, according to projections by the International Trade and Forfeiting Association (ITFA).

Defence production across Europe is already strained due to the war in Ukraine. A ramp-up of the proposed scale is unprecedented, and Europe requires a rapid and radical transformation of infrastructure, inventory, and technology.

In the second episode of ITFA’s webinar series on Funding European Security, Sean Edwards, Chairman of ITFA, hosted Tom Dunn, Chairman at Orbian; Katherine Earl, Head of Trade and Working Capital Sales at Citibank; Steve Jackman, Principal at Efficio; and Vincent Giboin, Global Trade Sales Lead: Industrials, Defence & Natural Resources at Santander Corporate and Investment Banking (CIB).

They discussed the role of trade, supply chain finance (SCF), and innovative financing solutions in scaling Europe’s defence capacity.

Supply chains for peace and war

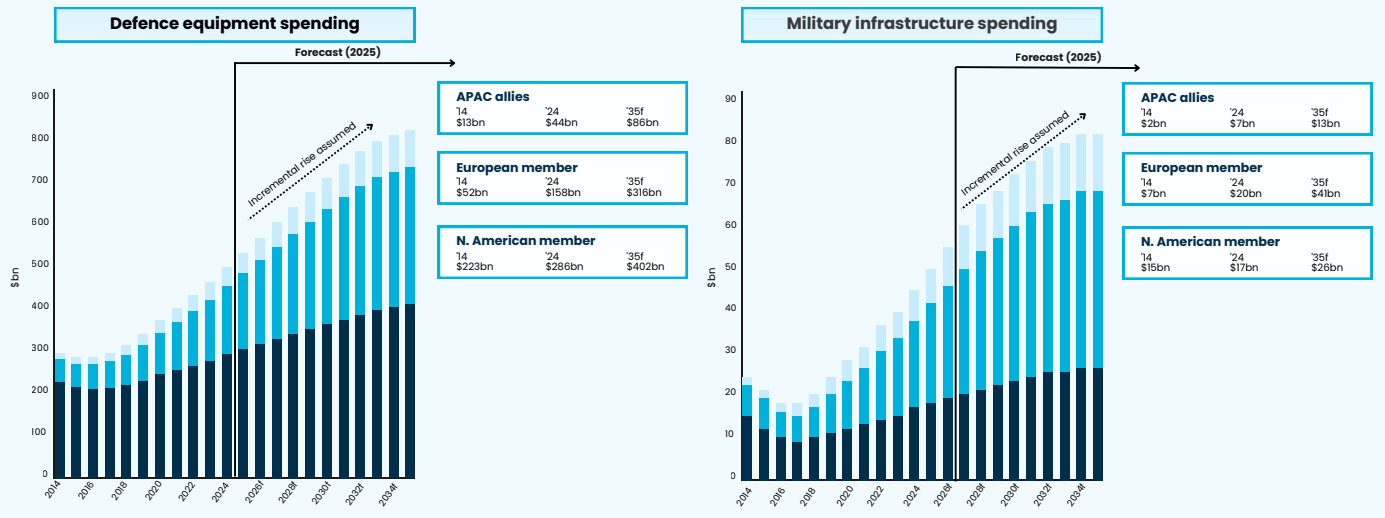
Defence spending, as a system, is highly capital-intensive and politically sensitive, requiring secrecy around supply chain contracts. For decades, Western governments have relied on ‘primes’ as a procurement strategy.

‘Primes’, also known as prime defence contractors, are major military providers with a direct contractual relationship with governments, including Lockheed Martin, BAE Systems, Boeing, and Northrop Grumman.

Primes are brokered between tier 2 and tier 3 suppliers, usually small and medium-sized enterprises (SMEs) and governments, picking up

Projected defence and military infrastructure spending in Europe and NATO allies through 2035

NATO members & APAC allies – Estimated 2014–2035f real defence equipment & infrastructure spending (2024 USD prices)



Source: ITFA webinar series, 'Funding European Security')

financial and supply chain slack, and taking on responsibility for increasing capacity.

But this system has significant risks. The first is that a concentrated distribution setup can undermine supply chain resilience.

The second, more crucial aspect is that secrecy leads to a lack of visibility over tier 2 and tier 3 suppliers, where tier 3 suppliers may have contracts with a huge variety of tier 2 and, in turn, tier 1.

When crunch time comes, if everyone has to ramp up production at the same time, tier 3 capacity becomes constrained; tier 3 cannot fulfil all tier 2 orders, which, ultimately, impacts tier 1 output.

Jackman said this has put companies onto a "charm offensive," each vying to ensure they are the company that suppliers maintain relations with, if and when supply disruptions occur.

However, new technology is shifting this procurement hierarchy. Growing markets, including drones, technology, and ammunition, have

led to an increase in SME specialists with contracts directly with governments, explained Gilboin.

According to Earl, this is particularly true for specialised tech industries, including in cyber security and artificial intelligence (AI), where industry start-ups have accelerated development faster than conglomerates.

These start-ups, though scaling quickly, lack the balance sheet and liquidity capacity of primes, which is a problem given lengthy government procurement cycles.

Earl noted that the drawn-out process and delays in government decision-making, coupled with changing political priorities that mirror election cycles, leave little room for companies to make long-term plans, let alone scale them effectively across the supply chain.

Beyond asking governments to make long-term commitments to their defence procurement cycles, building supply chain resilience into the procurement process relies on access to financing.

"We have a supply chain that has effectively been developed in peacetime for peacetime. We are now not in peacetime," said Jackman, pointing to how the changing geopolitical landscape means existing systems for defence supply chains are no longer effective.

Innovative financing strategies for defence

Shifting supply chain demands, driven by geopolitics, mean the European Union (EU) must come up with innovative strategies that aid the current climate's needs.

SCF, a cash flow solution that unlocks working capital, enables suppliers with weaker credit ratings to leverage their customers' stronger credit ratings.

"However, supply chain financing only really kicks in once manufacturing has been completed and invoices have been issued," explained Earl.

Scaling rapidly, particularly in wartime, requires access to liquidity earlier in the process. For Earl, there are three other financing products suitable for defence contractors:

- Purchase order financing, which provides liquidity access where companies manufacture goods before they can issue invoices, perhaps due to stringent testing requirements or security protocols.
- Inventory financing, which can enable suppliers to stockpile materials, including chips and rare-earth minerals, to avoid supply chain disruptions.
- Capital expenditure (CapEx), a necessary part of infrastructure upgrading, as companies may require new factories, tools, software, and technologies to meet changing supply chain demands.

Multilateral development banks (MDBs) also play a crucial role in enabling risk-sharing, particularly through partnerships with banks to enable blended finance agreements.

The European Investment Bank (EIB) recently signed an agreement which combined EIB-backing with bank distribution capacity, enabling institutions to channel liquidity across the defence ecosystem.

Export credit agencies (ECAs) are also moving away from transaction-by-transaction support. Giboin explained that ECAs have shifted toward a guarantee of receivables, combined with bank financing, extended across multiple suppliers and contracts. This funds an ecosystem, rather than providing individual transaction-based support.

“Blended defence is not a ‘nice to have’. It’s the only way to crowd in private liquidity and reach scale,” added Giboin.

It’s not just MDBs and ECAs that are enabling a transformation in defence financing. Increasingly, independent SCF providers, such as Orbian, operate as a point of integration to maximise available funding sources.

These providers can offer financing directly to SMEs, overcoming the administrative constraints and lower credit ratings that often prevent large banks from participating.

Earl noted that non-bank investors tend to seek higher yields than multinational corporations offer, and are therefore willing to take on the high-risk, high-reward nature of SME defence companies.

How to keep the money in Europe

The Trump administration’s tariffs have sent a clear message to European suppliers: do not rely on the US anymore.

Correspondingly, many European nations are looking to direct supply chain spending into Europe.

According to Jackman, sourcing activity has become increasingly sophisticated. Historically, sourcing relied on running a competition within regulation and finding a winning supplier. In contrast, now, there is greater pre-configured engagement with suppliers to end up with the supply chain you need – not just a winning bidder.

For instance, Ukraine builds supply chains to meet demands. Ukraine’s drone supply chain has become so efficient that it isn’t merely sustaining Ukraine at war; it is now exporting drones. This is enabled through low warehouse stocks that enable quick turnarounds for technological innovations and software updates. Resource inventories, in turn, remain high to meet production demands.

In 2025, the European Commission produced a white paper on defence readiness by 2030, which centred on keeping defence spending ‘in Europe’. But even where non-European companies are contracted, in particular with South Korean suppliers, Earl emphasised that they are increasingly required to localise in Europe to ensure that the money they spend supports the economy at home.

By using their SME networks to broker prime-SME contracts within Europe, financing platforms can help facilitate defence contracts that require a set percentage of spending to be regional or local, explained Dunn.

Additionally, in a phenomenon coined ‘patriotic capital’, private investors, from individuals to private equity corporates, are looking to invest in defence spending for patriotic, nationalist, and security reasons. However, the capital structures vary hugely across Europe.

Big banks have a critical role to play, too. Global banks that operate across multiple jurisdictions have access to data that suppliers lack, and can determine who else tier 3 is supplying.

Earl highlighted how governments, including those within Europe, are reaching out to banks to find out what can be seen from their data.

Scaling up defence supply chains, although may seem necessary for many governments, comes at a cost. Banks and sovereign wealth funds moving toward defence spending means they are shifting away from environmental, social, and governance (ESG) mandates.

ITFA’s projections show that defence spending will steadily increase until 2035 – a year that coincides with many sustainability mandates and carbon-neutral targets.



1.5

Australia might be a 'safe bet' minerals partner, but its reserves lie on Indigenous land

Amidst a sunny mesh of sandals, mullets, and backpackers, Australia's global reputation often overlooks its settler-colonial history. Much of the reserves that global superpowers are chasing after rests on land that Indigenous peoples have rights to – both historically and legally.

China holds a degree of monopolistic power in critical minerals supply. It accounts for over two-thirds of global refining capacity, and makes up 70% of the US' rare earth imports. The US, whose trade practices have grown increasingly isolationist, has been working to reduce this dependency.

Over the past year, the North American superpower has signed 27 new critical minerals agreements. In February, a summit held in Washington unveiled a plan to establish a preferential trade bloc for critical minerals. A month prior, the Trump administration launched the

Developing Overseas Mineral Investments and New Allied Networks for Critical Energies (DOMINANCE) Act, which – in line with its acronym – is a legislative proposal aimed at reducing China's mineral dominance over the US and its allies.

Australia, with its own list of 31 critical minerals – in accordance with clean energy, national security, and economic prosperity needs – is home to some of the world's most abundant reserves. As the world's top producer of lithium and a resource haven for cobalt, manganese ore, and rare earths,



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it's seen as a crucial partner in the US and its allies' diversification away from China.

In October 2025, the US and Australia signed a deal committing to invest at least \$1 billion into mining and processing projects. They agreed that the deal would support \$8.5 billion of pipeline projects that boost Australia's mining and refining capabilities.

A few months later, the Aussie government launched the Australian Critical Minerals Prospectus, revealing 49 mines and 29 mid-stream processing projects seeking investment. In March, a free trade agreement (FTA) between the European Union (EU) and Australia secured European access to reserves resting in the land down under, and in May, Japan and Australia agreed to invest \$1.2 billion in the sector.

However, amidst a sunny mesh of sandals, mullets, and backpackers, Australia's global reputation often overlooks its settler-colonial history. Much of the reserves that global superpowers are chasing after rests on land that Indigenous peoples have rights to – both historically and legally.

Somebody's land

Aboriginal peoples have lived in Australia for at least 65,000 years. However, in 1788, a British fleet arrived at Sydney Cove, and the continent was declared 'terra nullius' ('nobody's land' – a phrase historically used by European imperial powers to justify the colonisation of lands inhabited by Indigenous peoples).

What followed was a century filled with widespread dispossession, frontier violence, introduced diseases, and forced assimilation practices.

But as European imperialism deteriorated and colonial systems were overridden by globalisation and a newfound appreciation for human rights, complex questions regarding co-habitation and reconciliation arose for settler-colonial societies like Australia.

A 1967 referendum decided with an overwhelming majority that the federal government would include Aboriginal people in the national census. In 1976, the Aboriginal Land Rights (Northern Territory) Act gave legal recognition to indigenous land-ownership, allowing claims to land based on traditional association.

The law established the concept of the 'inalienable freehold title', which meant land could not be sold, bought, or mined without the consent of the 'traditional' owner. It facilitated the return of around 50% of land in the Northern Territory to its original owners.

Mining on Indigenous land

A 2024 study by the Centre for Social Responsibility in Mining at the University of Queensland, Brisbane, shows that 57.8% of Australia's critical minerals projects are located in lands where Indigenous peoples have the right to negotiate. That figure reaches 79.2% when including registered native title claims that were not yet determined.

This encompasses 14 critical commodities, with high levels of overlap detected across lithium (78%), vanadium (55%), copper (44%), and zinc (44%). Manganese and titanium in particular show high intersection with Indigenous land, whereas scandium and tungsten show lower overlap.

Critical minerals mining projects occupy Indigenous land at a notably higher rate than other Australian mining projects do. Only 41.4% of all Australian mines – which includes coal and gold mining as well – cover land where Indigenous peoples hold exclusive rights or where there are co-existing rights.

According to the study, land that holds exclusive Indigenous rights makes up 26.8% of the continent's landmass, and for co-existing rights, that figure is 32.8%.

Projects planned at the time of the study overlap geographically with existing mining areas, meaning future projects are largely concentrated in the same spaces.

The researchers note that Australia's Critical Minerals Strategy (2023–2030) doesn't involve government funding designed to support Indigenous participation, despite a stated commitment to 'First Nations engagement and benefit sharing'.



Legal disputes and next steps

A legal dispute between Australian billionaire Andrew Forrest, owner of mining company Fortescue (one of the world's largest iron ore producers), and the Yindjibarndi people, the traditional owners of land in northwestern Australia, concluded in May 2026. It resulted in a victory for the Yindjibarndi, who were awarded a \$103.8 million payout.

For over a decade, Forrest's company had been generating billions of dollars in extracted iron ore from land owned by Yindjibarndi. The Yindjibarndi sought approximately \$1.26 billion in compensation, which they argued was a fraction of the profits Fortescue garnered from extraction. The payout – granted in compensation for economic and cultural losses – was “peanuts” in comparison to Fortescue's earnings over the years, as described by Wendy Hubert, a Yindjibarndi elder.

The Jabiluka uranium deposits offer another example: one of the world's largest uranium deposits sits on Kakadu National Park –

the traditional home of the Mirrar Aboriginal people. The deposits were first discovered in the 1970s, and despite disputes, mining agreements were enforced. In the 1990s, a Mirrar-led international campaign resulted in hundreds of arrests. The nearby Ranger mine closed in 2021, and the longstanding dispute came to an end in 2023, when British-Australian multi-national mining company Rio Tinto declared mining the reserve was no longer viable.

Such legal wranglings, the notable gap of First Nations perspectives from Australia's Critical Minerals Strategy, and the increased geopolitical significance of raw materials have taken centre stage in Australia in recent months.

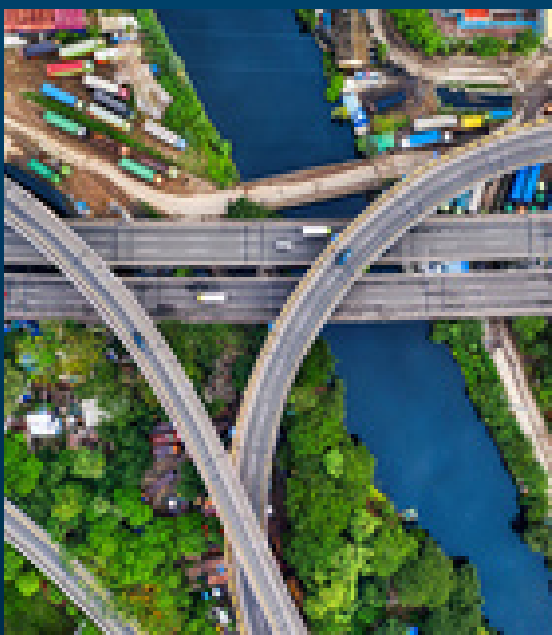
In late June, traditional owners, Indigenous rights groups, government agencies, financiers, and legal experts met in Melbourne to discuss the crucial role traditional owners will play in cementing Australia's position as a global leader in critical minerals.

They explored where in the critical minerals value chain traditional owners and Indigenous communities can fit, examining opportunities as Australia seeks to increase its refining capacity.

This entails policy involvement from inception and equity ownership, rather than mere compensation.

The EU-Australia FTA highlights the rights of Indigenous people as part of the social responsibilities lying ‘at the heart of critical raw materials trade’, and emphasises the importance of Indigenous involvement in energy transition projects. Other bilateral deals lack such explicit acknowledgement.

However, Australia's domestic policy on critical minerals underscores the need for genuine partnership with Indigenous communities. The next step is the genuine economic undertaking of this partnership.



5 JUNE 2026

Indonesia introduces state-controlled export regime for strategic commodities

Indonesia has launched a new regulatory regime, placing some of the country's most important commodities under centralised state control. The policy, announced by Indonesian President Prabowo Subianto in late May, took effect on Monday, 1 June.

Under regulations revealed this week, exports of certain commodities including palm oil, coal, and ferronickel will be routed through a new state-owned institution, PT Danantara Sumberdaya Indonesia (DSI) – a subsidiary of Indonesia's sovereign wealth fund, Danantara Indonesia.

The new approach will be implemented through a transition period lasting until the end of the year, with full compliance scheduled to begin on 1 January 2027.



1.6

Falling into a Ring of Fire: Deep-sea mining in Fiji



Mahika Ravi Shankar
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Antagonists of deep-sea mining have a nuanced, less extraction-focused outlook. The most important factor is a paucity of data, knowledge, and research. Biodiversity of the deep sea is poorly studied, so the scale of environmental degradation cannot be fully understood.

In the past week, Fiji has clashed heads with the International Seabed Authority (ISA). Concerns have been raised by civil society groups in Fiji and the wider Pacific region about their exclusion from debates on the feasibility of deep-sea mining.

Fiji, a Pacific archipelago, already has the legal machinery in place to allow deep-sea mining. Fiji issued their International Seabed Mineral Management Decree in 2013, and the country is a sponsoring state under the UN Convention on the Law of the Sea (UNCLOS). This enables Fijian entities to explore or exploit seabed minerals in a defined area, subject to contracts with the ISA.

This sets up a process, and Fiji is one of only a handful of small island developing states (SIDSs) which have previously issued licenses for seabed mineral exploration. But Fiji has taken a deliberately cautious approach to deep-sea mining: issuing a moratorium, it walks one step behind the timeline set by the ISA, waiting to better understand the true environmental consequences that deep-sea mining processes could have.

The ISA has spent years negotiating an international 'Mining Code' – the exploitation regulations that would govern commercial deep-sea mining beyond national jurisdiction – but

repeated Council sessions, the latest in March 2026, have ended without agreement. A bloc of more than 30 countries is now pushing for an outright moratorium or pause.

And as ever, the US – which is outside the ISA altogether – presses ahead with its own national deep-sea mining initiatives, regardless of the multilateral process.

Why mine the deep sea? And why not?

Deposits from the deep-ocean floor (usually over 1,000 metres below the surface) contain a number of minerals that are considered critical to modern technology.

Polymetallic nodules are the most sought-after deposits by proponents of deep-sea mining. On land, deposits only provide access to one

element; by contrast, polymetallic nodules contain manganese, nickel, cobalt, and copper. One patch of the Eastern Pacific Zone contains enough of these minerals to produce batteries for 280 million electric vehicles (EVs). This total battery storage capacity (roughly 16 terawatt-hours (TWh)) would be roughly enough to power 6.2 million UK homes for a year.

Other deep-sea mineral deposit types include seafloor massive sulphides (SMSs) – where copper, lead, zinc, and gold can be found – or cobalt-rich crusts (CRCs) – which contain precipitation of manganese and iron from cold seawater crusts.

To date, the ISA has issued 31 exploration contracts: 19 for polymetallic nodules covering, seven for SMSs, and five for CRCs.

But antagonists of deep-sea mining have a far more nuanced, less extraction-focused outlook. The most important factor is a paucity of data, knowledge, and research. Biodiversity of the deep sea is poorly studied, so the scale of environmental degradation cannot be fully understood.

Still, the many who have attempted to understand have identified the following factors:

- The destruction of seabed habitats and the death of associated fauna such as deep-water corals and sponges, organisms that are notably slow-growing and long-lived.
- Remaining habitats are altered by changing mineral and sediment composition, geomorphology, and biogeochemical processes.
- The creation of sediment plumes either during seafloor excavation or when excess water and sediment are discharged from surface vessels. These plumes can persist in suspension for as long as a year in nodule fields.

- The discharge of tailings – largely seawater mixed with mineral traces and sediment – back into the water column introduces sediment and dissolved metals. Dewatering can cloud the water and reduce oxygen levels – a cause for concern among fisheries.
- Seabed sediments are recognised as major carbon stores – holding roughly twice as much organic carbon as terrestrial soils. Disturbing these sediments risks releasing stored carbon back into the water as carbon dioxide (CO₂), compounding climate change.
- Once extracted, the transportation of minerals by ship to shore-based processing facilities exacerbates all the normal environmental impacts associated with maritime transport.
- The UN has also flagged the socioeconomic impact on local communities when construction of processing facilities rebalances economies and potentially damages heritage sites.

It's enough to turn one away from the prospect entirely – or at least to hold off until more research is conducted, as Fiji has vowed to do.

In the Pacific Ring of Fire

Ask Johnny Cash, and he'll tell you that the ring of fire refers to love, but in the context of the Pacific, the Ring of Fire is a belt of volcanic and seismic activity tracing the ocean's continental plate.

A quick geography lesson: where the Pacific plate meets neighbouring plates, oceanic crust is subducted beneath them, and thousands of kilometres of volcanic arcs form behind deep ocean trenches along these margins.

This causes seawater to percolate through fissures in the ocean crust near spreading centres or subduction zones, is heated by underlying magma, and re-emerges to form vents.

As this superheated water interacts with volcanic rock, it strips away certain elements while transferring others, including sulphur, copper, zinc, gold, and iron, from the crust into the water, concentrating metals that later precipitate out as mineral-rich deposits on the seafloor. As such, the Pacific Ring of Fire overflows with critical minerals.

Fiji's exclusive economic zone lies within the wider North Fiji Basin, an area long identified by regional geologists as prospective for SMS deposits. The wider region has also been explored for polymetallic nodules and CRCs; the ISA has so far granted deep-sea mining exploration licences for more than 1.5 million square kilometres of the Pacific Ocean floor, with explicit mining licences so far granted only for Papua New Guinea.

Fijian civil society groups have been vocal in their demands for a vigilant approach to deep-sea ventures, if they should take place at all. Voreqe Bainimarama, the then-Prime Minister of Fiji, called for a 10-year moratorium on deep-sea mining, stating that this would “allow for a decade of proper scientific research of our economic zones and territorial waters.”

The current prime minister, Sitiveni Rabuka, echoes this. Rabuka has resisted pressure from civil society groups in issuing an outright ban, but has highlighted that “at the moment, we do not have a comprehensive and conclusive science report to give the leaders the comfort to lift the moratorium.” But his arm may be twisted more than his predecessor's was.

“Common heritage of mankind”

Two articles in the UNCLOS are particularly relevant for the fair rolling out of deep-sea exploration.

Article 82 requires coastal states to share, via the International Seabed Authority, a rising percentage of revenue (from 1% in year six to a cap of 7% from year 12) earned from mining the extended continental shelf beyond 200 nautical miles. Developing importer states are exempt, and proceeds are redistributed equitably to developing and land-locked nations.

Article 150 sets out the guiding principles for exploiting the deep seabed beyond national jurisdiction (“the Area”), framing its resources as the “common heritage of mankind” to be developed for the

benefit of all countries through orderly management, broad and non-monopolistic participation, fair pricing, and revenue-sharing and technology transfer administered by the Authority.

The US has stepped outside the multilateral system altogether. In his executive order tirade, on 24 April 2025, US President Donald Trump directed federal agencies to expedite permitting for seabed mining, both within US waters and in areas beyond national jurisdiction, through Executive Order 14285, ‘Unleashing America's Offshore Critical Minerals and Resources’.

The US has never ratified UNCLOS and is not a member of the ISA; it has instead relied on the domestic Deep Seabed Hard Mineral Resources Act of 1980 as legal justification for licensing mining in international

waters, a law originally intended only as an interim measure pending the ISA's own regulatory regime.

Around 40 countries have now announced their opposition to deep-seabed mining, including China, which has argued that any commercial exploitation carried out without ISA authorisation would violate international law. No doubt the move from Washington to accelerate deep-sea mining was an attempt to oust Chinese hegemony in the space.

Beijing has been pursuing its own seabed strategy through the existing multilateral system, notably by signing a memorandum of understanding with the Cook Islands in February 2025 to jointly research and potentially extract that country's seabed minerals.

On the flip side, US posturing threatens to erode Pacific partnerships and relations. When caught between competing powers, states like Fiji appear likely to side according to the apparent – if merely ostensible – environmental conscience.



The UNCLOS declares deep-sea minerals to be part of the “common heritage of mankind.” Fiji’s dispute with the ISA in recent days is a flare-up emblematic of a wider shared desire in favour of scientific testing before mining in uncharted waters. But with the US demonstrating no heed for international agreements, Fiji may have bigger fish to fry.

CHAPTER

2 SUSTAINABILITY



2.1

Why we should all be concerned about Africa's upcoming mining bonanza



Geoffrey Omedo
Technical Specialist for
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Historically, the romantic phase of mining has always been the beginning: the exploration, the discovery, the first dig, the precious stones, and the immediate influx of cash. But the true measure of a mine's success is not how it starts, it's how it ends. It's not just how it impacts the economy, it is also how it affects the ecosystem.

As the global energy transition heats up, one continent that we must watch carefully is Africa. The continent is known to hold significant natural resources, especially some of the most sought-after minerals, centre of current geopolitical realignments.

This is currently evolving as the relentless, triple-engine mineral demand accelerator continues to churn. This refers to the three rapidly expanding sectors that drive growing demand for critical minerals:

electric vehicles (EVs), clean energy technologies, and artificial intelligence (AI) and semiconductors.

At the centre of this is the green energy transition, guided by the 2023 United Nations Climate Change Conference (COP28) UAE Consensus deal that committed countries to reducing fossil fuel dependency in energy systems in a "just, orderly, and fair manner," as well as tripling the use of renewables and doubling energy efficiency by 2030.

The next accelerator is the exponential AI data centre revolution, and the subsequent rise in energy demand. This is now further compounded by a surge in sovereign military-defence architecture, heavily reliant on drones and other technologies that require mining.

This can only mean one thing: we are on the cusp of an unprecedented mining bonanza, much of it expected to play out on the vast, underexplored African continent. This is coming into fruition through a new mineral diplomacy order – where mining and the lack thereof determine which country is courted by which superpower.

Chinese ventures into African mines

As the West seeks to out-compete dominant Asian suitors, Africa has been the recipient of numerous betrothal proposals.

Indeed, this is why the last decade has witnessed the worst explosion of mining adventurism in Africa. Mining companies are busy exploring, exploiting, and extracting precious rocks and soil matter amidst a tense, politically charged, and weakly governed mining sector.

For instance, Chinese President Xi Jinping's 13-year-old Belt and Road Initiative has carved out a pathway that now has almost unfettered access to most African countries' mineral resources.

China controls over half of global critical minerals production, with access to key sites such as Botswana's Khoemacau copper mine, Mali's Goulamina lithium mine, and Tanzania's Ngualla rare earth mine. Chinese EV company BYD also controls six African lithium mines.

This explains the sheer dominance that China now has in the global race for the critical transition minerals – especially from Africa.

Chinese miners can be found deep in the trenches of the forested villages of South Kivu, Ituri, and Haut-Uélé in the Democratic Republic of Congo (DRC). Various cases exist where they have even been arraigned in local courts for illegal mining activities, as well as allegations of human rights violations.

They can also easily be found, relaxed and at home, deploying sophisticated heavy-duty machinery in informal artisanal and small-scale mines in the wide plains of Zamfara, Nasarawa, Niger, and Ogun States in Nigeria.

As a result, rising allegations of illegal extraction, environmental degradation, human rights abuses, and labour laws contravention are abound.

They are also heavily involved in Zimbabwe, Ghana, Mali, Zambia, and South Africa, among many other countries, and they play a prominent role in the mining sector across the entire value chain.

From dominating African mines to dominating global clean energy

This is why the statistics emerging from Asia tell a story of sheer dominance. Last year, China's internal electricity demand grew by 520 terawatt hours (TWh), with its generation from solar alone almost doubling with a 43% growth.

Electricity generation from wind power grew by 14% in 2025, as the overall increase in generation from just three sources (solar, wind, and nuclear) amounted to around 530 TWh, effectively meeting almost all the growth in demand.

Similarly, in 2025 alone, Chinese battery giants CATL and BYD held over 65% of the domestic market, which powers 70% of TVs globally, controlling more than 80% of the solar supply chain and roughly 80% of all battery manufacturing. A significant chunk of the minerals required for these components originates from Africa.

Yet, Africa's mining sector is only said to be taking off now, as many countries scramble to put in place regulatory and policy reforms to govern the sector. Of course, regulation always seems to be playing catch-up amidst increasing policy summersaults.



A new pan-African awakening?

Just last month, Kenya hosted the first meeting of ministers in charge of mining portfolios and ending raw mineral exports.

In June this year, both Kenya and Nigeria are expected to hold a second meeting in Abuja. The meeting will discuss a roadmap towards stronger continental collaboration, with many expecting a major policy announcement on value addition.

It seems that the continent's policy makers and leaders are now taking notice, and with good reason. The sector is still nascent, yet the demand for minerals is skyrocketing, and Africa needs to ratchet up its systems fast so as to catch the windfall before it is too late.

Take Nigeria, for example. The country established its mining cadastre office in 2007, in accordance with Section 5 (1) of the Nigerian Minerals and Mining Act 2007 (which is now being amended).

A review of Nigeria's electronic mining cadastre system reveals a fascinating insight: only very few mines have gone through the full cycle for the formal closure of their operations, while numerous minerals from the country are already widely circulating globally.

The pace for issuing licences and permits for new mines is rapidly accelerating, implying that continued informal, unsustainable artisanal and small-scale mining is ravaging the country.

The mineral prospectivity map, issued by the Nigerian Geological Survey Agency, paints a picture of a trove of numerous minerals potential, just from the zonation of ores related to different rock structures.

It makes one thing clear: the most populous country in Africa has its largest fraction of minerals, still untouched – buried deep in the bowels of the earth.

The situation in Nigeria mirrors that in other African countries.

In Kenya, since the pre-colonial gold mines and limestone excavations, the country's largest mining expedition has been the Kwale Mineral Sands titanium project, which came into existence in 2013 and ceased operations in December 2024 due to resource depletion.

The company and the environmental regulator are now executing their formal post-closure management, and depending on how this final stage is executed, it could easily become a model worth replicating across the continent.

From South Africa to Tanzania, there are active exploration and extraction sites for these minerals. The Shimba Mrima rangelands in East Africa represent one of the most concentrated, mineral rich corridors in the world, with both the US and China locking their eyes into the area.

Of course, the DRC, another major mining epicentre, is home to numerous strategic mineral reserves – and is estimated to be holding roughly 70% of the global supply of cobalt, in addition to unknown reserves of coltan and more.

The environmental significance of formal closure

Historically, the romantic phase of mining has always been the beginning: the exploration, the discovery, the first dig, the precious stones, and the immediate influx of cash. But the true measure of a mine's success is not how it starts, it's how it ends. It's not just how it impacts the economy, it is also how it affects the ecosystem.

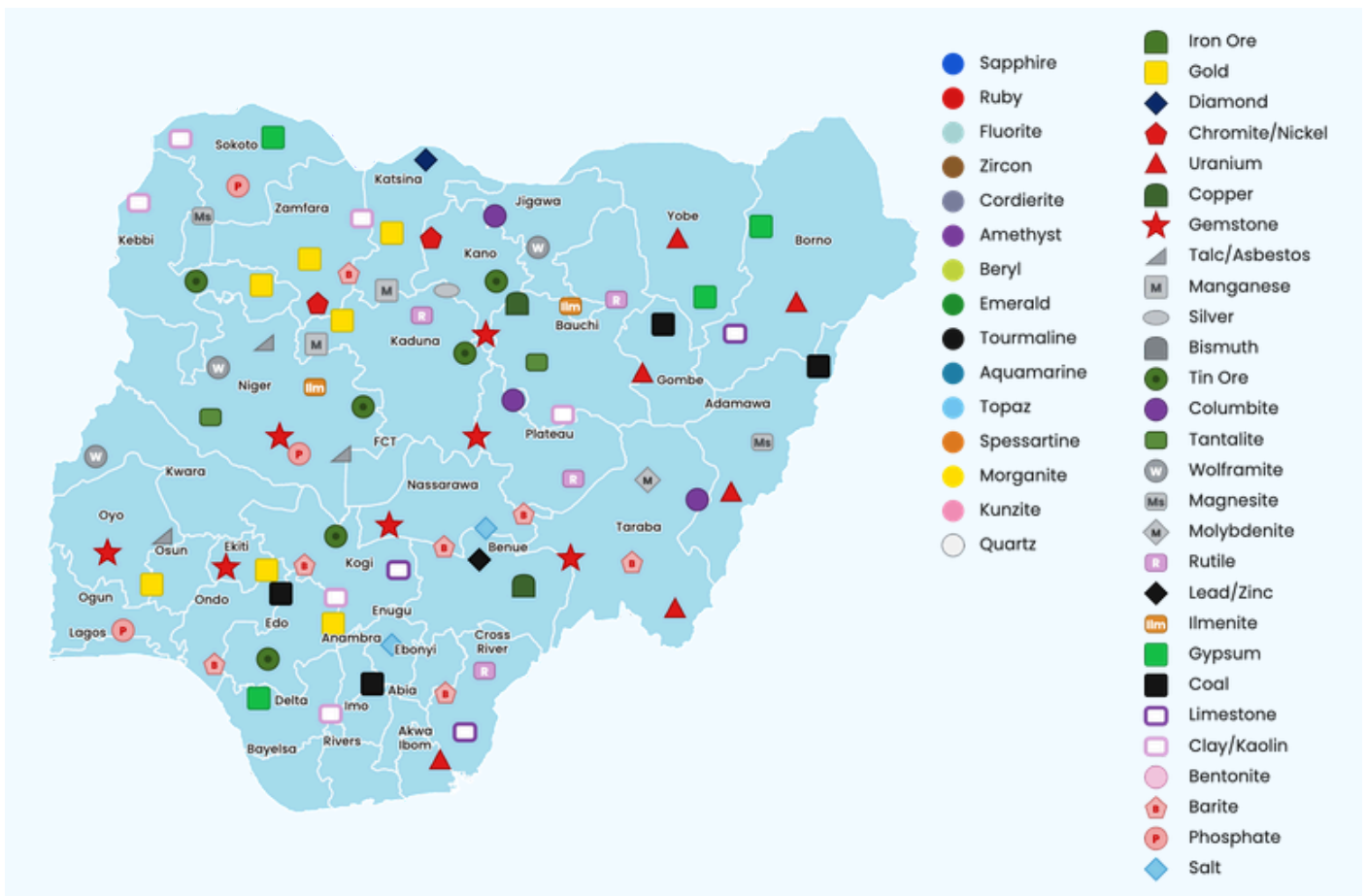
Thereby, as we watch Africa's fast-evolving mining dynamism, we must also radically shift our focus to the most critical, yet frequently neglected, dimensions of the mining lifecycle: the closure and post-closure phases.

When mining ends, operators and their business executives normally pack up – sometimes hurriedly – and rush to leave. If the mine closure is botched, the system crumbles as local communities lose their jobs and the environment crumbles.

Many environmental impacts, such as acid mine drainage, heavy metal leaching, and structural failures, can even extend to poisoning water reserves and devastating ecosystems for generations.

Africa will not survive another crisis, and unsustainable and unmanaged mine closures risks dealing the final blow to the continent's fragile biomes.

Already, the continent is ravaged by the triple planetary challenges of climate change, pollution, and biodiversity loss – it cannot afford a mining bonanza inducing even more disasters and catastrophes.



Source: Nigerian Geological Survey Agency

If left unchecked, the meagre economic windfalls expected from this mining bonanza can easily be swallowed by a century of ecological debt.

So, what must Africa do to avert such a scenario?

First, the continent must move to establish robust regulatory and policy instruments to govern the sector.

Second, massive investments in institutional and human capacity are required to enforce compliance. This is where the use of innovative financial incentives like environmental performance bonds and mine rehabilitation funds comes in.

Third, the mining bonanza can morph into an environmental tragedy. This imperative sits at the very foundation of the 2009 Africa Mining Vision (AMV), and must be actively prioritised today.

Beyond environmental, social, and governance (ESG) considerations, it's important to embed deposit bonds at the heart of all mining regulations and laws in Africa. This is because the funds from the bonds would ensure immediate restoration, rehabilitation, and reclamation.

The longer it takes to act after a mine failure, the more deleterious the impacts become to nature and communities.

Such instruments ensure that cash-strapped governments can step in and finance restoration immediately, though regulators must always remain vigilant against the moral hazard of companies treating the bond as a license to pollute.

Indeed, Africa is the bride in this evolving mineral bonanza but may well be left divorced after the honeymoon – when all her assets will be stripped away, leaving her destroyed and unable to fend for herself.



2.2

How can clean energy supply chains evolve sustainably?

The energy landscape is becoming increasingly diversified. Alongside conventional fuels, we are seeing growing demand for electrification and other clean-energy technologies, all of which depend on secure supplies of critical metals and minerals.

The unignorable urgency of the energy transition, the subsequent availability and affordability of clean energy technologies, the rise of artificial intelligence (AI) and data centres, and renewed interest in defence manufacturing all contribute to a newfound demand for certain metals and minerals.

This rise in demand inevitably influences the supply chains that sustain it, rewiring the focus of energy and commodity traders and placing increased emphasis on financing mechanisms.

Trade Finance Global's (TFG) Doğa Usanmaz recently spoke with Deia Markova, Executive Director of Finance, ESG & Strategy at BGN.

Markova dissected how metals and minerals supply chains are evolving alongside the energy transition, unpacking the key obstacles to financing and the changing nature of supply.

Doğa Usanmaz (DU): What are the key metals and minerals needed for the energy transition?

Deia Markova (DM): When discussing the energy transition, we are primarily referring to the metals required for electrification, battery production, and energy storage systems.



Deia Markova
Executive Director of
Finance, ESG &
Strategy
BGN



Doğa Usanmaz
Reporter
**Trade Finance Global
(TFG)**

Copper, for example, which is absolutely key to the energy transition, is traded in large, well-established markets with strong liquidity, transparent pricing, and developed risk-management tools.

At the same time, the energy transition also relies on a range of more specialised metals and minerals that are traded in smaller, less mature markets. These markets often have limited liquidity, fragmented supply chains, and fewer financing options. As a result, some critical materials remain considerably more challenging to trade and finance despite their growing strategic importance.

DU: Which of these critical metals and minerals face the greatest financing obstacles?

DM: The greatest financing challenges are generally found in the less liquid and less established markets rather than in mainstream metals such as copper, aluminium, or nickel. Materials such as lithium, cobalt, graphite, vanadium, tantalite, rare earths, and certain speciality battery materials often face greater obstacles because their markets are smaller, less transparent, and supported by fewer participants.

Many of these markets have historically attracted limited investment and therefore lack the liquidity, pricing transparency, and hedging tools that exist in more mature commodity markets. This creates additional challenges for producers, traders, and financiers.

However, this could also present an opportunity for traders who, rather than competing purely on scale, focus on areas where market knowledge, relationships, and structuring expertise can create differentiated value.

DU: What role do partnerships play in the metals value chain?

DM: Strategic partnerships are essential at all levels of the metals value chain. The lifecycle of a metal product involves multiple, complex processes, all the way from exploration and raw extraction through manufacturing and recycling. While international, geopolitically driven coalitions – deemed critical raw materials clubs (CRMs) – are increasingly making headlines, the end-to-end journey of a metal product requires long-term agreements between stakeholders at all phases of the value chain.

This need for cooperation is increasing and changing in nature alongside the growing demand for certain metals. For example, in 2025, electric vehicle (EV) sales exceeded 20 million, accounting for one in four cars sold and reflecting a 20% year-on-year increase. A single EV requires around 30 to 40 kilograms of nickel, and the nickel mining market size, which sat at \$56.6 billion in 2024, is anticipated to climb to \$87.8 billion over the next six years. This dramatic surge highlights the growing need for partnerships.

An end-to-end partnership between a nickel supplier and EV manufacturer bridges the gap between a mine and a car factory. EV manufacturers don't use raw nickel ore: they need battery-grade nickel, chemically converted at a refinery.

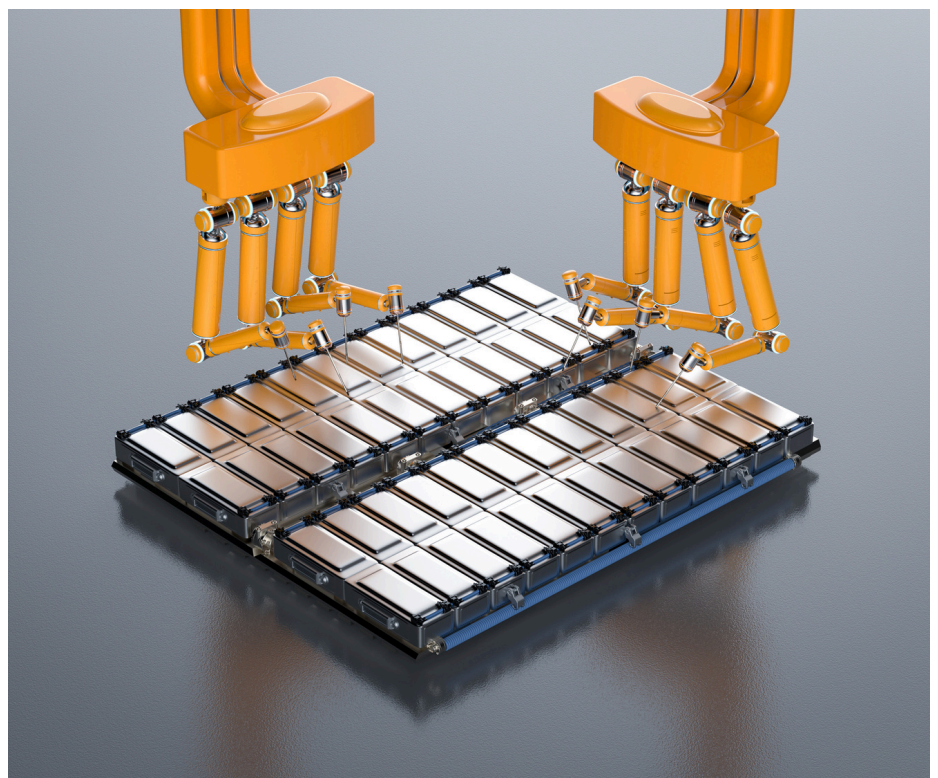
Moreover, alongside the 2025 European Extended Producer Responsibility (EPR) proposal, European policymakers are championing major recycling targets – up to 95% for certain metals like nickel.

Hence, the lifecycle of a nickel product is increasingly shifting towards a closed-loop system, where the battery-grade nickel is recycled to then be incorporated back into the supply chain. Unlike linear supply chains, where participants have traditional buyer-seller relations, stakeholders increasingly operate as partners working towards a common goal.

DU: To what extent are environmental, social, and governance (ESG) requirements helping versus hindering the development of new metals and minerals supply?

DM: I think it is important to view this within the broader context of the energy transition. What we are really seeing is a global shift towards electrification and cleaner energy systems that is fundamentally reshaping metals markets.

Technological innovation continues to influence which materials are required and in what quantities.



A good example is battery technology. The market's initial focus was on nickel-manganese-cobalt (NMC) batteries, which drove demand for nickel and cobalt. More recently, lithium iron phosphate (LFP) batteries have gained market share as manufacturers optimise for different performance and cost requirements.

The key point is that the energy transition is not a single pathway driven by one technology or one group of metals. It is a dynamic process in which technologies evolve, demand patterns shift, and new supply chains emerge.

It's also crucial to take into account the environmental impact of clean energy technology supply chains. They remain a significant source of greenhouse gas emissions, and production and manufacturing stages account for approximately 90% of emissions generated by these value chains. However, more stringent ESG requirements mean that the last phase of a metal's lifecycle is increasingly moving towards recycling, gradually decreasing the need for fresh mining projects.

According to the International Energy Agency (IEA), recycled critical minerals cause around 80% less greenhouse gas emissions than materials produced from mining do.

Moreover, trading firms are increasingly integrating carbon management into their key operations, leveraging their expertise on climate regulation such as the EU Emissions Trading System (ETS) and overseeing compliance.

DU: Why are traditional energy traders that focus on liquefied petroleum gas (LPG) and hydrocarbons increasingly entering the metals and critical minerals space?

DM: While hydrocarbons will remain an essential part of the global energy mix for many years to come, the energy landscape is becoming increasingly diversified. Alongside conventional fuels, we are seeing growing demand for electrification and other clean-energy technologies, all of which depend on secure supplies of critical metals and minerals.

The progressively more visible impacts of climate change alongside subsequently stringent ESG regulation and ambitious net-zero targets are driving this demand.

However, more stringent ESG requirements mean that the last phase of a metal's lifecycle is increasingly moving towards recycling, gradually decreasing the need for fresh mining projects.

For many, the strategy is not about moving away from traditional energy markets; it is about broadening participation across the full spectrum of the evolving energy ecosystem.

Additionally, this growing demand for metals and minerals is amplified through the rise of AI, data centres, and defence capability. Ultimately, in recent years, there have been multiple forces simultaneously boosting the need for resilient and abundant metals and minerals supply chains, leading to many energy traders shifting focus.



13 MAY 2026

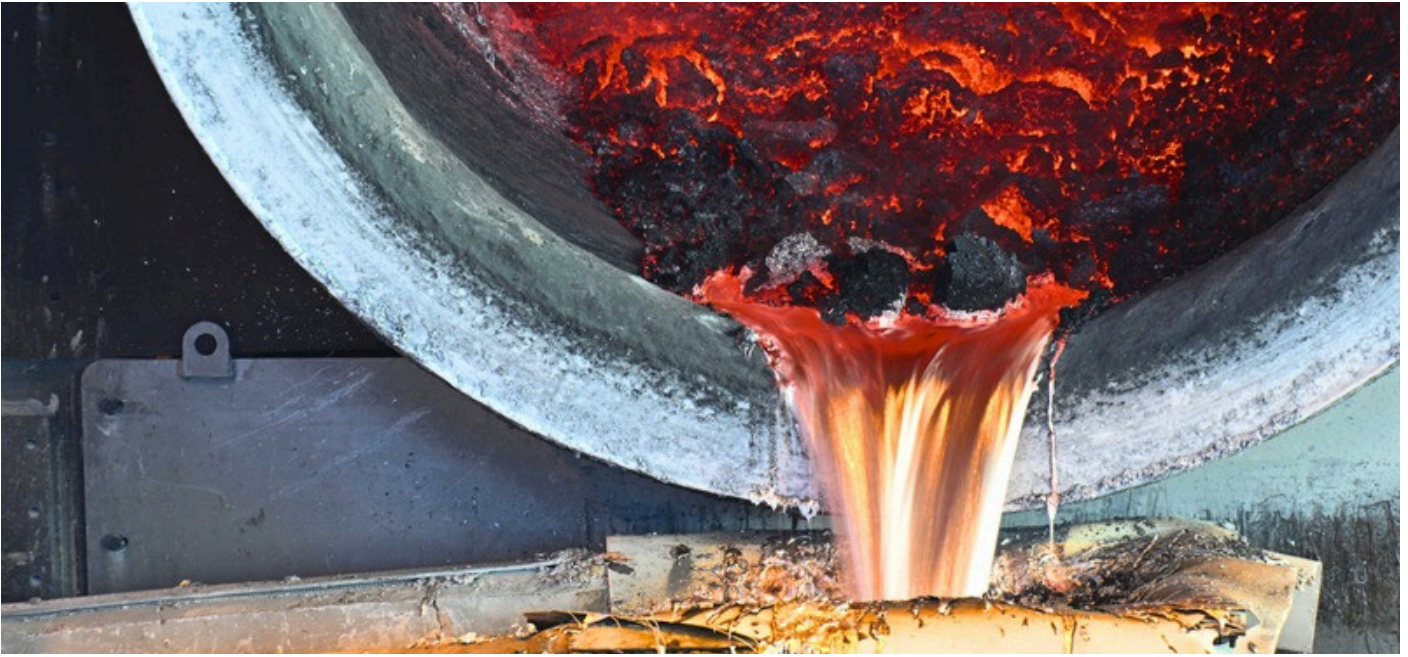
Indian energy firm Godawari signs battery deal with China's Eve Energy, as demand for energy storage grows

Chinese battery manufacturer Eve Energy agreed to supply Indian energy company Godawari with batteries to meet the rising demand for renewable energy storage.

The deal, announced on Tuesday, 12 May, involves Eve Energy initially providing eight gigawatt-hours (GWh) batteries, with potential to expand to 60 GWh in the next five years.

The agreement supports India's plan to boost its non-fossil fuel energy storage to 500 GW by 2030, which requires an estimated energy storage capacity of 411.4 GWh by 2031-32.

In December 2025, India's installed battery storage capacity sat at 1.082 GWh. To achieve its 411.4 GWh goal, the required battery energy storage system (BESS) capacity is around 236.2 GWh.



2.3

The illusion of resource security: How refining and recycling are shifting the balance of power



Alexander Peters
Chief Financial Officer
Torq Commodities

China has already established the recycling of critical metals as an effective strategic tool for hedging against volatile energy costs. The country is reaping the rewards of this forward-looking strategy in many ways, gaining a significant competitive advantage over the global market.

The global race over critical battery metals is continuously accelerating, but the decisive battle is fought not at the extraction sites but in the refining and recycling facilities.

While western industries are putting their hopes and investments into new deposits, China has long translated a fundamental insight into strategic action: whoever controls processing capacity ultimately determines prices and supply across the market.

This shift in power from resource extraction to resource processing and refining is having far-reaching consequences for the global energy transition and for Europe's economic sovereignty.

China has already established the recycling of critical metals as an effective strategic tool for hedging against volatile energy costs. The country is reaping the rewards of this forward-looking strategy in many ways, gaining a significant competitive advantage over the global market.

In the case of aluminium, for example, recycling can save up to 95% of the energy costs that would be incurred in refining primary material.

Building sovereign power through recycling

These enormous savings are not just an economic advantage. They also make Chinese producers less exposed to price fluctuations in international energy markets. At a time when energy prices have become one of the greatest sources of uncertainty in the global economy, this independence is proving invaluable.

However, the importance of recycling goes far beyond simple cost savings: it is a key component of a sustainable energy transition.

Critical battery metals such as lithium, cobalt, nickel, and rare earth elements are not available in unlimited quantities, and their extraction is often associated with significant environmental and social problems.

A well-functioning circular economy that efficiently recovers and recycles these metals reduces the demand for primary raw materials while minimising the environmental impact.

However, for many critical metals, recycling is still in its infancy. The recycling potential from waste and scrap remains below 5% for cobalt, lithium, and rare earths. And these sobering figures highlight the urgent need for technological advancements in the recovery of these essential minerals.

While efficient recycling processes have been in place for decades for metals such as aluminium and copper, the necessary technologies for recycling critical battery metals are yet to be developed, or require significant further efforts.

The International Energy Agency (IEA) forecasts that battery recycling could meet around 20 to 30% of the demand for lithium, nickel, and cobalt by 2050. However, this depends heavily on improving collection rates and developing more efficient recycling technologies.

The process behind recycling battery metals

Currently, three main processes compete in the battery recycling industry: pyrometallurgy, hydrometallurgy and so-called direct recycling.

Pyrometallurgy uses high temperatures to melt down batteries, but it is extremely energy-intensive and struggles to recover lithium,

aluminium, and manganese. Hydro-metallurgy uses chemical solvents and is less energy-intensive, but it produces significant amounts of liquid waste.

Direct recycling is considered the most promising method, as it requires the least amount of material, enables the highest rate of material recovery, and produces the lowest emissions. However, this process requires a complex sorting procedure, as it can only process one type of battery chemistry at a time.

The recycling rate of rare earths from waste streams is less than 1%. This extremely low rate is particularly problematic, as rare earths are essential for permanent magnets in electric motors and wind turbines.

However, there are encouraging developments: using innovative processes, researchers have achieved recovery rates of over 90% for neodymium and dysprosium. Such breakthroughs demonstrate that technological solutions are possible, but the path from laboratory development to industrial-scale production is long and capital-intensive.

What's holding Europe back?

While Asia is continuously expanding its refining capacity, Europe is struggling with fundamental structural disadvantages.

The combination of persistently high energy prices – largely due to import-reliance and currently at levels reminiscent of when prices skyrocketed following the Russian invasion of Ukraine – and rising labour costs, which increased by 3.3% in the euro area in the fourth quarter of 2025, makes the development of competitive refining capacity a virtually insurmountable challenge.

Energy-intensive processes, such as the smelting and refining of metals, are simply more expensive in Europe than in regions with lower energy costs.

Added to this are strict environmental regulations, which, no matter how desirable they are, further drive up production costs. The result of these unfavourable conditions is sobering: Europe remains dependent on imports for critical battery metals, even though the raw materials could, in theory, be found in its own soil or extracted through urban mining.

An Asian monopoly over refining and recycling critical battery metals

The figures speak for themselves: China controls the majority of global critical mineral refining, including 85–90% of rare earth processing and 68%, 65%, and 60% of global cobalt, nickel, and lithium refining, respectively. Together with other Asian countries, the region has established a near-monopoly that extends far beyond individual metals to encompass the entire value chain.

This dominance encapsulates not just control over production volumes, but, above all, pricing power. Those who own the smelting capacity can determine the terms on which raw materials are processed, and thus indirectly influence the market prices for the refined materials.

Experts across commodity trading agree: access to smelting capacity is now more important than simply owning mineral deposits. A country may have rich deposits of lithium, cobalt, or rare earths, but without the necessary infrastructure to process these raw materials, it remains reliant on the goodwill of those nations that possess modern smelting and refining facilities.

Not only can these countries set processing fees at their own discretion, but they can also exert political pressure by restricting access to their facilities or imposing conditions.

The risks of European dependency

This structural dependence poses significant risks to the European energy transition. Batteries for electric vehicles (EVs), stationary energy storage systems for renewable energy, electric motors for wind turbines, and numerous other key technologies underpinning the green transition require a continuous and reliable supply of high-quality processed critical metals.

Without its own, sufficiently large-scale refining capacity, Europe remains exposed not to both economic uncertainties and geopolitical risks.

In the event of international tensions or trade disputes, access to these essential materials risk being restricted or used as a political tool.

The strategic importance of processing capacity thereby becomes particularly clear when one considers the entire value chain. While the extraction of raw materials is labour-intensive and capital-intensive, it ultimately generates relatively little added value, and the real economic value lies in the downstream processing stages.

Refining, alloying, and further processing raw materials into high-quality products for industrial applications not only creates jobs requiring higher qualifications, but also generates significantly higher profit margins. China has grasped this logic and has systematically moved up the value chain.

The challenge for Europe now is to overcome this structural disadvantage.

In order to do so, what it needs is a coordinated continent-wide strategy, comprising several elements:

- Investment in energy-efficient processing technologies
- The establishment of a functioning circular economy for critical metals
- The promotion of research and development into advanced recycling technologies
- The safeguarding of a long-term energy supply at competitive prices

The takeaway is clear: anyone wishing to have a say in this new era of energy insecurity and maintain economic sovereignty must not only secure raw materials but, above all, invest heavily in processing capacity and recycling technologies.

Otherwise, despite its ambitious climate targets and technological expertise, Europe risks becoming a mere spectator in the global race for the control of green technologies.



9 JUNE 2026

Total Graphite updates Mozambique graphite project to support US battery supply chain

On Monday, 8 June, British mining company Total Graphite announced that it has changed its feasibility study for a graphite mining project in Montepuez, Mozambique, to ensure it can support a planned graphite processing facility in the US.

Graphite is the largest portion of lithium-ion batteries by weight, and one electric vehicle (EV) battery holds 50 to 100 kilogrammes of graphite. Updating the feasibility study involves aligning extraction and production practices with the requirements of the anticipated US facility, a purified spherical graphite plant.

Purified spherical graphite plants process raw flake graphite into battery-grade anode material for lithium-ion batteries through a process of micronisation, spheronisation, and purification, followed by carbon coating.



2.4

Mining suspensions in Africa following conflict and environmental degradation

The region's mineral wealth, particularly from coltan, cassiterite, and gold, has long been used to fund violence, particularly by rebel groups who establish parallel administrations across seized territories.

Illegal mining yields up to \$48 billion in criminal proceeds each year. It is also a key driver of soil erosion, deforestation, and water pollution. While certain communities view it as a way to integrate into the global economy and alleviate poverty, it has dire environmental implications and health dangers, and has even been found complicit in sustaining systems of violence and exploitation.

As a result, mining operations in certain parts of the Democratic Republic of Congo (DRC) and Mozambique have been halted in

the last few months. In DRC, this was done to combat illicit mining networks that smuggled minerals and have historically financed armed rebel groups, fueling regional conflict. In Mozambique, illegal mining operations were found to poison water drunk by local communities, causing environmental harm and a subsequent health hazard.



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Doğa Usanmaz
Reporter
Trade Finance Global (TFG)

DRC suspends mining in the east amid crackdown on illegal mining networks

The DRC suspended mining operations in its eastern province of South Kivu for three months, following growing suspicion over illicit mining activity, as revealed in a directive issued on Friday, 22 May.

This comes as concern mounts over the extraction of valuable minerals such as gold, cassiterite, and coltan, without adherence to formal regulatory standards.

During the suspension period, authorities are conducting a special inspection mission led by the General Inspectorate of Mines, anticipated to identify operators suspected of illicit mining.

The DRC is the second largest producer of copper globally, and is home to around 70% and 60% of the world's cobalt and lithium reserves, respectively. The central African nation is crucial for high-tech manufacturing and renewable energy supply chains.

According to the Congolese government, the illegal mining and export of ores sap state revenue and amplify the already increasing pressure to secure critical minerals supply chains.

The suspension is particularly important for the Mwenga and Shabunda territories, both known for prominent levels of unregulated artisanal mining activity – informal, manually-intensive small-scale mining conducted without official licensing and outside of large mining companies.

The process is often linked to social issues such as conflict, environmental degradation, child labour, and health problems.

Last year, the DRC banned the trading of minerals from artisanal mining sites, after evidence surfaced suggesting that supply from illegal mining was financing armed groups in the east.

More than 120 armed groups operate in eastern DRC, including the Rwanda-backed March 23 Movement (M23) rebel group. With its objective framed as safeguarding the Congolese Tutsi minority – who fled to the DRC following the 1994 Rwandan Genocide – the M23 controls significant mineral-heavy territories across eastern DRC.

The region's mineral wealth, particularly from coltan, cassiterite, and gold, has long been used to fund violence, particularly by rebel groups who establish parallel administrations across seized territories.

In 2024, the United Nations (UN) revealed that rebels controlling the coltan-mining region of Rubaya imposed a production tax, generating around \$300,000 in monthly revenue.

Additionally, minerals illegally mined in eastern DRC are smuggled through Rwanda, then exported to major processing countries like China.

However, the line between legitimate and illegitimate mining in the DRC is frequently blurred. A 2022 UN Security Council report documented factions within the country's national military forces collaborating with rebel armed groups to benefit from gold mining.

Just days before the recent suspension, the government revoked 90 mining titles covering mines across over 12,000 square kilometres. Officials said the permits of non-compliant or inactive operators would be recovered for new investment into mining.

Mozambique's parliament demands closure of illegal mines as mercury poisons water supply

Mozambique's parliament has called for the immediate shutdown of all illegal mining operations in the central province of Manica, after widespread mercury contamination was found in drinking water sources used by local communities.

The Parliamentary Commission of Inquiry (CPI), established in December 2025 after the country's mineral resources inspectorate found that mining activity was poisoning the Revue river and Chicamba reservoir, presented its findings to the Assembly of the Republic on Saturday, 9 May.

Analyses of the affected waterways detected not only mercury, heavily used in artisanal gold washing, but also lead, cadmium, and arsenic.

Even licensed companies flout basic environmental standards, operating without waste containment systems or restoration plans, abandoning equipment on site, and breaching labour laws.



The findings take further a 2022 study by researchers at Mozambique's Púnguè University, which found that constant burning of mercury in Manica had increased soil mercury concentrations.

Mining has been polluting nearby rivers, including the Revue, which feeds directly into the Chicamba reservoir and the region's water treatment plant.

In the Manica district alone (which has 338 small-scale mining sites, of which 288 are active), more than 10,000 people are estimated to be exposed to mercury through gold mining and refining activities; health effects include neurological damage, memory loss, personality change, and birth defects. The problems associated with mineral governance in Mozambique are not new.

In the northeastern Nampula province, criminal proceedings have been opened against four individuals allegedly involved in a deadly raid on a mining company in December.

According to a local non-government organisation (NGO), more than 40 people died in the incident, the majority of them illegal miners, though this figure is still unconfirmed.

Mozambique loses an estimated \$50 million annually to illegal trafficking in gold and precious stones, according to the Ministry of Mineral Resources and Energy.

Smuggling is also a serious concern, particularly in northern and central provinces, as a result of a weak border between Mozambique and Tanzania.

In the northernmost Niassa province, 30 to 40 kilograms of Mozambique-produced gold are lost every month.

The CPI has recommended regular independent audits of water quality, with particular attention to fish stocks. The parliamentary report calls for a stepped-up military and security presence in mining zones, tighter controls on the smuggling of explosives and hazardous chemicals across borders, and the introduction of biometric registration for artisanal miners.

It also urges a national awareness campaign on the dangers of mercury and cyanide use. The UNODC has previously warned that illicit mining proceeds feed into money laundering and terrorism financing networks, particularly in the conflict-affected north.



5 MAY 2026

ADB launches financing facility to build critical mineral supply chains across Asia-Pacific

On Sunday, 3 May, the Asian Development Bank (ADB) launched a financing facility aimed at helping Asia-Pacific (APAC) countries develop critical minerals supply chains.

The ADB facility, named the Critical Minerals-to-Manufacturing Financing Partnership, seeks to move APAC beyond mining of critical minerals and into processing, manufacturing, and recycling. The facility is split into two parts: the grant window and a catalytic finance window.

The grant window is designed to fund early project work, such as conducting feasibility studies, environmental and social assessments, and technical and information assistance. The Japanese and UK governments have committed to providing \$20 million and \$1.6 million to the grant window, respectively.

The next day, 4 May, Japan and Australia signed an agreement to increase their cooperation on energy and critical minerals, framing the deal as safeguarding against economic shocks and uncertainty.



2.5

Coal in Indonesia: Benci tapi rindu, the toxic love affair



Jeffrey Moningka
Seasoned banker

The world wants a 'green' future filled with electric vehicles (EVs), but it needs Indonesia's nickel to build them. To turn raw nickel into battery-grade material, our smelters need massive, steady heat that runs 24/7. Right now, only coal-fired captive power plants can provide that level of reliability at the scale we need.

Looking at Indonesia's Energy Minister Bahlil Lahadalia's recent statements on the enduring necessity of coal, emphasising that Indonesia will continue to rely on coal-fired power plants (PLTU) to ensure energy efficiency and keep electricity prices affordable, I found myself humming a classic melody.

It is the tune of 'Benci Tapi Rindu' (Hate but Miss You), the 1978 masterpiece written by Rinto Harahap and popularised by the legendary Diana Nasution.

The lyrics describe a volatile relationship: you push someone away when life is easy, only to realise you are desperately dependent on them the moment a crisis hits.

Our global relationship with coal mirrors that ballad. When the economic seas are calm, we talk of 'phase-outs' and 'dirty fuel'. We set aggressive net-zero targets and treat coal like a pariah. But the moment the wind stops blowing, a pipeline is sabotaged, or a geopolitical conflict sends oil prices screaming, coal becomes the prima donna again.

It's reliable, it's domestic, it's significantly more cost-effective than oil and gas, and, most importantly, it keeps the lights on.

The reality check: Energy security as a priority

The events of early 2026 have delivered a definitive wake-up call. As geopolitical tensions between Iran, Israel, and the US escalated, the Strait of Hormuz became a focal point of global instability. The threat of supply chokepoints sent Brent crude prices soaring past \$115 per barrel, and regional liquefied natural gas (LNG) benchmarks followed suit.

When imported oil and gas become instruments of war or victims of geography and geopolitics, nations must prioritise survival over climate sentiment.

We saw this in Europe in 2022, when Russian gas supply was cut off following the invasion of Ukraine. Germany and the UK were forced to lean back on coal to keep their industrial heartlands from freezing.

The recent crisis has proven that in a volatile world, you cannot abandon your most reliable domestic energy source just because its replacement is 'ready'. You must ensure that the replacement is resilient against global conflict.

A blessing in disguise for Indonesia

Indonesia is endowed with abundant coal resources, yet we remain a net importer of crude oil and liquified petroleum gas (LPG).

Every time the Middle East flares up – especially with recent tensions in the Strait of Hormuz – our trade balance is threatened, not only by the rising cost of imported fuel, but also by the sheer uncertainty of supply. For Indonesia, this global volatility is a strategic opportunity.

By utilising Indonesian coal for over 60% of our country's electricity, we create a 'strategic buffer'. Coal is a domestic resource paid for in Rupiah, protecting our foreign exchange (FX) reserves from being drained by skyrocketing global oil prices.

Indonesia's domestic market obligation (DMO) policy requires that at least a quarter of the domestically produced coal is sold in local markets. It ensures Indonesia's factories and households have a structural demand floor, keeping us insulated from the price shocks currently crippling other emerging markets.

The bottom line: the usage of coal is the primary mechanism ensuring our energy security is well-prepared and defensive.

The "captive" dilemma: Fueling the green revolution

There is a fascinating irony here: the world wants a 'green' future filled with electric vehicles (EVs), but it needs Indonesia's nickel to build them. To turn raw nickel into battery-grade material, our smelters need massive, steady heat that runs 24/7. Right now, only coal-fired captive power plants can provide that level of reliability at the scale we need.

This is the ultimate Benci Tapi Rindu scenario: the global market hates the coal we use in our factories, but it misses (and desperately needs) the nickel those factories produce. We aren't using coal because we want to be 'dirty'; we are using it because it is the only energy source strong enough to build the 'clean' future the world is asking for.

Affordable engineering: Making clean coal feasible

If we accept that coal remains part of our energy mix for the foreseeable future, the answer is not to ignore it, but to re-engineer it using affordable, modular, and doable technology. We need pragmatic engineering that fits within our national investment budgets, not billion-dollar moonshots.

This is a call to Indonesian scientists and engineers currently working overseas or at home: We need you to bring your expertise and work hand-in-hand to seek solutions. The idea is for both our diaspora and the in-country experts to act as a team – the true agents of growth.

Your collective experience is the key to turning our "Toxic Love Affair" with coal into a sustainable, sovereign partnership.

This can be achieved through cost-effective retrofitting and low capital expenditure (CAPEX) solutions:

- **Modular biomass co-firing:** Blending coal with agricultural waste using existing boiler infrastructure.
- **Efficiency upgrades:** Implementing AI-driven combustion optimisation to maximise 'MWh per gram', without building new plants.
- **Small-scale carbon capture, usage, and storage (CCUS) & gasification:** Developing localised units to capture carbon or convert coal to Dimethyl Ether (DME) and compressed natural gas (CNG), directly reducing our reliance on expensive, imported LPG. This is a vital fiscal win that protects our trade balance and reduces the national subsidy burden.

The West decarbonised after it industrialised. Asia is being asked to decarbonise while industrialising. This is a different game with different rules. We might hate the carbon footprint, but we miss the reliability the moment global supply chains break.

In an era of Hormuz-related uncertainty, our coal is our anchor to ensure our energy security is operational and effective. Let's work as a team to innovate with feasible, doable engineering, ensuring that when we finally do transition, we do so from a position of economic strength and national sovereignty, not desperation.



2.6

Beyond bauxite: Can Canada's Thor project reinvent aluminium supply chains?



Hannah Knight
Freelance writer

As in many mineral supply chains, China's role lies in the processing and production of aluminium, dominating the market with 60% of global production and producing over 40 million tonnes in 2025 alone. While these levels of production are in response to global demand, concerns over China's long-term approach towards sustainability have grown in recent years.

Aluminium is considered a critical mineral, and not for its use in kitchen foil. The metal is vital for the global transfer of goods, power transmission, and energy storage.

But its market is dependent on production from China and Australia – production which requires a notoriously energy-intensive smelting process, posing a significant challenge

for the transition to net-zero aluminium production.

The search for a greener alternative, one which spreads market concentration, has resulted in a new project funded by Canadian Energy Metals (CEM), which may offer a solution and model for the future of a more sustainable approach to mining and aluminium production in North America and worldwide.

Aluminium production: Too dirty, too dependent

Globally, the overall quality of aluminium ore grades is decreasing, the need is increasing, and the push towards sustainably obtaining materials is ever growing.

Traditional aluminium production relies on two primary processes: the extraction of bauxite ore and the subsequent production using coal-powered smelters.

Bauxite is found in tropical and sub-tropical regions, and is extracted by stripping the top layer of soil, using explosives when the overlying rock is too compacted, and removing the material with heavy machinery.

Australia is the largest bauxite producer, producing 110 million tonnes annually, generating over \$10.5 billion in exports per year. Bauxite ore extraction is a land-intensive process, and has become one of the leading causes of deforestation in the country – the root of 62% of all deforestation in South-West Australia alone.

As in many mineral supply chains, China's role lies in the processing and production of aluminium, dominating the market with 60% of global production and producing over 40 million tonnes in 2025 alone. While these levels of production are in response to global demand, concerns over China's long-term approach towards sustainability have grown in recent years.

Coal-powered smelting is the predominant method of choice, emitting high quantities of greenhouse gases (GHGs). Transition Asia, a non-profit think tank, estimates that 5% of China's overall GHG emissions stem from aluminium production, for which 70 to 80% of power generation is fuelled by coal.

In part, China's preference for coal stems from its limited ability to harness clean energy, demonstrated in the realm of hydroelectric power: a drought in Sichuan between May 2022 and 2023 led to a 25% drop in aluminium production volumes.

This critical mineral supply chain is concentrated largely in two countries for extraction and processing, with environmental repercussions for both – and for the world. The time is ripe for an alternative.

A new approach: The Thor project

The Canadian Energy Metals (CEM) Thor project aims to position itself as a “clear path to development” towards higher quality, sustainably produced aluminium-ore grades.

The project is located in the western Canadian province of Saskatchewan and covers 1,111 square miles of land. The site sits on an estimated 49.5 billion tonnes of resource, including scandium, vanadium, and 6.8 billion tonnes of aluminium: approximately one third of the global known supply of aluminium.

Unlike traditional mining – with its reliance on bauxite and the environmental externalities that come with it – this project aims to excavate polymetallic black shale as its feedstock, yielding both 3N ('three nines', or 99.9% pure aluminium oxide) chemical grade alumina and 4N ('four nines', 99.99% pure) high-purity alumina.

Processing of black shale for aluminium avoids the creation of the 'red mud' – a highly corrosive, toxic alkaline by-product created during the process of refining bauxite into aluminium.

Additionally, Canada's abundant use of hydroelectric dams and smelters means production processes can sidestep coal.

It's important to note that the black shale method also has environmental implications, primarily through acid rock drainage, where rocks containing sulphur are exposed to water and air, generating sulphuric acid and degrading water quality. However, the level of harm is much lower when compared to processing bauxite.

A preliminary economic assessment (PEA) projects an annual 1.8 million tonnes of aluminium, representing roughly 2.4% of global primary output, but with potential for strong global significance. According to the Canadian Mining Journal, at \$5,000 per tonne of 3N chemical grade alumina and \$25,000 per tonne of 4N high-purity alumina, the project boasts an estimated internal rate of return of 72% with a \$72.3 billion net value, attracting mining investment.

Can the Thor project set a precedent for the future of 'green' aluminium?

Supply chain dependency on imported bauxite, and the geopolitical and logistical exposure which that entails, does not need to be something which commodity markets have to live with. As countries like the US increasingly opt for nearshoring and friendshoring when it comes to raw materials, a North American aluminium hub could bring processes closer to home.

Beyond freedom from bauxite, in the environmental domain, the prospect of Canadian mining would allow the North American market to decrease GHG emissions through transport, saving on costs and supporting progress towards net-zero production.

In Norse mythology, Thor's hammer both destroys and builds; the CEM Thor project carries a similar duality, posing a credible challenge to one of the most carbon-intensive and geopolitically concentrated supply chains in commodities. With the right investment, it can serve as a blueprint for economies around the world.

CHAPTER

3 FINANCING



3.1

How can banks support clients in today's volatile geopolitical climate?

Supply chains are inelastic. Oil and gas traders operate in huge, fast-moving financial markets that can use existing physical workarounds, such as cross-country pipelines that bypass slow-moving shipping lanes. Minerals, on the other hand, are not so easy.

The ostensible answer is the provision of liquidity, but in the modern age, the answer is not so obvious.

The successive shocks of the COVID-19 Pandemic, the Russia-Ukraine conflict, and recent developments in the greater Middle East have infused supply chains with a structural volatility that liquidity alone cannot manage.

Combine that volatility with the rapidly developing capacity of artificial intelligence (AI) to process data at a pioneering rate, and something changes.

Banks are no longer just vending machines for liquidity. In a geopolitical crisis, banks have become clients' true operational partners.

What has stayed the same?

During the present geopolitical situation, traders turned to top-tier banks for emergency liquidity funding. Clients were broadly supported by banks, receiving six-month or one-year emergency loans.

In part, this was a lesson learned the hard way from Ukraine, just four



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years earlier. In 2022, extreme energy price swings triggered by the Russia-Ukraine conflict cascaded into a series of instant bankruptcies. Cash crunches left businesses unable to access instant liquidity. Markets responded with greater price spikes, which dragged more businesses under.

Banks and businesses learned not to overlook liquidity. Strict banking regulations have since required larger cash buffers for corporates operating in sensitive geopolitical areas, and emergency loans were built into the quotidian workflow for banks.

The cooperation of banks and traders to stabilise emerging situations is also essential. The Russia-Ukraine conflict caused an immediate shortage of gas supply to Europe, in the middle of winter, with no obvious alternatives. The uncertainty threw markets into a frenzy.

2026 has been different. The conflict in the Middle East has halted roughly 25% of the world's maritime oil trade. But that oil was to be globally distributed. Other trade routes continued to operate, and national reserves evaded an immediate supply shortage, limiting market uncertainty.

Minimal uncertainty and the predictable stability ensured by widespread bank loans and guarantees enabled the market to distribute global energy supplies in an orderly manner.

Global stability requires banks to protect immediate oil and gas funding; otherwise, they risk harming energy securities and future funding sources. But that liquidity is only one part of the picture.

How data is changing the game

For centuries, banks have served as a safe and trusted place to store money. Now, there is something more valuable in their vaults: information.

In a crisis, the first thing affected clients choose is total transparency. Treasurers can share real-time shipping data and up-to-date paperwork for negotiations, insurance applications, and contracts.

Facilitated by the physical flexibility electronic documents (e-documents) enable, banks can step in to assist with compliance checks and risk assessments, easing the administrative burden for clients.

But, crucially, e-documents have led to an exponential increase in data. With thousands of customers, banks have access to data points throughout the supply chain that individual clients cannot see.

With the development of large language models (LLMs), banks can combine client data with geopolitical updates, weather reports, credit ratings, and supply chain bottlenecks: and process that data to map risk.

That means banks have the capacity to analyse and predict liquidity needs more accurately, and avoid blowing past their own liquidity thresholds. They can analyse new supplier-buyer pathways to ensure an optimal supply of commodities, offering clients new opportunities where old ones may have collapsed.

As an example, the Middle East accounts for nearly half of all global seaborne sulphur exports. Sulphur is a key component of sulphuric acid, a chemical used in phosphate fertiliser manufacturing, uranium processing, and critical mineral extraction.

Before the conflict, sulphuric acid accounted for a significant proportion of the production of various metals.

It accounted for 3% of C1 costs (the costs of producing and selling a unit of metal) for lithium chemicals. For copper, this figure once stood at 14% of the cost of production, but has more than doubled in recent times, now standing at 30%. For lithium chemicals, the role of sulphuric acid has skyrocketed, nearly quadrupling to 11% of C1 costs since the conflict.

As such, on 1 May, pre-empting a global sulphur shortage, China, the world's largest exporter of sulphuric acid, banned all exports of the good.

But banks foresaw this domino effect. On 28 May, operations began at a large-scale sulphuric acid production plant in Kazakhstan, backed by the Swiss-based Eurochem Group. The production facility is set to have an average annual capacity of 800,000 tonnes and is accompanied by phosphate ore mining and processing facilities.

As information becomes increasingly available, banks can predict challenges with growing accuracy and reshape global supply chains before bottlenecks happen.



Building the infrastructure of the future

With presupposed geopolitical instability and the data to pre-empt what these risks may be, the maths has changed, and banks' priorities along with it. Repeated crises have accelerated the push to diversify the supply chain to prevent single-point network failures.

Banks are working with clients to target future bottlenecks. Financial institutions are actively shifting capital towards alternative projects such as local refining plants, alternative shipping routes, and green transitions to protect the global trade network.

Critical minerals are a key example. Supply chains are inelastic. Oil and gas traders operate in huge, fast-moving financial markets that can use existing physical workarounds, such as cross-country pipelines that bypass slow-moving shipping lanes. Minerals, on the other hand, are not so easy. Their origins are fixed to very specific countries, and they rely on specific containers and shipping infrastructure.

Fixing this vulnerability requires an investment that can overhaul the supply chain's direction: opening new mines and building new processing facilities.

These projects are too big and too risky for clients to ask a single bank for a loan. Instead, banks are the new project instigators. Banks can bring multiple investors together, blending private capital with government grants and insurance guarantees to facilitate projects.



On 9 March, the Inter-American Development Bank (IDB), in collaboration with Export Finance Australia (EFA) and Japan Bank for International Cooperation (JBIC), announced a financing package of up to \$1.175 billion for Rincon Mining to support the development and expansion of a lithium mining project in Salta, Argentina.

By utilising development bank capital for the most costly infrastructure demands, and \$160 million in commercial banks' capital, backed by the JBIC, risk was spread.

Blended capital arrangements bring us full circle: they enable a broad level of risk-sharing that functions where traditional financial arrangements fall short, making operating in a challenging zone, or with a geopolitically sensitive commodity, financeable.

Crises can no longer be treated as exceptional moments: after all, they now happen every two or three years. To this end, digitalisation and data, alongside partnerships with clients, have pushed the boundaries of financing. Banks now have the tools to finance initiatives to build a stronger global ecosystem.

The Middle East and other Asian regions are important growth areas, both for resources and for financing opportunities. Banks will not just look the other way and provide a line of credit from afar; they are ready to harness data to ease the bottlenecks two or three years in the future.



3.2

Salt, brine, and strategic advantage: Turkmenistan's mineral wealth and its export potential



Christopher Wizda
International
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education specialist

The iodised salt on a kitchen table in Ashgabat likely came from a facility on the Caspian shore. The fertiliser sustaining cotton fields in Mary traces back to phosphorite deposits in the east. These are small threads, but they connect to a larger industrial fabric, one the government is betting on as it tries to diversify its exports beyond gas.

Turkmenistan looks, from a distance, like a country defined by mystery and emptiness – desert, heat, and a unique ambiance, with the occasional gas pipeline disappearing into the haze. But that perception misses something.

Beneath the sunbaked flats and along the Caspian coast, a quieter economic story is playing out; one built not on hydrocarbons alone, but on salt, sulfur, phosphorites, construction stone, and a web of

brine-derived chemicals that feed industries most people never think about. Many of these minerals show up in daily life. The iodised salt on a kitchen table in Ashgabat likely came from a facility on the Caspian shore.

The fertiliser sustaining cotton fields in Mary traces back to phosphorite deposits in the east. These are small threads, but they connect to a larger industrial fabric, one the government is betting on as it tries to diversify its exports beyond gas.

Coastal mineral wealth: The Garabogazköl Basin

Garabogazköl is a shallow, hypersaline lagoon hugging the eastern shore of the Caspian Sea. Its salinity hovers around 35%, on par with the Dead Sea and roughly thirty times saltier than the Caspian. The evaporation is relentless as water flows in through a narrow strait, and the sun does the rest, concentrating salts into vast crystalline deposits that stretch to the horizon.

The lagoon is, by any measure, one of the world's largest natural reserves of sodium sulfate.

The Garabogazsulfat production association, identified by the United States Geological Survey (USGS) as one of the region's major raw material enterprises, has been harvesting these deposits since the Soviet era.

The output feeds paper mills, textile plants, and chemical processing lines. Turkmen state media claims the lagoon's resources supply more than 25 industrial sectors. That figure hasn't been independently verified, but the operational footprint is real and well-documented.

South along the coast sits Guwlyduz, the enterprise that puts Turkmen salt on the map, literally. Guwlyduz extracted nearly 57,364 tonnes of salt in just the first seven months of 2024, beating its target by 1,600 tonnes. With reserves exceeding 40 million tonnes, the plant is the leading salt producer in Central Asia and is ranked fourth globally among individual facilities, according to regional media.

A caveat: this is a facility-level ranking. At the country level, Turkmenistan doesn't crack the global top ten. China alone produced 53 million metric tonnes of salt in 2023; the US, 42 million; India, 30 million. Guwlyduz is a big salt crystal in a regional shaker. But the enterprise has been pushing into granulated and technical salts, targeting Afghanistan and other nearby markets; a shift from bulk commodity, toward something closer to value-added chemistry.

Inland mineral corridors

In inland Turkmenistan, the picture is less glamorous, but arguably more consequential for the domestic economy.

Along the southern rim, where the Kopet Dag mountains drop into the plains, there is limestone, gypsum, dolomite, and construction stone.

The USGS confirms active production of cement, gypsum, and lime from these deposits. Nothing exotic, but in a country with ambitious construction plans and a preference for reducing imports, these materials matter.

Further east, in the Lebap region, things get more interesting. The Gaurdak sulfur plant anchors a fertiliser value chain that feeds directly into Turkmenistan's agricultural backbone. Sulfur and phosphorites become fertilisers, and fertilisers sustain cotton and wheat. That integration between mining and farming is more deliberate than it might appear from the outside.

Then there's the Karakum Desert. It may look barren, but it's not. Halite, mirabilite, and other evaporites sit beneath the surface, offering a kind of strategic redundancy: if coastal operations face disruption, inland reserves can pick up the slack. Whether anyone has built the transport infrastructure to make that possible is another question.

The Mary Province ties it together. Local mineral deposits feed fertiliser and soil-conditioner production that directly supports the country's large-scale cotton and wheat operations. It's a tidy example of what Turkmenistan does well when the pieces connect: extraction linked to processing linked to agriculture.

Minerals production over time

The numbers tell a story of resilience and missed potential in roughly equal measure. CEIC Data tracks Turkmenistan's aggregate mineral output. After bottoming out at around 39.5 million tonnes in 2009, production climbed steadily through the 2010s.

It peaked at around 78.7 million tonnes in 2021. By 2022, the figure

had eased slightly to about 77.4 million tonnes, and some sources report a further dip.

The resilience is real. Through commodity price swings, pandemic disruptions, and the usual turbulence of a state-managed economy, Turkmenistan has kept output at levels that would be envied by many states with limited resources. But the ceiling is visible too.

Much of this tonnage is bulk material – raw minerals and fuels shipped without much processing. The gap between what Turkmenistan extracts and what it could earn by moving downstream into chemicals, finished materials, and refined products remains wide open.

The Chinese assessment: Key findings in context

A 2024 report by researchers at the Xi'an Center of Geological Survey (China Geological Survey) and Zhejiang University offers the most comprehensive recent analysis of Turkmenistan's mineral endowment and investment climate.

Natural gas reserves are the headline. The report cites 19.5 trillion cubic meters of proven reserves. Across all sources, Turkmenistan consistently ranks as holding the fourth-largest gas reserves on the planet, behind Russia, Iran, and Qatar. The variation largely reflects differences in methodology and reporting year, rather than any fundamental disagreement about scale.

On oil reserves, the report claims 100 million tonnes proven, with prospective reserves of 20.8 billion tonnes.

For potash, the report ranks Turkmenistan sixth globally with 833.53 million tonnes of reserves, concentrated in the Gaurdak basin. International datasets frame the resource differently.

On iodine and bromine, the report claims Turkmenistan holds 70% of former Soviet reserves, with 70,000 tonnes of iodine and 700,000 tons of bromine. News Central Asia reports that Turkmenistan produced nearly half of the USSR's iodine at its peak, and the USGS ranked the country third in the world (excluding the US) in iodine production as of 2022–2023.

The diplomatic framing is straightforward. In January 2023, Presidents Xi Jinping and Serdar Berdimuhamedov elevated bilateral ties to a comprehensive strategic partnership.

Just from January to August 2022, Chinese customs data shows bilateral trade at \$6.9 billion; a 52.4% year-on-year jump.

China has been Turkmenistan's largest trading partner since 2011. The relationship is deepening, and minerals and hydrocarbons sit at its centre.

Regional comparisons: How neighbours play differently

Turkmenistan's mineral strategy comes into focus when you look at what its neighbours are doing.

Kazakhstan goes big. Its Tengiz field alone produced about 2.7 million tonnes of sulfur in 2024, and the country exported 6.3 million tonnes that year.

Uzbekistan takes a more state-directed path. Copper, molybdenum, lithium, phosphorites, and an emphasis on integrating mining with downstream processing. The goal isn't just to dig things up; it's to capture midstream value.

Kyrgyzstan bets on gold. Smaller reserves, but high-value. The Kumtor mine advanced extraction, offering a niche strategy built on quality over quantity.

Turkmenistan's approach is different again. It lacks Kazakhstan's scale and Uzbekistan's industrial integration, but it has something else: specialisation. Chemicals from the Caspian coast. Fertilisers from the east. Construction materials from the Kopet Dag foothills.

The pitch is not 'we produce the most'. It's 'we produce what the region needs'. Whether that positioning can translate into durable competitive advantage depends on execution, more than geology.

Strategic and environmental realities

Potential is one thing, delivery is another. And Turkmenistan faces a set of constraints that no amount of mineral wealth can wish away.

The first one is water. The interior is arid, and mining operations, especially chemical processing and fertiliser production, are thirsty. Conservation technologies, selective desalination, and careful allocation: all necessary, none easy in a governance environment that prizes central control over adaptive management.

Another is transport. Getting minerals from deposit to market means rail, road, and port infrastructure that, in many corridors, is developing but doesn't yet exist at the scale needed. The Caspian ports are a natural advantage, but inland connections remain a bottleneck.

Last is ecology. The history of Garabogažköl itself is a cautionary tale: when the Soviets dammed the inlet in 1980, the lagoon dried up within three years, turning into a salt-dust bowl that poisoned downwind farmland and sickened nearby communities.

The dam was removed in 1992, and the ecosystem was partially recovered.

The lesson is that these systems are more interconnected and more fragile than they appear, and this should inform every extraction decision going forward.

The real prize is extraction integration: linking mineral output to processing, to downstream manufacturing, to export markets. Turkmenistan has the raw materials. What it still needs is the industrial architecture to turn them into something more than cargo.

Turkmenistan will not become a mining superpower, and that's not the point. What it can become, what it is fitfully becoming, is a specialised mineral supplier with a particular role in Central Asian trade: chemicals from Garabogažköl, fertilizers from Lebap and Mary, construction materials from the southern foothills, iodine from the Balkan coast.

Deposits are real, documented, and in many cases, already in production. What's missing is the next layer: modern processing, reliable logistics, transparent investment frameworks, and the environmental stewardship to keep these resources viable over decades rather than quarters.

From the salt flats of the Caspian to the phosphorite corridors of the interior, Turkmenistan has the raw ingredients for a mineral economy that punches above its weight. Whether it gets there depends less on what's in the ground and more on what happens above it.



3.3

Are critical minerals at their most critical?



Flora Prideaux
Reporter
Trade Finance Global
(TFG)

In a global economy marred by the price shocks stemming from the conflict in the Middle East, nations are more terrified than ever of trade dependency, and none more so than for critical minerals.

Critical minerals are defined by convoluted global supply chains that originate in high-risk conflict zones, and access that is largely dependent on what – for many countries – is an increasingly strained trade relationship with China.

At the inaugural Trade Finance Global (TFG) conference in Singapore, Doğa Usanmaz, Reporter at TFG, hosted a panel of critical mineral experts:

- **Anis Nassar**, Head of Critical Minerals at the World Economic Forum (WEF);

- **Alexander Peters**, Chief Financial Officer (CFO) of Torq Commodities;
- **Joe Vu**, Global Client Development and Head of Buy Side APAC, London Metal Exchange (LME);
- **Zisu Wang**, Commodity Derivatives Broker at the SCB Group; and
- **Gautam Varma**, Managing Director at V2 Ventures Pte Ltd.

The panel discussed the drive towards nationalistic resource policies, the financing and market controls needed to strengthen existing supply chains, and the innate challenge in diversifying goods that rely on concentrated, narrow supply lines.

Are we really moving towards resource nationalism?

The Trump administration has aggressively moved to end the US's dependency on foreign states for critical minerals by fostering mineral markets and taking equity stakes in mines.

Public sector engagement in resource development and procurement is unprecedented, but so is the scale of US dependency: The US is 100% import-reliant on 15 critical minerals, with 70% of US rare earth imports coming from China.

They are not alone. Last year saw a record-breaking number of new trade restrictions imposed on critical minerals, according to analysis by the Organisation for Economic Co-operation and Development (OECD).

16% of global trade in critical raw minerals faced at least one export restriction; that soared to roughly 70% for global cobalt and manganese exports between 2022 and 2024.



Nassar explained that the apparent shift towards increasingly protectionist economic policies had two drivers.

Firstly, over the last 24 months, there has been a general shift among policymakers. Critical minerals are no longer considered critical for energy security alone, but also for broader economic security. Critical minerals and their immediate products are essential to industries including artificial intelligence (AI) and data centres, defence, aerospace, and industrial work.

Secondly, nations have begun to leverage critical mineral deposits as a negotiation tactic. For countries such as China, which responded to US tariffs by requiring foreign companies to obtain an export licence from China to export goods containing China-sourced rare earth materials, this has become a political strategy.

But for other nations, such as the Democratic Republic of the Congo (DRC) and Indonesia, both of which temporarily halted critical mineral exports – cobalt in February 2025

and nickel ore in 2020, respectively – this strategy is about economic leverage.

For Indonesia at least, using export controls to reiterate state power is working. On 5 June 2026, Indonesia issued regulations to bring strategic commodities, including palm oil, coal, and ferroalloys, under the control of a state-owned company. Indonesian officials argued that the state was losing billions in revenue due to a lack of export oversight, introducing the new export regime as a means to maximise gains from domestic resources.

Although the boom in economic restrictions indicates a shift towards nationalistic thinking, that is only part of the equation. The location of critical mineral ores is inherently geologically dependent, meaning widespread access requires partnership with other nations.

While trust in a traditional, multilateral trading order is breaking down, Nassar explained, it is not being replaced with resource nationalism, but is rather being taken over by the flourishing of new plurilateral alliances.

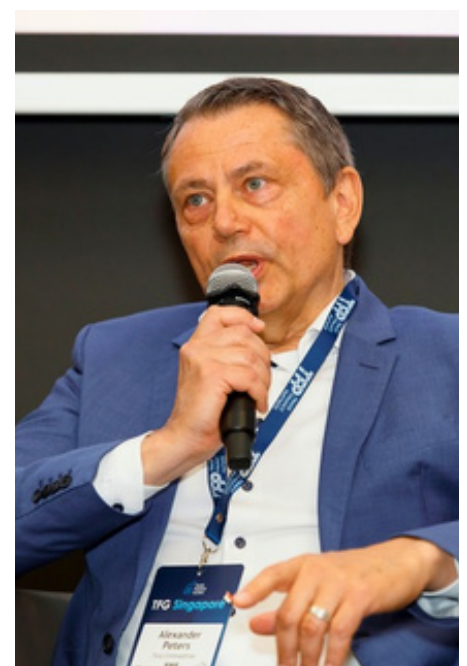
In February of this year, the US launched the FORGE alliance, bringing 54 countries together to coordinate raw material pricing to break China's hold over the critical minerals market.

Countries are prioritising trade flows with close allies, seeking partnerships with 'like-minded' countries, and seeking to leverage blocs' critical mineral capacity to circumvent geological limitations.

However, Peters explained that the real advantage isn't at the mining and extraction stages but rather the processing stages.

"Refining capacity is what earns pricing power and domination of global markets," he said. Building a refining plant and a smelter need billions in upfront investment, whereas investment in mining requires a few hundred million dollars.

But processing capacity isn't so much limited by geography as it is by the municipality. Particularly in Europe, the multi-tiered system – comprising sovereign states alongside the intergovernmental European Union (EU) – gives



multiple players a say in investment, political, and social decisions, making setting up a processing facility "unrealistic," Varma explained.

European and American economies are building processing and refinement centres on 'friendly' territory, outside of their own countries. Increasingly, national resource strategies require the maintenance of and investment in infrastructure that extends beyond the borders of each nation.

How to finance the diversification of critical mineral supply chains

Each country defines its own set of critical minerals. According to Varma, what makes a mineral 'critical' is largely defined by where the supply lies, and whether it's concentrated in a jurisdiction that a country isn't comfortable with. Diversification requires the opposite, spreading supply opportunities across partnered supply chains.

The problem is that critical minerals are typically found in emerging markets, which often carry increased sovereign, credit, and foreign exchange (FX) risk, to name just a few. With Europe largely unable to set up processing facilities at home, the same risks apply to the later stages of production.

Just a few months ago, Varma explained, significant momentum was behind investing in processing capacity in the Middle East, which looked competitive from an energy, labour, and geographical perspective. "The conversations are obviously paused right now," he said, exemplifying the risks associated with investing in new countries.

Banks lend against a hedgeable forward curve, not a price forecast – the LME provides that for base metals. Vu explained that for critical minerals, this is imperative as often there is no liquid futures market, and lenders demand higher returns; hence, projects don't get built at exactly the prices that should incentivise them.

Transparent pricing isn't a nice-to-have; it's the prerequisite for capital formation that unlocks projects that would otherwise not be commercially viable. However, the volatility of the previous few years, particularly the 2022 nickel crisis, has driven a greater range of participants into the critical minerals market.

According to Wang, prop trading houses with zero exposure in physical lithium, and equity-linked investors with exposure downstream of the supply chain – perhaps in batteries or electric vehicles (EVs) – have been participating. Moreover, battery metal contracts outside of China have created a strong contango compared to the local market, drawing further speculators into bets on the arbitrage, intermarkets, or contango spread.

With volatility driving an abundance of participants amid unstable market conditions, using public funds to back large-scale infrastructure projects and de-risk investments could be a pathway through.

One of the key developments is the growth of import credit agencies (ICAs), which can support credit lines for national imports, indirectly financing extra-national development projects. Many ICAs morphed from export credit agencies (ECAs) and are mostly government-backed.

"At the end of the day, this is really a judgment call for resource nationalism," said Varma.

Pooling resources

The issue is that critical minerals did not just become concentrated in certain countries and areas by chance. The supply chains are narrow by economic necessity.

A significant portion of the cost of extracting and refining critical minerals is spent on energy, Peters explained. For just one tonne of aluminium, that is around 10 to 15 megawatt-hours. If you have recycling capacity within a facility, it acts as an energy hedge, saving the majority of energy costs, he noted.

That alone creates an incentive for large processing facilities to incorporate recycling capacity.

That incentive is increased by pooling refineries at scale. Processing close to the mining site reduces shipping costs. Pooling multiple mines at a processing site saves on infrastructure. Industrial parks can pool energy demand to reduce their cost. For Nassar, places like ports and mines, where resources are naturally pooled, are perhaps areas where the greatest savings on investment can be made.

European investment is following this model. The Swiss-based Eurochem Group has invested in a huge three-part sulphuric acid production centre in Kazakhstan. In three stages, the company launched a phosphate ore mining and processing complex, a sulphuric acid production facility, and, next year, the launch of a chemical complex for the production of mineral fertilisers. The facility has fattened its margins by moving the processing and industrial facilities to the site of the mine.

But it remains to be seen whether this will perpetuate future risk by keeping supply chains narrowly concentrated. For now, at least, the risk of doing so seems to outweigh the risk of not doing so.

The flip side of export controls is purchasing power. The importance of purchasing power as a rebuff to protectionist economic policies is a lesson that the critical minerals market should not overlook. As industries realise that everything from magnets to missiles depends on critical mineral supplies, downstream demand is certainly becoming a bigger player..

But in their quest to diversify, financiers should be careful not to fall into the narrow rabbit hole of condensed critical mineral production, and instead ensure diversification is not just a geopolitical statement but a supply chain reality.



3.4

The missing link in critical minerals financing



Lily Russell
Reporter
Trade Finance Global
(TFG)

Since critical minerals do not operate as a distinct and monolithic market, but rather as a fragmented ecosystem shaped by differing geographies, actors, and pricing structures, investors face heightened uncertainty around risk exposure and long-term returns.

As economies become increasingly shaped by complex, multinational supply chains and material production networks, critical minerals are rapidly becoming the backbone of energy technologies and the digital economy, while also gaining relevance in broader global security considerations.

However, their growing importance masks a more practical constraint.

The World Economic Forum's (WEF) May 2026 report, 'Making Critical Minerals Bankable: Policy Tools to Unlock Investment' – part of the Securing Minerals for Energy and Technologies (SMET) initiative – suggests the main barrier to scaling capital across the mineral production channel is not demand or resource scarcity, but investor apprehension driven by perceived risk.

This reflects a mismatch between strong structural demand signals and the financial tools available to absorb that volatility.

Mining for solutions: The investment gap that's hurting global progress

Since critical minerals do not operate as a distinct and monolithic market, but rather as a fragmented ecosystem shaped by differing geographies, actors, and pricing structures, investors face heightened uncertainty around risk exposure and long-term returns.

At its core, this disaggregation is the main contributor to persistent concerns among financial stakeholders over project failure.

Inevitably, the report suggests that there is no one-size-fits-all solution for this pressing issue.

As a result, no single intervention can be applied universally. And in this context, complexity alone is often sufficient to deter investors.

Ultimately, what emerges is not a singular binding constraint, but a web of interconnected financial, regulatory, and operational frictions that collectively suppress capital formation and require coordinated, not isolated, responses.

Progress must therefore depend on a collaborative set of tools that reflect the diversity of each market – some acting as safeguards and others as enablers – that shape the bankability of operations in a variable but constructive manner.

To address this, the WEF report proposes a de-risking framework built around six policy levers, designed to be applied in combination, with the hope of unlocking and scaling greater investment across the field.

So...can 'de-risking' bridge this gap and make these markets more investable? And how does the WEF's suggested framework seek to build shareholder confidence?

Targeted de-risking: Building bankable critical mineral markets

First and foremost, policy still tends to rely on broad instruments applied invariably across often opposing projects: critical minerals are mistakenly filed under one redundant label, leading to weakened effectiveness and wider discouragement of private participation.

As it stands, this blanket approach does not really hold: realities vary too extensively between operations, pointing instead to the need for a more targeted toolkit:

- Upfront capital support is one clear lever. Early-stage mining is expensive, risky, and cash-flow negative for years, which leaves investors relying largely on projections rather than performance. Concessional loans, grants, and equity stakes can absorb much of that capital expenditure (CapEx) burden in exploration and construction phases. This is seen in rare earth projects in Australia where public capital helps get mining initiatives over the line, before private finance steps in.
- Offtake and demand are also vital determinants of whether a market thrives or stalls. When supply is a little rocky (excuse the pun!), demand certainty becomes the real currency. Long-term offtake agreements lock in volumes and pricing formulas years in advance, turning uncertain future revenues into more predictable working capital. This not only reduces risk for financiers, but signals bankable demand to lenders – often making the difference between a project that gets funded and one that never gets off the ground.
- Thirdly, revenue stabilisation mechanisms would also help strip back volatility out of otherwise uncertain markets by shielding producers from extreme price swings, all thanks to a minimum income guarantee. The US Department of Defence Mountain Pass (MP) Materials deal has done just this, helping cushion trade fluctuations and set more foreseeable financing conditions.

Although, even where the economics stack up, more external factors can still very much make or break investment decisions:

- Political risk mitigation tools such as insurance, export credit guarantees and completion guarantees can – and in most cases do – be decisive in determining whether institutional investment is deployed at all. This is particularly true in contexts exposed to expropriation, contract breaches, civil unrest, cost overruns, or currency inconvertibility, where safeguarding instruments help make otherwise unfeasible projects financeable.
- Structural enablers are arguably the most important piece of the puzzle, even if they are often overlooked. This is especially true in the private sector, where they are treated as 'background' elements rather than deal-making fundamentals. In reality, regulation, infrastructure provision, and local operating rules are what make projects actually workable, right down to the last employee on site.
- Lastly, tax credits, accelerated depreciation, and royalty cuts can make a huge difference, making supply chains less costly to build. In Saudi Arabia, the more value you add locally through processing, the lower the royalties you pay, nudging investment up the value chain exponentially.

That said, these tools are not neutral in impact. Without the strict enforcement of environmental, social, and governance (ESG) standards, they risk accelerating extraction and environmental pressure, rather than managing it.

One size fails all: The end of uniformity in critical mineral markets

But to really understand why these tools cannot operate in silos, it is necessary to move beyond policy design and into the realities of the market itself.

The WEF report highlights how no two critical mineral markets operate in the same way, determining whether standard project finance can hold or whether deeper risk-sharing mechanisms are required to keep investment flowing.

In this sense, bankability is not fixed by the mineral itself, but rather, shaped both by its commercial structure and its geographical placement.

This becomes clearest when moving across mineral archetypes and their respective markets.

For instance, copper sits at the 'mature' end of the spectrum: widely traded and underpinned by years of established benchmarks that make pricing relatively transparent. Contrastingly, lithium is slightly more unsettled as it is still building its pricing architecture, falling into more 'emerging' and volatile trading environments.

On the other hand, rare earths operate in a different system altogether, in which a small number of dominant suppliers influence price formation, making long-term and bespoke contracts a priority over spot markets within each 'concentrated' mineral niche.

From a geographical perspective, however, these market distinctions make up a fraction of the story.

The same mineral can behave very differently depending on where it is produced and processed – not from a geological standpoint, but from a jurisdictional one.

Governance conditions play a central role here, directly shaping project risk, timelines, regulatory exposure, and ultimately whether investment readiness steps in.

Fiscal regimes, permitting systems, regulatory consistency, and broader political stability all feed into the operating environment of a commodity, materially affecting its capital value on a global scale. In this sense, jurisdictional conditions add a second, equally decisive layer of risk that can determine whether a project attracts financing, or completely fails to secure backing at all.

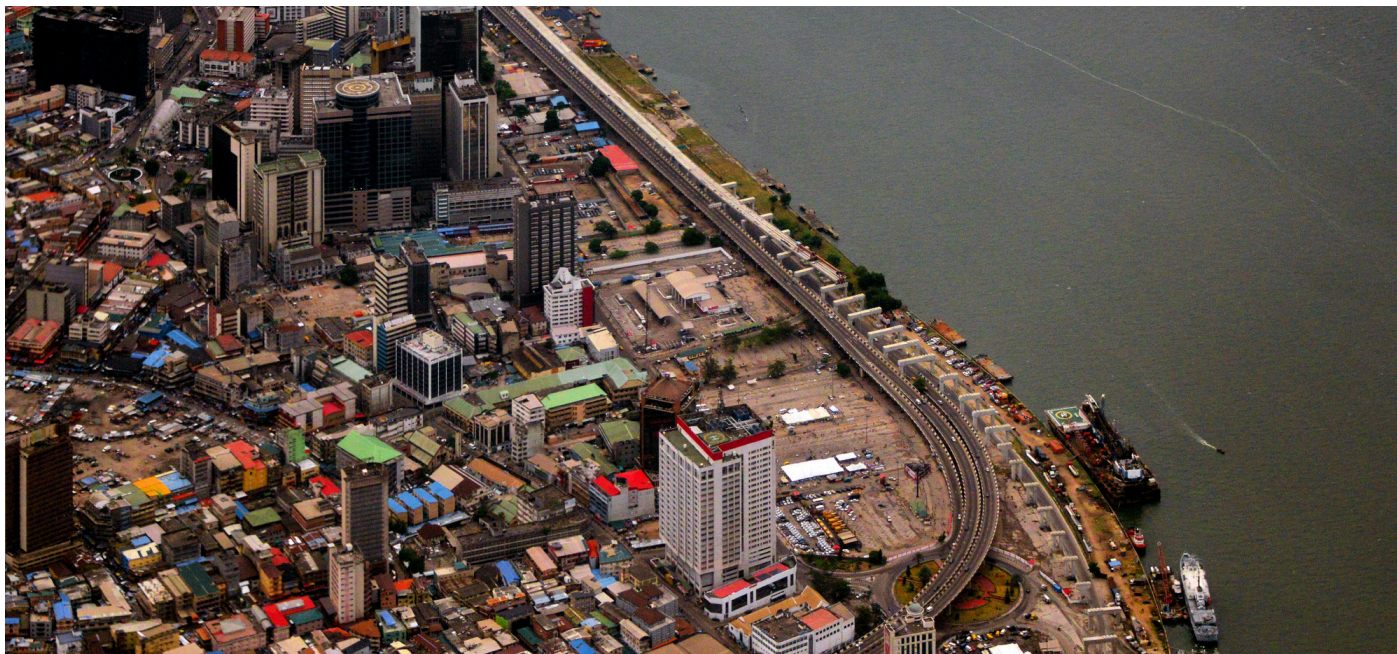
The SMET initiative sets out five broad categories, ranging from low-risk, high-governance jurisdictions to high-risk, fragile states, with intermediate types reflecting varying degrees of policy uncertainty, state direction, and reform momentum.

These subdivisions are neither fixed nor uniform, but they provide a useful framework for more informed financial decision-making – hopefully boosting investor confidence.



Ultimately, the challenge here is clearly not a lack of demand or awareness, but how to apply the right tools to the right risks at the right time.

If coordinated effectively, these mechanisms could make critical minerals investment more scalable and financially viable over the long term. But any transition built on these supply chains will also depend on producer countries sharing in the economic benefits, rather than serving only as sites of extraction.



3.5

How investible is Africa, and why?



Bayo Ajayi
Founder and CEO
Acorn & Partners

Beyond GDP, investors ultimately look for predictability: stable regulation, resilient financial systems, functional infrastructure, and governance that supports long-term planning. Where these conditions align, capital is less cautious.

Africa's five largest economies by nominal GDP, Nigeria, South Africa, Egypt, Algeria, and Morocco, naturally command the attention of institutional capital. Scale signals opportunity, and with it deep markets, diversified sectors, and the promise of liquidity. But it is resource endowment that truly attracts capital, and structural conditions determine whether that capital supports industrialisation.

What has become increasingly apparent in Africa is that capital gravitates towards structure rather than size.

When institutional investors, trade financiers, insurers, development finance institutions (DFIs), pension funds, and infrastructure sponsors assess African markets, nominal GDP is often the first filter. Large economies offer breadth and perceived absorption capacity, but what appears as opportunity at scale can conceal fragmentation at execution.

Nigeria, South Africa, Egypt, and Algeria each illustrate this tension. Continental-scale demand, deep capital markets, strategic geography, and hydrocarbon buffers are real assets. But so are the structural frictions that accompany them,

be it foreign exchange (FX) volatility, energy instability, policy cycles that diverge from micro-level predictability, or private sector openness limited to the resource complex.

The forces that supersede GDP

Egypt's largest foreign direct investment (FDI) inflows have historically required sovereign-backed structures and geopolitical alignment to overcome its structural deficits. For instance, the Ras El-Hekma transaction – a monumental, \$35 billion FDI deal between Egypt and the UAE in 2024 – illustrates how strategic and geopolitical interests can shape capital flows, independently of underlying investment conditions.

The deal was crucial in providing relief for Egypt's foreign currency crisis, allowing the North African state to avert a full-blown economic meltdown. It came just in time to cushion Egypt against its structural deficits, including severe dollar-denominated debts driven by import reliance.

Through this investment, the UAE gained development access to Egypt's valuable Mediterranean coastline. But beyond that, as the most populous Arab country in the world and a major military power with strategic geographic positioning that gives it control over the Suez Canal, Egypt's stability is critical for Gulf states trying to avoid regional instability.

Beyond GDP, investors ultimately look for predictability: stable regulation, resilient financial systems, functional infrastructure, and governance that supports long-term planning. Where these conditions align, capital is less cautious. However, when there is misalignment, it fragments into higher risk premiums, cost of capital, and execution delays.

Egypt's northwestern counterpart, Morocco, stands out for stability across these dimensions. Long-cycle policy continuity, sustained infrastructure development across ports, logistics and energy transition assets, and a progressively modernised regulatory environment have combined to create a setting where capital can be planned with greater confidence. Its strength lies in coherence rather than scale.

Botswana demonstrates a different form of durability. Fiscal discipline, credible contract enforcement, and institutional stability have created an investment environment where predictability compensates for size.

Namibia reflects a similar pattern, where governance consistency and legal clarity – particularly through the 1992 Minerals (Prospecting and

Mining) Act 33 – have supported the development of mining and energy projects within globally integrated value chains.

Critical minerals and the long arc of capital

The global energy transition is increasingly dependent on cobalt, copper, lithium, manganese, and rare earth inputs, many of which are concentrated across African jurisdictions. From discovery to production, critical minerals mining projects take on average 15.5 years, with extreme cases reaching 30 years. Therefore, these require long-cycle investments, spanning multiple regimes and commodity cycles.

Resource endowment will continue to attract capital regardless of institutional quality. Commodity extraction frequently proceeds in jurisdictions where governance, infrastructure, or policy conditions remain imperfect – often resulting in mining projects that lack proper closure procedures, leading to dire environmental consequences.

The real question is, thereby, whether those same conditions support the longer-horizon capital required for processing, manufacturing, logistics, and domestic value addition.

In this context, governance and policy stability operate as pricing variables, just as much as institutional qualities. Shifts in mining codes, fiscal regimes, or export frameworks can alter project viability, long before traditional sovereign risk metrics are triggered.

The DRC and Zambia sit at the centre of global cobalt and copper supply chains respectively, while South Africa holds dominant positions in manganese and platinum group metals.

For capital entering these sectors, the horizon extends across decades and multiple political cycles. Governance and fiscal regime stability are the real drivers of investability.

Reshaping how investability is understood

Much of the prevailing lens on African markets still draws heavily on sovereign credit frameworks as shorthand for investment risk. These frameworks primarily reflect repayment capacity at a sovereign level, rather than the operational conditions that determine whether capital projects succeed.

In practice, underperformance in infrastructure, trade finance, and energy transition investment rarely originates in sovereign default events. They emerge from more granular frictions such as regulatory shifts that alter project economics, infrastructure constraints that slow delivery, environmental, social, and governance (ESG) misalignment that disrupts financing, or governance instability that re-prices risk mid-cycle.

These are execution realities, and they sit closer to investment outcomes than they do to sovereign balance sheets. Ultimately, a more useful framework for assessing execution risk measures whether a jurisdiction can deliver consistently, across cycles, and at the pace that long-term capital requires.

Africa has never lacked capital willing to extract its resources. The more consequential question for the next decade is whether its jurisdictions can attract the patient, longer-horizon capital that turns extraction into industrialisation.

That capital makes different demands, and responds to different signals.



3.6

The missing middle: Why refining is the real bottleneck in critical minerals



Ziyan Hong
Reporter
Trade Finance Global (TFG)

While governments have invested heavily in diversifying upstream supply, refining remains the critical chokepoint through which much of the world's energy transition materials must still pass.

From the European Union's (EU) Critical Raw Materials Act to the US' Inflation Reduction Act, critical minerals have become a cornerstone of modern industrial strategy. Governments worldwide have committed billions of dollars to securing long-term supplies of lithium, nickel, cobalt, and rare earths – the materials underpinning the energy transition and future economic competitiveness.

Despite this unprecedented political attention, supply chains remain stubbornly concentrated.

While efforts to diversify sources of raw mineral production are gathering pace, building truly resilient supply chains has proven far more challenging.

This raises a fundamental question: if the need to diversify critical mineral supply chains is widely recognised, why has reducing dependency across the broader value chain proven so difficult?

Refining, not mining, is the bottleneck

For much of the past decade, discussions around critical minerals have focused on securing access to resources. Governments have competed for mining rights, investors have backed exploration projects, and policymakers have sought to diversify sources of supply.

However, ownership of mineral resources does not automatically translate into influence over supply chains. Australia is the world's largest lithium producer, accounting for around 40% of global output in 2024. The Democratic Republic of Congo (DRC) supplied roughly 70% of global cobalt production in 2025, while Indonesia holds around 42% of the world's nickel reserves.

Despite this growing geographic diversity in extraction, much of the value chain remains concentrated elsewhere.

The reason lies in what happens between extraction and end use. Lithium ore cannot be used directly in batteries, nickel ore cannot be fed straight into electric vehicle (EV) supply chains, and rare earth concentrates must undergo complex separation processes before they can be used in magnets, electronics, or defence applications.

Refining is the stage that converts raw materials into commercially usable products, and increasingly, it's also where market power is concentrated.

According to the International Energy Agency (IEA), China is the dominant refiner of 19 of the 20 strategic minerals it tracks, holding an average market share of around 70% across these supply chains.

Concentration has not only persisted but increased: the combined market share of the three largest refining countries for key energy minerals rose from around 82% in 2020 to 86% in 2024, with roughly 90% of the new refining capacity added during this period coming from the single largest supplier.

The result is a growing disconnect between where minerals are extracted and where they are transformed. While governments have invested heavily in diversifying upstream supply, refining remains the critical chokepoint through which much of the world's energy transition materials must still pass.

Why refining is more complex than mining

If refining has become the key bottleneck in critical mineral supply chains, why has building additional capacity proven so difficult?

Part of the answer lies in the nature of refining itself. Mining projects are tied to geology; refineries are tied to industrial ecosystems. A country may possess abundant mineral resources, but that alone does not guarantee it can support a competitive processing industry.

Refining requires reliable power supplies, transport infrastructure, water resources, specialised industrial inputs and a skilled workforce.

Their competitiveness depends on securing reliable feedstock, maintaining high utilisation rates, and processing materials at costs that can compete with established producers.

New entrants are therefore not simply constructing new facilities; they are attempting to compete against established refining hubs that already benefit from integrated supply chains, operational experience, and long-established customer relationships.

This commercial reality has important implications for investment. Processing facilities require substantial upfront capital and often take years to generate returns, making investors particularly sensitive to uncertainty.



These conditions are difficult to develop simultaneously and often take years, if not decades, to establish. As a result, refining capacity tends to cluster in locations where these ecosystems already exist.

Yet building a refinery is only the first step. Unlike mines, which derive value directly from the resources they extract, refineries operate as commercial businesses.

Thereby, the issue is often whether projects can actually attract capital.

Copper, for instance, benefits from a globally recognised benchmark pricing, deep futures markets, and well-established risk management instruments.

Many critical minerals, by comparison, still operate within less developed market structures, where pricing transparency, liquidity, and contracting norms vary significantly.

As a result, investors face greater uncertainty when assessing long-term project economics, reinforcing the concentration of processing capacity in established refining centres.

Building the missing middle: Indonesia's nickel experiment

Rather than remaining a supplier of raw nickel ore, Jakarta sought to move up the value chain through a series of downstreaming policies, culminating in a ban on nickel ore exports in 2020.

By restricting exports of unprocessed ore, the Indonesian government aimed to channel investment into domestic smelting and refining capacity, rather than overseas processing hubs.

The policy was controversial. Critics argued that export restrictions distorted markets and disrupted global supply chains. Yet the results have been difficult to ignore. The number of nickel smelters increased from just two in 2014 to more than 40 within a decade, while exports evolved from roughly \$6 billion of nickel ore in 2013 to around \$30 billion of nickel and nickel-based products by 2022.

However, Indonesia's nickel industry is still evolving and questions around environmental standards, market concentration, and long-term competitiveness remain.

Nevertheless, its experience offers an important lesson for countries seeking to diversify critical mineral supply chains.

While resource abundance can provide the foundation, building the missing middle requires both strategic policymaking and targeted investment aimed at establishing industrial infrastructure.

The race for critical minerals is often framed as a race to secure resources. Increasingly, however, the challenge lies in where these resources are transformed.

As governments seek to build more resilient and diversified supply chains, refining capacity may prove to be the most critical resource of them all.

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