

Translating Critical Raw Material Trade into Development Benefits

WHITE PAPER

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Executive summary

Increased demand for energy-related critical raw materials could bring development opportunities for resource-rich countries. Trade deals need to be better leveraged to this end.

Demand for critical raw materials (CRMs) is soaring because they are needed for new clean-energy technologies. Current projections suggest demand may rapidly outstrip supply. This presents opportunities for resource-rich developing countries as a source of future growth. However, sustainable development pathways will not emerge automatically, and significant investment facilitation and careful policy strategy will be required.

Mineral extraction and processing are capital-intensive industries with a variety of risks. In light of the demand for energy-related materials, a number of countries are now engaging in state-to-state arrangements to encourage more investment and project development, often shaped by geostrategic considerations. Concerns have emerged particularly in the European Union and the United States regarding China's dominant position in global critical-mineral supply chains. Many governments also have a desire to encourage high environmental, social and governance (ESG) outcomes in mining and processing.

The new generation of state-to-state deals can be categorized as investment-focused, policy or market access-related and data or analytics-driven. Investment-focused deals are the most prominent, where parties agree to jointly invest or develop mining, processing or recycling projects, sometimes linked to development finance. While these deals are intergovernmental, the intention is to work with the private sector to bring more supply online, typically with strong messages about sustainability.

Developing countries could prioritize several areas within these partnerships, whether in new negotiations or as part of ongoing implementation. Transparency provisions are vital for committing stakeholders to consulting with Indigenous groups and civil society before and during project developments. An estimated 54% of energy-transition minerals are located on or near Indigenous peoples' lands.

Facilitating investment is important, too, especially where countries want to attract downstream industries, since the costs of capital and other infrastructure challenges dampen investor appetite. Commitments between parties to cooperate

on research activities would help spread the concentration of new innovations, particularly where low-carbon technologies are prioritized. Developing countries should also seek capacity-building commitments in relation to the skills needed for sustainable critical-mineral activity.

Sustainability standards are increasingly a cause for debate in deals between countries. Elevating sustainable supply could be a powerful outcome of CRM deals since, to date, commodities markets are ill-equipped to identify and reward high-standard ESG materials. CRM partnerships could articulate a shared conception of ESG standards, referencing credible international principles, and commit to working with producers willing to adhere to credible, comprehensive ESG performance standards for their operations. Similar expectations could be set for buyers of minerals to implement a credible due-diligence standard to guard against adverse ESG-related risks in their supply chains. Policy exchange on circular economy legislation and cooperation to build out secondary materials markets could kick-start reverse material supply chains that are currently largely flat.

Many stakeholders believe that regional integration initiatives, such as the African Continental Free Trade Area (AfCFTA), could encourage greater investment in minerals processing and downstream activities. Aspects of this regional deal could indeed be employed, but more analysis is required on which trade barriers policy-makers could target, and in which value chain, to increase investment attractiveness. That is an area ripe for public-private dialogue.

Finally, as interest in CRM supply will no doubt continue, existing development programmes focused on sustainability, good governance and equity should be reinforced, rather than reinventing the wheel. There are two ongoing complementary UN processes focused on ensuring that the growth of energy-related critical minerals translates into just and sustainable supply. These efforts could lead to some important global principles as well as additional capacity building, but it will be vital to link such efforts with market signals and to engage with the geo-economic forces already at play in this space.

Introduction

Attracting investment in energy-related minerals is still challenging. Scaling up interventions in resource-rich countries requires navigating geostrategic and sustainability considerations.

Critical raw material (CRM) extraction is a significant sector for many developing economies, from Africa to Latin America and parts of Asia. Africa, for example, is home to 30% of the world's mineral reserves.¹ In recent years, CRM demand has expanded rapidly with the growth of clean-energy technologies. The International Energy Agency (IEA)'s Announced Pledges Scenario, which estimates CRM demand for clean-energy technologies based on existing long-term greenhouse gas (GHG) emissions and energy access targets, indicates a two-fold increase in demand for CRMs by 2030. Under a "net-zero emissions by 2040" scenario, demand for CRM grows three and a half times by 2030, driven by electric vehicles (EVs), battery storage, low-emissions power generation and electricity networks.²

Based on current projections, CRM supply could be insufficient to meet rising demand in a net-zero emissions scenario, in part due to historical underinvestment in energy-related mineral exploration and mining. Energy consultants Wood Mackenzie estimate that approximately \$400 billion in capital expenditure is required for mining, refining and smelting critical minerals by 2030 to bridge the supply gap for an energy transition in line with holding global temperature rise below 1.5°C.³ Current investment shortfalls are both structural and risk-related. Mining is a capital-intensive industry with a long lead time before investors see returns. Many projects or new technology approaches do not succeed. A range of risks, from environmental, social and governance (ESG) concerns to poor regulatory environments or policy uncertainty in countries of operation, further diminish investment attractiveness.

In theory, addressing the potential supply gap could be an opportunity for developing countries with mineral reserves. However, local communities have not always benefited from mineral extraction, which can cause environmental degradation, pollution and GHG emissions. In some cases, mining has resulted in poor labour standards or territorial appropriation. Attracting investment is typically more complex in developing countries where capital costs have been higher in recent years. Further, there is a growing sense among many commodity-producing countries that raw materials should be processed domestically, and attracting downstream industries will drive more economic gains. According to the IEA, nearly 200 policies and regulations now affect mineral supply, with half of these enacted in just

the past few years. Many of these interventions focus on the terms for trade and investment.⁴ The International Monetary Fund (IMF) finds that trade restrictions on critical-mineral exports could make the clean-energy transition harder to achieve.⁵

Levels of concern have also risen in the European Union (EU), the United States (US) and elsewhere about China's domination of global CRM supply chains. China accounts for approximately 60% of worldwide CRM production and 85% of processing capacity.⁶ The potential supply-demand gap and geopolitical rivalry have driven a flurry of activity to secure alternative CRM supply. Both the EU and the US are pursuing CRM partnerships. Gulf states including the United Arab Emirates (UAE) and Saudi Arabia are making major investments in mining projects – particularly in Africa – as part of their fossil-fuel diversification strategies.⁷

Taken together, these trends mean that the development of and trade in CRMs is increasingly becoming a state-influenced business, with producer nations looking to move up value chains and buyer nations eager to secure supply. What elements should be included in CRM partnerships to maximize development gains and sustainable outcomes?

Further, stakeholders have suggested that regional integration initiatives – such as the African Continental Free Trade Area (AfCFTA) – could address hurdles to investment in downstream industries. Can the implementation of AfCFTA encourage regional minerals-related value chains? Finally, several international development programmes already exist that focus on sustainable mining. How can these be accelerated, given the present interest in energy-related critical materials?

This white paper has been produced by the World Economic Forum's Climate Trade Zero project under the Centre for Regions, Trade and Geopolitics, in collaboration with the Securing Minerals for the Energy Transition (SMET) platform under the Centre for Energy and Materials.⁸ The SMET community has identified 30 risks arising from the potential supply-demand gap in critical minerals. They have further outlined 25 strategies to address these risks, with an emphasis on 10 high-priority actions. The SMET platform offers essential context for discussions on how the increased demand for critical materials can translate into development benefits.

The paper explores three themes: 1) how to maximize CRM partnerships for development; 2) trade policy options and knowledge needed to advance regional mineral value chains, using the AfCFTA as a case study; and 3) mapping international development programmes. It benefits from insights shared by business, international organizations, academia and think tanks, including those imparted during a workshop held in March 2024. It is not intended to provide definitive answers but rather to offer various communities a starting point for discussion and to help navigate a fast-moving, topical area. This white paper is the first in a series from the Forum's Centre for Regions, Trade and Geopolitics, with future work to include an exploration of trade policies with regard to labour in mineral value chains as well as the maintenance of functional global critical-mineral markets.

This paper builds on an existing rich body of research analysing mineral value chains, solutions and potential good practices in policy, but more work is needed. The end goal should be to sustainably and justly secure minerals for the energy transition with maximum development gains. The critical materials being considered in the paper are those most in demand for the energy transition, notably lithium, copper, nickel, cobalt, manganese and rare earth elements, but a host of other "niche" materials are also highly relevant. Countries and economic blocs have different lists they use to define CRM, but with some obvious overlaps, and not all are linked to the energy transition.



1

CRM partnerships

State-to-state deals are growing rapidly to secure critical-mineral supply. Good practices within these deals could ensure long-term development benefits.

Governments' interest in CRM supply and production has increased dramatically in recent years: 13 jurisdictions, representing roughly 45% of global GDP, have issued or updated their CRM lists since 1 January 2020.⁹ These lists are the first step that governments take when defining sectoral policy for supply or production. In their report *The Scramble for Critical Raw Materials: Time to Take Stock?* Simon Everett and Johannes Fritz documented an increase in unilateral commercial policy interventions in relation to CRM since 2017, while clarifying that this is not more pronounced than for other materials amid increasingly tense geopolitics. However, many of these unilateral interventions have changed in recent years, away from supporting international projects and towards encouraging production domestically. Unilateral commercial policy interventions involve actions such as inward and outward subsidies, import tariffs, import quotas and licensing regimes, measures against dumped and subsidized imports, foreign direct investment (FDI) measures and measures encouraging local production.¹⁰

Accordingly, trade policy interest in CRMs has surged. In 2019, the World Trade Organization (WTO) Public Forum programme – one of the largest global gatherings of trade experts – made one passing reference to “critical commodities”.¹¹ In the 2023 edition, at least four session descriptions referenced critical materials, and twice that amount featured the topic in speaker interventions.¹² The trade community is, of course, not wholly unfamiliar

with critical materials. The US, the EU and Japan brought a case in 2012 against China's export restrictions on a number of rare earth elements, tungsten and molybdenum. A WTO panel ruled in favour of the complainants in 2014.¹³ Another WTO panel in 2022 ruled in favour of the EU's complaint on Indonesia's nickel ore export bans and domestic processing requirements.¹⁴

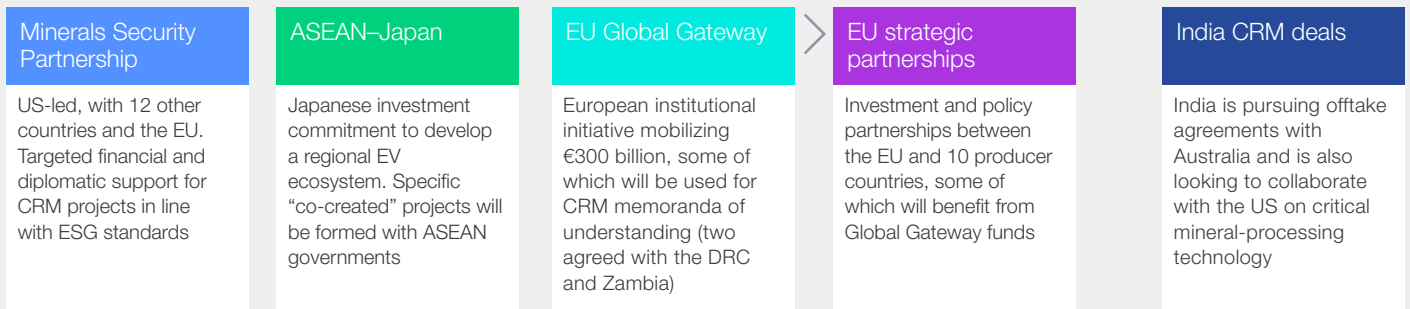
Trade policy-makers are variously interested in security or diversity of supply, access to incentives, value-addition opportunities and local community impact. Climate policy-makers raise similar issues, given the importance of CRM for the energy transition, but they are less well acquainted with commercial policy debates. The landscape of state-to-state agreements and partnerships on CRMs is evolving rapidly and is in some cases linked to new legislation in major economies. Figure 1 suggests that these agreements can be categorized as:

- *Investment-focused* – where parties agree to jointly invest or provide public financing (including development assistance) for mining, processing or recycling projects
- *Policy or market access* – where parties collaborate on important policy issues and provide access to domestic incentives
- *Data collection and analysis* – where parties collaborate on supply transparency and demand forecasts as well as risk analyses¹⁵

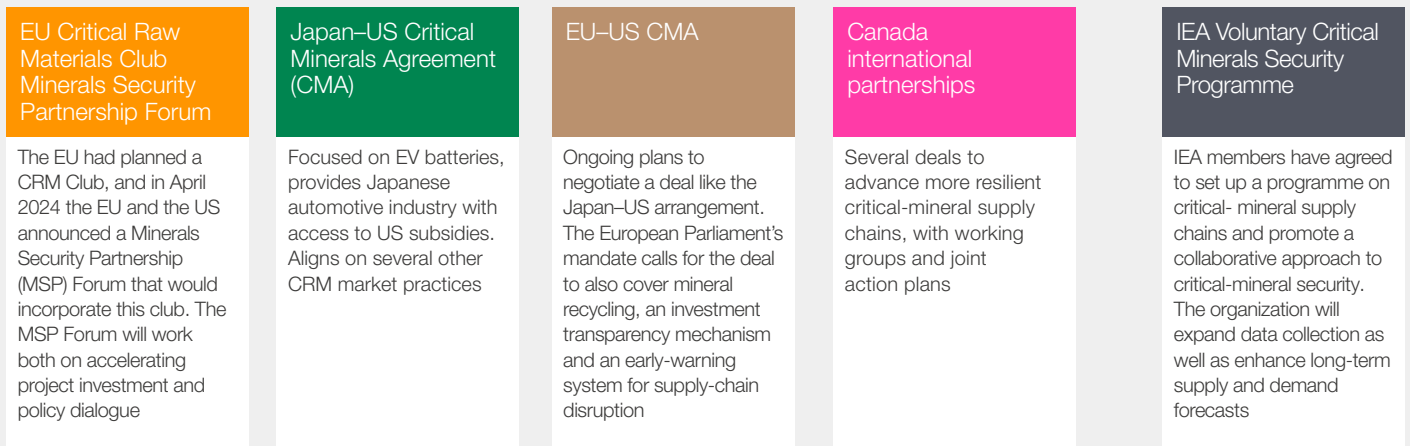


FIGURE 1 | CRM state-to-state partnerships

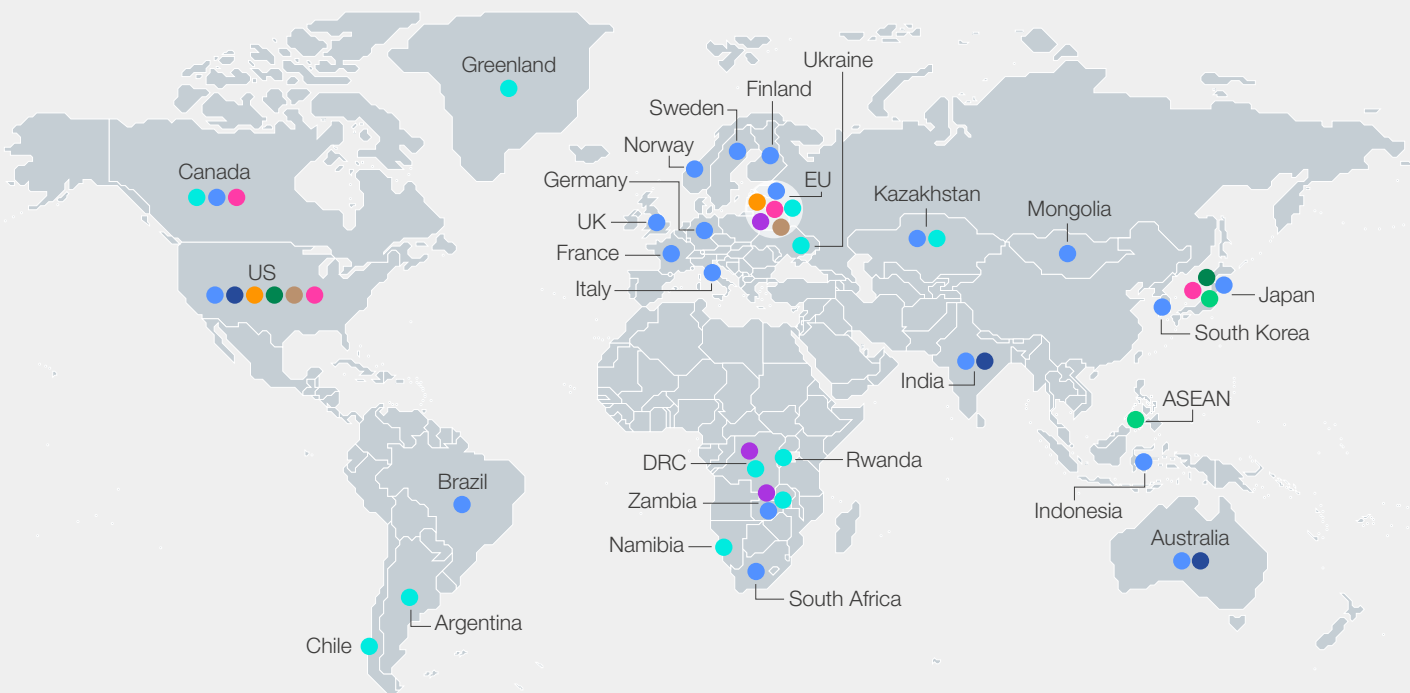
Investment



Policy



Data & analysis



Note: This figure is not intended to be an exhaustive mapping but is illustrative of different types of state-to-state arrangements emerging with regard to CRMs.
Source: World Economic Forum

Annexe 1 goes into more detail and provides examples in each of these categories and summarizes relevant unilateral legislation that provides a basis for some agreements. In reality, experts argue that governments have preferred policies that fragment CRM markets instead

of creating “thicker” (see below) competitive global markets for these materials. Certain policy approaches are linked to concerns with regard to supply dependency, while others are rooted in resource nationalism.¹⁶



The combination of expected demand expansion as well as concerns about securing sufficient supplies have resulted in nothing less than a scramble for critical raw materials in recent years. While this could have been an opportunity to develop system-wide thicker, open, transparent, and competitive markets for these materials, in fact many steps have been taken that fragment markets, diminishing the range of potential buyers available to sellers and, as is often the focus, vice versa. Worse still, once again discriminatory trade, investment, and sectoral policies beget other bad policy at home and abroad.

Simon J. Evenett and Johannes Fritz, *The Scramble for Critical Raw Materials: Time to Take Stock*¹⁷

This assessment raises the question of what “good” would look like for CRM partnerships, memoranda of understanding (MOUs) or equivalent and, particularly, from the perspective of resource-rich developing countries. Figure 2 outlines some focus areas and objectives, setting aside views on whether the topic should be dealt with at bilateral or multilateral levels. Annexe 2 goes into more detail on potential provisions in each focus area.

Many producer nations, particularly those with less developed economies, are clear about what they seek – a greater share of the value derived from their mineral endowments than the primarily extractive models of the past. These nations know that they need to attract investment to do this, but they want to ensure that this happens on fair terms, again in contrast to past experience. Offtake nations are also clear – they want a guaranteed supply at fair market prices. Some countries also want to ensure high ESG standards throughout the supply chain and – in certain cases – to route supply chains through countries they deem to be “preferred” for geopolitical reasons. A third category of processor nations – with neither mineral endowments nor large offtake demand – are seeking to create a role for themselves as intermediaries, especially given the energy transition, often making the most of geographical, environmental or geopolitical advantages to do so. Reconciling different economic models and strategic objectives through partnership agreements will, therefore, be a challenge. Figure 2 assumes that, for now, momentum in the area of CRM partnerships (or equivalent) will ramp up mainly bilaterally and that a global, multilateral outcome in this space is not geopolitically viable.

One important consideration is how countries and stakeholders define “value addition”; in other words, adding value domestically to mineral ores and capturing larger segments of the mineral value chain. While there is no shared, agreed global understanding, *economic* value addition may include mineral processing (smelting and refining) or growing downstream industries (flowing from precursor production to battery-cell assembly or end-products such as EVs). Much literature demonstrates that it is also important to consider the social value addition as well as *environmental impacts* in the sector. Further, the International Renewable Energy Agency (IRENA) estimates that 54% of energy-transition minerals are located on or near Indigenous peoples’ lands.¹⁸ It is increasingly acknowledged that economic value addition cannot come at the expense of social or environmental subtraction.

Producer nations, however, face several challenges when overlaying their desire for greater value addition on the economic realities of CRM value chains. First, a good deal of value comes from the primary extraction phase, so policies that preference downstream production may disrupt valuable existing industries.¹⁹ Second, factors such as lack of transport access, green-power availability and water constraints, among others, can make local processing challenging. Finally, activities such as battery manufacture typically take place close to automotive or manufacturing hubs, which may not even be in neighbouring nations. Significant new opportunities may emerge in relation to secondary markets – currently only 1% of minerals required for batteries are recycled – but these too will need to be built on a manufacturing basis or assets. Green energy inputs will be a major competitiveness factor that nations should look to and profile for investors in all cases.

FIGURE 2 | Advancing development gains in CRM partnerships



Source: World Economic Forum

For the most equitable outcome, these challenges must be met with clear long-term strategies, from both producer and buyer nations. Each will, of course, develop its own national stance. However,

more dialogue – including with a public–private dimension insofar as such state-led strategies are ultimately seeking to influence market actors – is vital for these globalized value chains to remain functional.

Employing regional integration

Regional deals could encourage more investment in the critical-minerals value chain, but targeted research is needed on interventions that will increase investor appetite.

Regional integration initiatives that include mineral-rich countries could be employed to address barriers that hold back investment as well as generate new opportunities by facilitating CRM value chains to develop on a cross-border basis. The AfCFTA is one such effort, in principle, though much will depend on implementation (see Table 1). It includes current mineral players such as the Democratic Republic of the Congo (DRC, cobalt and copper), Gabon (manganese), Ghana (manganese), Madagascar (cobalt), South Africa (manganese), Zimbabwe (lithium) and Zambia (copper). Projects to expand mineral supply are under development in these countries as well as others across the continent. Together, Africa is home to 79% of global cobalt, 44% of global manganese and 21% of global graphite reserves.²⁰

The AfCFTA came into force on 30 May 2019 for 24 countries that had deposited their instruments of ratification by this date.²¹ The deal aims to create a single African market for goods and services. Countries submit individual tariff concession schedules following a shared framework – 45 have done so for the goods trade and 22 have done so for services, with others in negotiation. The deal also includes legal instruments on investment, intellectual property rights and competition policies, with further talks ongoing for digital trade and women and youth in trade. The agreement is subject to a dispute-settlement mechanism.²²

Several initiatives have been launched to encourage the private sector's use of the agreement, including the AfCFTA Guided Trade Initiative (GTI), which helps to match businesses and products for export and import among interested parties, as well as the Pan-African Payment and Settlement System (PAPSS) to smooth local currency payments. The AfCFTA Secretariat has organized numerous private-sector outreach events, including partnering with the World Economic Forum,²³ and has particularly prioritized work in four value chains over the past year: agro-processing, automotive, pharmaceuticals and transportation and logistics.

Mining and metals are not among the priority sectors per se. However, African leaders have been clear that the AfCFTA should help countries move away from primary exports, promote industrialization and generate regional value chains and value addition activity on the continent. Implementation of specific provisions could help these goals within the sector, depending on how targeted stakeholders want to be. Figure 3 suggests several areas that could be explored as a starting point, and these are further explored in Annexe 3.

Other potential regional initiatives, such as an Africa, Middle East, Central and South Asia minerals “super region”, could interlock with AfCFTA implementation. The vision would connect African producer nations with investment and sources of offtake in the neighbourhood, as has indeed already started.²⁴

Instrument(s) and tools

Relevance

Protocol on Trade in Goods; GTI; AfCFTA Automotive Task Force	Use Africa's existing place in automatic value chains to attract investment in battery production and related EV component manufacturing.
Protocol on Investment, Article 6 (joint investment promotion)	AfCFTA parties could use this instrument for regional value-chain investment, such as in regional battery value chain and downstream manufacturing, among others. Parties could also create a unified geological data portal to enable better targeting of mining investment promotion.
Protocol on Investment, Article 7 (investment facilitation)	Investment facilitation activities within the AfCFTA are not sector-specific, but affording special attention to and campaigns relating to targeted projects could demonstrate a commitment to create stable conditions for industry investment. This should be done in parallel with efforts to encourage sustainable investment.
Protocol on Investment, Article 25 (labour, environment); Article 26 (climate)	The Protocol on Investment includes provisions on minimum standards for the environment, labour and consumer protection. Demonstrating a commitment to adhere to these will encourage capital flow; the Protocol also encourages specific investment promotion for mitigation and adaptation that could be applied to focus on lower-emissions mining activities.
Protocol on Trade in Services	Cross-border movement of skilled labour can help ease operational costs and create greater market attractiveness for investments. Countries within the region can share mining expertise via services exports, while importers demonstrate that the necessary resources are available. State parties could prioritize these types of services in their ongoing liberalization efforts on services trade.
Protocol on Trade in Goods; Protocol on Trade in Services	Distribution and transportation are vital to a successful minerals value chain. AfCFTA heads of state and governments have endorsed a corridor approach to addressing outstanding trade facilitation challenges through the deal's implementation. This will include border reforms and transport services liberalization.

Source: World Economic Forum

Table 1 outlines some outstanding questions and knowledge gaps that merit further reflection by interested stakeholders. These questions offer

important context for the subsequent section on development programmes.

TABLE 1 | AfCFTA implementation questions for value addition

Challenge	Description
Value-chain assessment	More details are needed on which value chains should be targeted and to what extent current tariff reductions act as an incentive for regional activity. Further, Annexe 5 of the Protocol on Trade in Goods establishes a reporting, monitoring and elimination mechanism for non-tariff barriers (NTBs), whereby traders can file complaints on specific trade obstacles. To what extent is there a need for and appetite to highlight NTBs with regard to minerals-related value chains? Battery-cell assembly and, eventually, EV production are value chains to consider that are already the subject of several research papers. ²⁵
Nationalism	As it stands, many countries in the region are looking to move up the minerals value chain, creating tensions between regional coordination and national interests. Are there specific areas in which these tensions can be overcome – for example, through regional investment promotion initiatives?
Trust	Regional cooperation to secure spillover benefits from increased mining activity – such as improved infrastructure, social benefits or new capacities – requires trust between partners (among nations as well as with the private sector along a value chain). What mechanisms or approaches can be used to improve confidence in long-term benefit-sharing?

Source: World Economic Forum

Accelerating development programmes

Many development programmes already focus on supporting equitable, sustainable mining activities. These need to be better integrated into state-to-state efforts to secure sustainable energy-related critical-mineral supply.

Meeting the supply–demand gap will translate into more extractive activities. In this context, governance and capacity-building initiatives are crucial to ensuring responsible mining practices. Existing initiatives and programmes are already assisting resource-rich developing countries in tackling this challenge. Some of these initiatives are orchestrated by international organizations such as the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), the Organisation for Economic Co-operation and Development (OECD), the World Bank Group and others. Additional programmes are run by non-profit organizations. Table 2 summarizes major initiatives.

Through tailored training, technical assistance and knowledge transfer, programmes endeavour to fortify governance structures, enhance fiscal management and promote the responsible use of resources. By embracing principles of good governance and sustainable development, these efforts aspire to propel countries towards a trajectory of inclusive prosperity, wherein the dividends of mining activities are equitably distributed and the adverse impacts mitigated.

If reinforced and well used, these initiatives can supplement critical-mineral supply in a sustainable and inclusive manner. In the future, it would be helpful for stakeholders to examine how these programmes might interact with CRM partnerships or other trade policy-making forums.

Furthermore, the United Nations has kicked off two important processes relevant to the debates in this paper. The first is the United Nations (UN) Secretary General's planned Panel on Critical Energy Transition Minerals, which will bring together governments, international organizations, industry and civil society to develop common voluntary principles to guide extractive industries, especially with a view to equity and sustainability.²⁶ The second is a UN interagency initiative launched in 2023 on harnessing critical energy transition minerals for sustainable development in landlocked developing and least developed countries, aimed at creating a UN framework on a just transition for such minerals. These processes are also important to harness for achieving the twin goals of climate action and development via energy-related critical minerals.²⁷

TABLE 2 | Key capacity-building programmes and initiatives

- International organization-led
- Non-profit-led

Capacity-building programme	Actors involved	Goals
Climate-Smart Mining Initiative	World Bank and International Finance Corporation (IFC)	Support sustainable mining and processing of minerals needed for low-carbon technologies while minimizing environmental and climate footprints
IGF's Base Erosion and Profit Shifting (BEPS) mining programme	IGF in partnership with: the African Tax Administration Forum (ATAF), the Inter-American Center of Tax Administrations (CIAT) and the OECD	Increase fiscal return from mining operations in developing countries as part of the IGF's Mining Policy Framework
IGF capacity-building and training	IGF	Improve skills and knowledge for good governance in mining, considering the environmental, social and economic contexts
Tax Inspectors Without Borders (TIWB) initiative	OECD and the United Nations Development Programme	Use experienced mining tax auditors to collaborate directly with local tax authorities on mining audit cases, facilitating practical, hands-on assistance and knowledge transfer
World Bank's Mining Sector Diagnostic	World Bank Group	Provides a comprehensive assessment of a country's mining sector to identify relative strengths and weaknesses. It can be used to support policy dialogue and to identify areas of targeted support and assistance
AfricaMaVal	Coordinated by BRG (French Geological Survey)	Evaluation of 100 European CRM value chain-responsible investment opportunities in Africa to form the basis of concrete EU-African partnerships on sustainable access to primary and secondary raw materials
Columbia Center on Sustainable Investment (CCI) executive training	Columbia Center on Sustainable Investment	An annual training programme that equips participants with skills for responsible development of the extractive industries in resource-rich developing countries
IISD Handbook on Mining Contract Negotiations for Developing Countries	IISD	Assist government officials in developing countries to negotiate investment contracts with mining companies
International Institute for Sustainable Development (IISD) mining programme	IISD	Focus on using mining for sustainable development, limiting negative impacts and sharing financial benefits
International Mining for Development Centre (IM4DC) training	IM4DC	Provide capacity-building in mining governance through education, training and research, enhancing skills and institutional capacity

Source: World Economic Forum

Conclusion

All nations want to benefit from the energy transition. Scaling up mineral supply offers opportunities, but each nation needs to consider where it can best integrate itself into new clean-technology value chains.

Developing countries are not interested in extractive partnerships that leave little behind for local communities. Focusing on attracting downstream industries at all costs, however, could reduce the space for sustainable partnerships. As CRM partnerships evolve, steps can be taken to ensure that these prioritize environmental and social sustainability as well as increase the producer nation's skills and research base. Combined with a concerted effort in the area of investment facilitation, this could encourage and position countries as prime locations for downstream industries, especially where regional approaches are considered and attention is paid to clean energy supply.

This paper offers a snapshot of current debates on clean energy-related material supply. The annexes offer further technical insights, but the topic merits continued, deeper analysis. In general terms, stakeholders could be guided by four principles, to inform activity choices and priorities:

1. **Public-private partnership growth:** The private sector's agility, innovative approach and capital must be in sync with government facilitation efforts.
2. **Cross-sector ecosystems:** The critical-mineral value chain is not limited to one industry but is influenced by players in multiple sectors. These need to be integrated into efforts to scale a sustainable, just and circular supply.

3. **Balanced government intervention:** Increasing supply will require public investment and incentives, including to stimulate low-carbon technologies and processes. This support should be carefully framed to thicken rather than fragment critical-minerals markets.
4. **De-risk investment:** Following on from the above, a significant role for governments is to provide policy certainty and stability to help ease capital flows into a complex sector. Governments will need to profile projects, facilitate permitting and licensing, collaborate to generate economies of scale, and then allow markets to function.
5. **Technology transfer and collaboration:** Mechanisms for technology transfer and research collaboration between countries can help spread the gains from industry development.
6. **Effective capacity building:** Standards for responsible mining will only be as effective as each supplier country's capacity to meet them. It is vital that capacity-building programmes align with market actors.

The world is at a crossroads now for climate action. Meeting mitigation goals will require a massive acceleration of technology diffusion and development that will, in turn, intensify the considerations raised in this paper. It is imperative that private and public leaders work together on critical-mineral value chains to capture win-win outcomes for climate and development.

Annexes

Annexe 1: CRM partnership examples

- Investment-focused
- Policy alignment and/or market access
- Domestic legislation
- Shared data collection and analysis

Initiative	Actors involved	Scope
Minerals Security Partnership (MSP) ²⁸	<p>US-led, with Australia, Canada, Finland, France, Germany, Japan, India, Italy, Norway, South Korea, Sweden, the UK and the EU</p> <p>An additional group of mineral-producing countries including Brazil, Indonesia, Kazakhstan, Mongolia, South Africa and Zambia took part in a meeting in October 2023; previous meetings have involved other producer countries</p>	Targeted financial and diplomatic support for CRM projects in line with high environmental and social governance standards. Specific focus on EVs and advanced batteries. Seventeen projects in development through public-private collaboration, covering upstream mining and mineral extraction, midstream minerals processing, and recycling and recovery. ²⁹
Japan-US Critical Minerals Agreement (CMA) ³⁰	Japan, US	Critical minerals deal focused on EV batteries, addressing Japan's concerns regarding clean vehicle tax credits in the US Inflation Reduction Act (IRA). The automotive sector is a major component of US-Japan trade. Commitments made not to impose export duties on CRM trade between the partners; to confer on domestic measures addressing non-market practices of other countries; to confer on best practices of CRM investments; to cooperate to discourage imports of goods containing CRM involving forced labour; to cooperate on circular approaches to CRM.
EU-US Critical Mineral Agreement ³¹	EU, US	The EU and the US signalled plans to negotiate a CMA in March 2023. The deal, which could be similar to the Japan-US CMA, would allow European car manufacturers access to IRA tax credits. The European Parliament's mandate for the talks calls for a wide coverage of minerals, minerals obtained from recycling, an investment transparency mechanism and the set-up of an early-warning system against supply-chain disruptions. These negotiations remain ongoing as of April 2024. ³²
Canada international partnerships ³³	Canada-US; Canada-EU; Canada-Japan	Canada, as a resource-rich developed economy, has established several partnerships to advance more resilient critical-mineral supply chains. These include a joint action plan with the US, a strategic partnership with the EU, a working group with Japan and joint statements with Australia and the UK.
India CRM deals ³⁴	India-Australia; India-US	India is pursuing investment and offtake agreements with Australia and collaboration with the US on critical-mineral technology processing.
ASEAN-Japan Co-Creation Initiative for the Next-Generation Automotive Industry ³⁵	Japan, Association of Southeast Asian Nations (ASEAN)	Japan is committing investment to develop a regional EV ecosystem. A master plan for the industry will be developed as well as policy coordination on decarbonized, resilient and reliable supply chains. Specific "co-created" projects will be formed.
EU Global Gateway ³⁶	Global	<p>A cross-European institutional initiative is mobilizing €300 billion investment for sustainable projects tied to boosting Europe's links in digital, energy and transport sectors around the world as well as strengthening health, education and research systems.</p> <p>Two MOUs on CRM value chains have been signed under the Global Gateway with the DRC and Zambia. The EU-Africa Global Gateway Investment Package will also contribute to several other EU Strategic Partnerships on CRM (see below).</p>

EU Strategic Partnerships ^{*37}	Argentina, Canada, Chile, the DRC, Greenland, Kazakhstan, Namibia, Rwanda, Ukraine and Zambia	<p>The EU has pursued strategic partnerships and policy dialogue with 10 countries (including those mentioned in the row above).</p> <p>These partnerships may be grandfathered into the EU's CRMA (see below). Chapter VI (Article 33) of the Commission's proposed CRMA provides a framework for cooperation on strategic partnerships. It stipulates that the European Critical Raw Materials Board should discuss priorities for strategic partnerships, including a consideration of the third country's environment and social governance frameworks.</p>
EU Critical Raw Materials Act (CRMA) ^{**38}	EU-27	<p>Negotiations for a CRMA were concluded in November 2023 through the EU co-legislative process. The text has been formally adopted by the European Parliament and now needs to be endorsed by the Council.</p> <p>The CRMA aims to boost EU access to secure and sustainable CRMs. It sets targets for EU extraction, processing and recycling capacity, and includes provisions aimed at diversifying imports as well as a well-functioning single market. The CRMA will become the principal reference point for EU external policy in this area.</p>
EU Critical Raw Materials Club ^{***}	TBC	<p>EU announcements and the CRMA (see above) indicated that the bloc planned to set up the Critical Raw Materials Club for like-minded countries to strengthen global supply chains. In April 2024, the EU and the US launched the Minerals Security Partnership Forum, which will incorporate the Critical Raw Materials Club and focus on two strands: a) supporting and accelerating sustainable critical-minerals projects; b) policy dialogue for boosting sustainable production and local capacities as well as regulatory cooperation and the promotion of high ESG standards.³⁹</p>
Minerals Security Partnership Forum		
IEA Voluntary Critical Minerals Security Programme ⁴⁰	31 member countries	<p>IEA members indicated in February 2024 that the organization would set up a programme on critical-mineral supply chains and promote a collaborative approach to critical-mineral security. It has committed to expanding data collection in the sector as well as market outlooks, long-term supply and demand forecasts, supply-chain risk analyses and increased work on market transparency.</p>

Note: This table is not intended to be an exhaustive mapping but is instead illustrative of different types of state-to-state agreements emerging with regard to CRMs

* The EU also has free trade agreements (FTAs) with several partners relevant to CRM supply. These include, for example, with Chile (with notable chapters on sustainable access to mineral resources and renewable energy), Viet Nam and Canada, and ongoing negotiations with others such as Australia, MERCOSUR (the Southern Common Market), Indonesia and India. Energy and sustainable development chapters in these FTAs would be relevant, but policy experts debate whether traditional market-access approaches would be appropriate for delivering greater value addition in the partner economy.⁴¹

** The CRMA targets critical materials based on importance to the European market and, within these, a set of strategic raw materials that are at risk of supply-chain disruption.

*** Individual EU countries are already pursuing investment-promotion activities on CRMs with resource-rich economies. For example, Germany will dedicate approximately €1 billion to investments in raw materials over the next four years. These investments will be coordinated with France and Italy and focus on minerals defined as critical under the CRMA.⁴²

Source: Compiled by the World Economic Forum based on public sources and media reports

Annexe 2: Encouraging value addition in CRM partnerships

Focus	Provision(s)
Transparency	Commitment to consulting with communities and (as appropriate) Indigenous groups prior to and during project development.
Investment	Provisions to facilitate investment, including: <ol style="list-style-type: none"> Commitments to transparency on measures affecting CRM activities Commitments to transparency on laws and regulations addressing FDI as well as information on practical steps related to investment in the territory Commitments to streamline and speed up administrative procedures linked to investment, in particular in relation to permits and licences (in accordance with other provisions in the partnership on consultation and standards) Commitment to cooperating on investment facilitation, including facilitating linkages between parties' respective export- and investment-promotion authorities
Technology transfer	Commitment to cooperating on research and development (R&D), including joint research activities, with a focus on minimizing environmental and climate footprints. Commitment to supporting projects that deploy energy-efficient, low-carbon and circular production practices, as appropriate.
Skills	Commitment to cooperating on capacity-building in the area of skills and services necessary for sustainable critical-mineral activity.
Standards	Commitment to articulating a shared conception of ESG standards, referencing credible international principles, standards and guidelines, as appropriate. Commitment to encouraging and expecting all types of producers of minerals and/or metals in the applicable jurisdiction to undergo assurance against a credible, comprehensive ESG performance standard for their operations (mining and processing) and to publicly disclose results in a format that enables comparability (see key reference points in the endnote). ⁴³ Commitment to encouraging and expecting all types of buyers of minerals and/or metals in the applicable jurisdiction to implement a credible due diligence standard to ensure that ESG-related risks in their upstream supply chains are effectively identified and publicly reported (see key reference points in the endnote). ⁴⁴ Commitment to exchanging information and best practices on the above areas among producers and buyers of minerals. In accordance with each party's legal system and international standards, commitments to maintain anti-corruption policies. ⁴⁵
Circularity	Commitment to policy exchange on national circular economy legislation relevant to CRM products and waste stream. Commitment to identifying areas for policy cooperation, mutual access and recognition on accelerating CRM circularity, including, among others, product design and standards, product labelling, product passports and incentives. ⁴⁶ Commitment to identifying and proposing for consideration ways to address bottlenecks relating to CRM recycling economies of scale.
Market access	Shared definition of materials covered by the deal as well as desired sustainable economic outcomes, including value-addition activities. Commitment to jointly developing (including through joint ventures) innovative and sustainable minerals value-chain projects, prioritizing processing and recycling activities, and in all cases ensuring economic benefit for local communities. Commitment to promoting and facilitating trade and investment linkages between the parties. Commitment to open, resilient and competitive markets for raw, processed and recycled materials. ⁴⁷

Source: World Economic Forum

Annexe 3: AfCFTA implementation for CRM investment

Instrument(s) and tools	Relevance
Protocol on Trade in Goods; GTI; AfCFTA Automotive Task Force	Africa is already home to internal combustion engine (ICE) automotive exporters, led by South Africa and Morocco. Facilitating regional trade in the battery value chain could be a strategic target, complementing current efforts to fast-track the automotive value chain under AfCFTA.
Protocol on Investment, Article 6 (joint investment promotion)	Transparent and accessible geological data is vital to increasing investment in mining. Parties could explore using AfCFTA mechanisms to create a unified geological data portal to enable better targeting of mining efforts, minimize land disruption and reduce waste. State parties could also use this instrument for regional value-chain investment.
Protocol on Investment, Article 7 (investment facilitation)	State parties commit to facilitating investments that contribute to sustainable development. This includes granting visas and permits to foreign workers; streamlining investment administration procedures; setting up mechanisms for business entry facilitation (including one-stop shops); aftercare services; and digitalizing business facilitation procedures. While these commitments are not sector-specific, targeting attention, campaigns and projects specifically to the sector could demonstrate a commitment to encourage more foreign capital investment in the industry. Flanking work will be required to ensure that the projects themselves are environmentally sustainable and contribute to tangible community benefits.
Protocol on Investment, Article 25 (minimum standards on environment, labour and consumer protection); Article 26 (investment and climate change)	<p>The Protocol on Investment includes provisions on minimum standards on the environment, labour and consumer protection, stipulating that parties will ensure that these objectives, consider domestic policies, international best standards and relevant international agreements. Parties also commit not to encourage investment by relaxing or waiving domestic standards or compliance with environmental, labour and consumer-protection laws and international minimum standards.</p> <p>Article 26 is an innovative provision on investment and climate change. State parties therein specifically commit to promoting and facilitating investments that support emissions mitigation – which could be highly relevant to investment in lower-emissions mining activities – as well as to promoting investments in renewable energy and creating new investment regimes, such as low- or zero-carbon special economic zones. These provisions could be used by investment promotion agencies (IPAs) for low-carbon mining. Technologies are under development to reduce both Scope 1 and Scope 2 emissions and the overall sector needs to reduce carbon dioxide emissions to zero by 2050.⁴⁸ State parties also commit to collaborating with one other on investment-related aspects of climate change policies and measures.</p> <p>The Forum has launched a Guidebook on Facilitating Climate FDI⁴⁹ and is also working with more than 16 IPA heads on building a peer-learning and collaboration network⁵⁰ in this area. Several African IPAs are part of the group, and this could be an area to explore further across the region.</p>
Protocol on Trade in Services	Facilitating the cross-border movement of skilled labour can help ease operational costs and make the market more attractive for investment. Furthermore, countries in the region with mining expertise can benefit from skilled labour exports, while importers demonstrate that the necessary resources are available to deliver on projects. Under the Protocol on Trade in Services, state parties are engaging in negotiations to liberalize services trade in five priority areas, including “all professional business services”. To date, 48 initial and revised offers from both state and non-state parties are being considered.
Protocol on Trade in Goods; Protocol on Trade in Services	Distribution and transportation are vital to a successful minerals value chain. Logistics networks are a broader, systemic challenge across the continent. Heads of state and governments have endorsed a corridor approach to addressing outstanding trade facilitation challenges, with a focus on five major trade corridors, and with targeted work ongoing on border reforms and integration. The liberalization of transport services is under way as one of the important areas under the request/offer process for services liberalization.

Source: World Economic Forum

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Endnotes

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