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**THE RISE PARTNERSHIP  
SECURING THE GREEN ENERGY TRANSITION IS AN OPPORTUNITY TO  
SUPPORT AFRICA'S DEVELOPMENT**

**Update note for  
G7 Finance Ministers and Central Bank Governors  
May 2024**

## THE RISE PARTNERSHIP

### SECURING THE GREEN ENERGY TRANSITION IS AN OPPORTUNITY TO SUPPORT AFRICA'S DEVELOPMENT

#### EXECUTIVE SUMMARY

The global energy transition will require the world to ramp up mineral and metal production on an unprecedented scale. A few countries and vertically integrated global players dominate the production of Energy Transition Minerals (ETM) worldwide, posing supply-disruption risks and market-entry challenges.

Africa, with its vast ETM resources, has immense potential to play a key role in global value chains for clean energy products. The region can provide the minerals and metals for the energy transition and capture a share of the growing markets along batteries, solar panels, transmission lines, and electric vehicles value chains— and in doing so create millions of jobs.

But seizing these opportunities requires addressing sustainable minerals production challenges, infrastructure and skills deficits, facilitating access to finance, as well as enabling investments and minimize fiscal costs and market distortions, and strengthening fiscal management—while maintaining high environmental, social, and governance (ESG) standards.

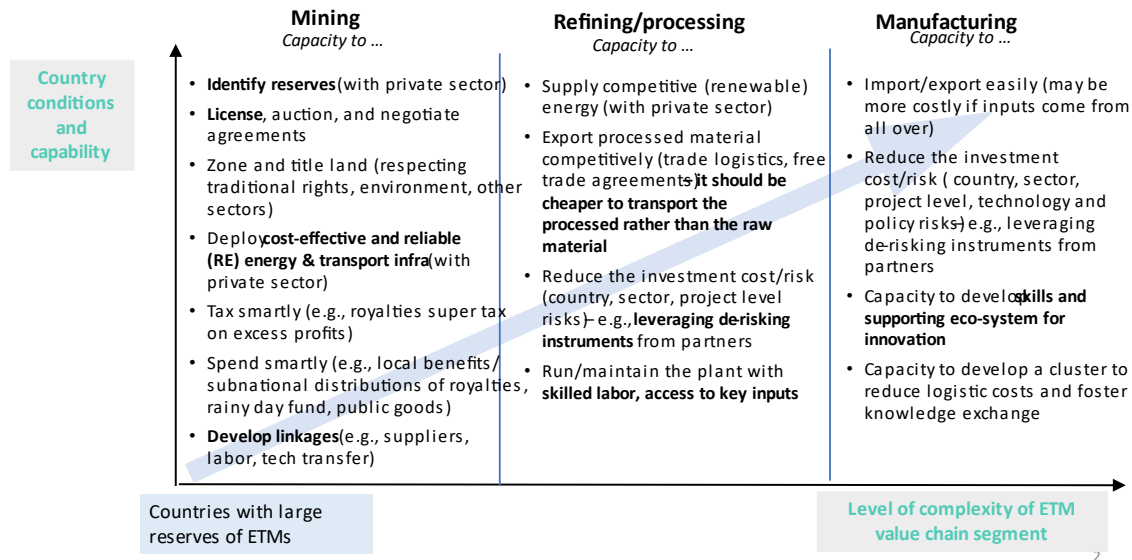
The Resilient Inclusive Supply Chain Enhancement (RISE) Partnership, launched by G7 countries and the World Bank Group, supports this agenda. The initiative was launched in October 2023 during Japan G7 Presidency, and became effective in 2024. RISE is identifying opportunities in developing countries, starting with Africa, for investments in smelting and refining of critical minerals, manufacturing of clean energy products, and related infrastructure. It will help attract private sector investment with sound ESG practices—so that the opportunity turns into real and sustainable impact.

This note shares preliminary results from the first RISE-supported initiatives and the World Bank Group's analytical work in Africa during Italy G7 Presidency up to May 2024. It highlights the main opportunities and challenges for ETM countries to add value in processing and manufacturing—moving downstream from ongoing and planned minerals production. The note identifies areas where development partners can further support this agenda to drive jobs and economic transformation in Africa and maximize RISE potential, including investments to enable infrastructure.

An early finding from RISE's work is that the regional dimension is critical to reach scale. RISE has identified potential areas in southern Africa that are key for supply chains. For example, a battery cluster spanning DRC, Mozambique, South Africa, Zambia, and Zimbabwe. And a cluster for hydrogen in Namibia, South Africa, and Zimbabwe.

ETM country roadmaps—tailored to each developing nation's resources, infrastructure, and institutional capacity—are needed. These roadmaps can define the scope of government interventions, as well as the support needed to increase sustainable supply response and promote local development. RISE has initiated country roadmaps and related analytical work in Burundi, DRC, Malawi and Zambia. The roadmaps will be customized to country conditions and level of complexity of the value chain (Figure ES1).

Figure ES1. Framework for RISE Country Roadmaps



From the RISE country roadmaps, we can see that some policy options under consideration by ETM-rich countries to boost value addition come with higher risks of distortions that could jeopardize fiscal revenues and leave infrastructure challenges unresolved. Responsibly and sustainably supplying ETMs will require improving the quality and availability of geological data; strengthening mining legislation and its enforcement; better licensing and permitting; traceability of ETM production and processing; adequate ESG risk mitigation strategies; solutions to address water-intensity and biodiversity protection; and competitive and fair fiscal regimes. Clean energy for scaled-up ETM production will require a deepening of energy sector reforms and updated energy sector investment plans that facilitate private sector participation. To facilitate ETM production, meanwhile, national and regional transport and logistics systems trade will need new investment, including private sector financing, for critical port, road, and rail infrastructure. The country roadmaps also analyze the education and skills needs. Several related actions to upgrade university curricula and vocational training; strengthen collaboration with the private sector and ensure open policies for the movement of professionals and highly skilled labor have been identified.

Integration of developing countries in global mineral value chains will contribute to a diversified and more resilient global mineral supply. Direct investment in all industrial stages of the mineral value chain will be critical. De-risking private investment in mineral value chains will be key. There will be tradeoffs of economic efficiency for security of supply.

Over the next 24 months, RISE will expand its engagement in southern Africa and develop “local information platforms” to coordinate stakeholders and help countries seize the opportunities of the current shifts in trade patterns and the energy transition, while help them address the challenges identified in the country roadmaps. RISE will also start activities in Latin America, Central Asia, and India.

## THE RISE PARTNERSHIP

### SECURING THE GREEN ENERGY TRANSITION IS AN OPPORTUNITY TO SUPPORT AFRICA'S DEVELOPMENT

This note outlines the opportunities for Africa in the new trade and energy transition global patterns drawing on analytical work by the World Bank including through the RISE partnership. It describes the main challenges for the continent to seize opportunities and be more integrated in the global chains for decarbonization, focused on countries that are energy-transition-mineral (ETM) rich, highlighting the contributions of the RISE.<sup>i</sup>

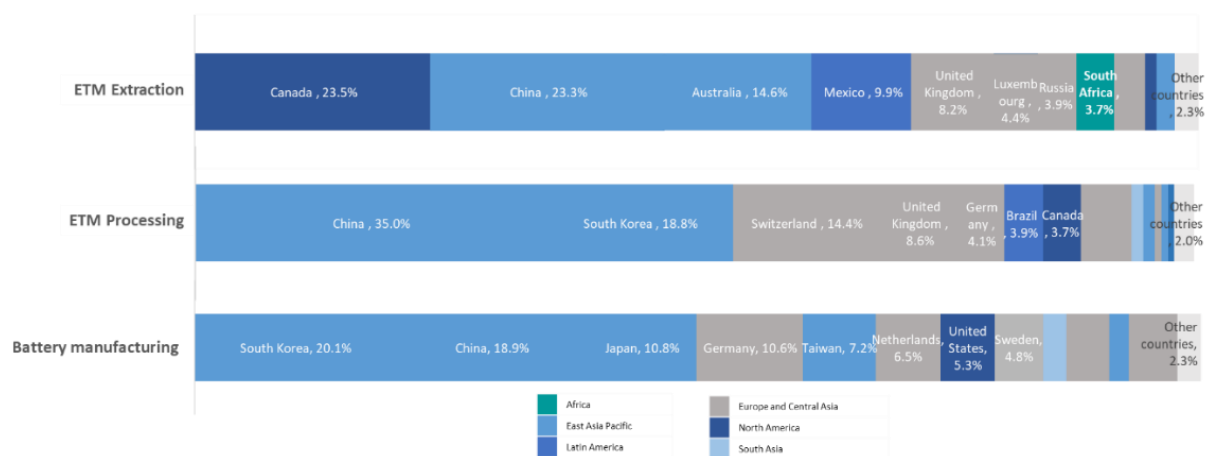
## I. GLOBAL TRENDS

*Demand for clean energy products and energy transition minerals is soaring, but there are market challenges along the supply chain.*

**The mining, refining, and manufacturing of ETMs are concentrated in a few countries creating supply vulnerabilities along the value chain.** Extraction of some key ETMs is geographically concentrated, such as cobalt (about 75% in the Democratic Republic of Congo) and graphite (70% in China). Australia, Chile, and China together account for over 80% of global lithium mining, while refining takes place mostly in China (about 65%) and Chile (about 30%). In EV batteries, China produces more than two thirds of cell components (cathodes and anodes) and battery cells China and Canada are important sources of FDI in extraction (over 20% each in 2019-2023), and China and South Korea in processing and battery manufacturing (Figure 1).

**Figure 1. A few countries are key sources of FDI in ETMs globally**

*Source of greenfield FDI investment announcements in energy transition minerals extraction and processing and in battery manufacturing, by country, 2019-2023. Percent of total greenfield investment announcements*



*Note: Data captures investment announcements at the project level. The identification of FDI projects in ETM extraction and processing includes the main minerals driving the energy transition such as copper, lithium, nickel, cobalt, and rare earth minerals according to IEA (2022). FDI in extraction includes ETMs such as nickel, cobalt, and others.*

*Source: World Bank based on fDi Markets.*

**Market concentration and vertical integration across segments of ETM value chains bring scale-related efficiencies but can potentially create market power and barriers to entry for new or smaller players.** Large capital and research and development (R&D) investments create economies of scale in ETM value chains, leading to market concentration. Moreover, the need to secure inputs and buyers leads to vertical

relationships along ETM value chains. Globally, five companies account for 75% of global production of lithium carbonate, three companies (in China) account for more than 40% of global anodes production, and three other companies for more than 60% of battery cells (IEA, 2022; UNECA, 2021).

**Rapid technological changes in downstream manufacturing, price uncertainty, overcapacity, and operational risks pose additional significant challenges for new investments in ETM value chains.**

Investments in alternative technologies to replace critical minerals, the uncertain pace of the green transition, and policy changes in major renewable energy product markets are key factors that affect demand. In addition to the known volatility of commodity prices, weak price transparency and overcapacity in concentrated ETM segments can affect price uncertainty. Operational risks are also important as long lead times are needed to translate exploration efforts into commercially viable mineral reserves and into production, delaying supply responses.

**G7 countries are promoting the green transition and diversification of sourcing through a variety of fiscal and regulatory incentives.** These include, for example, the US Inflation Reduction Act (IRA), the EU Critical Raw Materials Act and similar policies in Canada and Japan. Other clean energy manufacturers such as South Korea and India also provide fiscal and regulatory incentives to secure a reliable supply of ETMs and encourage local sourcing.<sup>ii</sup> The diversification effort of the G7 countries is focused on preferred partners through Free Trade Agreements (FTA)<sup>iii</sup>, Memoranda of Understanding, or Cooperation Agreements.

**Unprecedented Opportunities for ETM-rich Developing Countries in Africa**

**Developing countries will play a pivotal role in the energy transition due to their vast ETM resources.** Mapping of major mineral belts in the world shows high mineral potential in developing countries, particularly in Africa. For instance, the DRC has over 40 percent of the world’s cobalt reserves; Zambia and DRC are important suppliers of copper to global markets; Tanzania, Mozambique, and Madagascar have significant graphite resources; and more than 90% of platinum group metals are concentrated in South Africa and Zimbabwe. Botswana and Namibia share the Kalahari Copper Belt, a highly prospective new geological zone (Table 1).

**Table 1. Eastern and Southern African countries have energy transition minerals critical for the green transition**  
Percentage of global production and reserves/resources

Mineral	Reserves and Resources <sup>1</sup>												Production <sup>2</sup>												
	ZMB	TZA	DRC	AGO	BDI	ZWE	MWI	MOZ	BWA	ZAF	NAM	MDG	Process	ZMB	TZA	DRC	AGO	BDI	ZWE	MWI	MOZ	BWA	ZAF	NAM	MDG
Copper	2.0	0.02	4.2	0.1	0.01	0.1			0.4	0.2	0.2		Mined	3.7	0.5	8.4	^	^	^			0.1	0.1	^	^
													Refined	1.4		5.2								0.1	^
														Smelter	4.2	0.6	0.9								0.1
Cobalt	2.3	0.8	43.2		0.5					0.01	0.8	0.7	Mined	0.2	^	70.9		^	0.2				0.3	^	1.6
														Refined										0.3	^
Nickel	0.1	1.0			0.7	0.5			0.2	3.1		0.6	Mined	0.1	^			^	0.5			^	0.1	^	1
														Smelter										1.4	^
Manganese									0.1	38.3		0.6		0.2								^	^	0.1	
Graphite		11.8					5.7	50.3			0.5	2.5			^					^	6.1			7.7	
Lithium			2.7			0.6						0.3				^			1.1					^	
Platinum Group						5.6				0.1	82.3								6.5			^	60.4		
Rare Earths*	0.1	2.3		0.4	0.02		0.4			0.2		0.3		^	^		^	^		^		^	^	0.7	

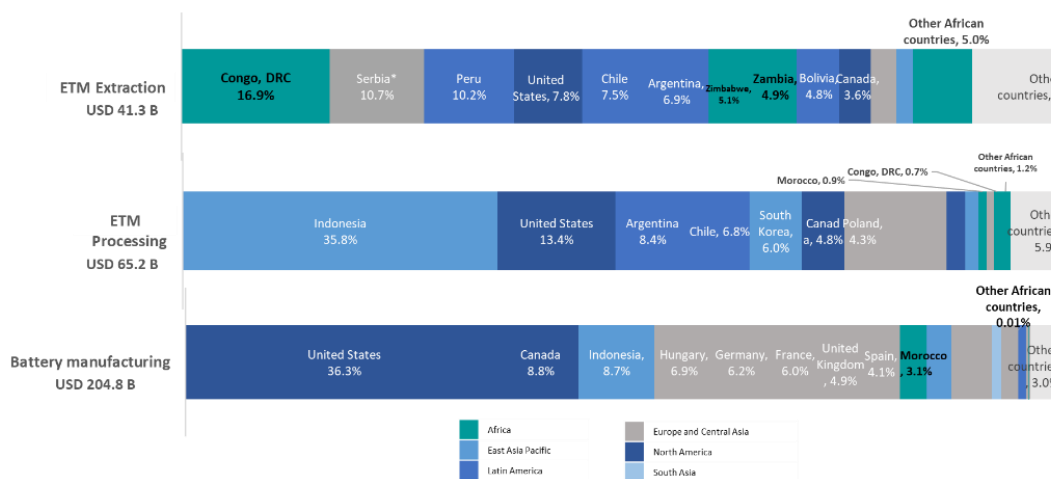
Less than 1%  
 Between 1-5%  
 Between 5-10%  
 More than 10%  
 ^ Significant reserves or resources but no present production (i.e. potential future production)

Notes: \* Includes both rare earth minerals and rare earth oxides as production and lanthanide as reserves/resources.  
Sources: <sup>1</sup> S&P Capital IQ (2023), <sup>2</sup> British Geological Survey (2021)

**Africa is trailing in FDI in ETM downstream processing and manufacturing.** So far, investments in battery manufacturing have been announced only for a few African countries, e.g., Morocco (about 3% of global investment announced in 2019-2023).

**Figure 2. Africa attracts FDI for ETM extraction, but lags in processing.**

Greenfield FDI investment announcements in energy transition minerals extraction and processing, and battery manufacturing, 2019-2023 by destination country. Percent of total green field investment announcements



*Note: Data captures investment announcements at the project level. The identification of FDI projects in ETM extraction and processing include the main minerals driving the energy transition such as copper, lithium, nickel, cobalt and rare earth minerals according to IEA (2022). FDI in extraction includes ETMs such as nickel, cobalt, and others.*

*Source: World Bank based on fDi Markets and S&P.*

## II. RESILIENT AND INCLUSIVE INCREASE IN MINERALS SUPPLY

**The RISE Partnership managed by the World Bank Group is designed to strengthen global supply chain diversification of clean energy products.** This will be achieved by supporting to create an enabling investment climate in mineral-rich low and middle-income countries to facilitate their participation in global supply chains and capture a larger share of value added on their mineral production. RISE aims at enhancing participating countries' manufacturing capabilities and increasing midstream and downstream value addition to their mineral production.

**A customized application of the RISE program for Southern Africa is being implemented by the World Bank Group through a programmatic advisory and analytics.** The project aims to leverage green minerals for economic transformation through a combination of country-level and regional approaches.

**The RISE program for southern Africa launched regional analytical work** in multiple areas:

- **An asset-level assessment of ETM potential and output to 2050** under two different scenarios to generate a view of potential output, value addition, and demand for inputs such as skills, energy and transportation.
- **Assessment of potential for regional participation in ETM value chains**, including input-output mapping for mineral commodities and manufacturing products, and competitive benchmarking of regional production;

- **Vulnerability assessment of mineral-rich regions to violent conflict and human rights abuses**, including identification of interventions to mitigate adverse social impacts from resource development.
- Subsequent regional work will leverage the World Bank's **regional transportation and energy models to assist in determining bottlenecks to roll-out of the roadmaps** and identification of critical transformational investments in infrastructure.

**Zambia, DRC, Malawi, and Burundi are covered in the first phase** of country roadmaps because of their significant ETM potential and the potential developmental impact that ETM chain development can have in those countries. Given the preliminary stage of engagement in the DRC, Malawi and Burundi, detailed insights are provided with reference to Zambia where more advanced discussions with the government and stakeholders have already occurred.

**ETM country roadmaps, tailored to each nation's resources, infrastructure, and institutional capacity, can provide for a comprehensive and sequenced approach to policy reforms and public investments.** National government policies, coupled with international support - including through the RISE initiative, are the keys to success. These ETM roadmaps can mobilize action and attract international support by clearly defining the scope of government interventions to promote mining value chains, including policy reforms and public investment plans. ETM-rich countries also need to (i) increase supply response capability; (ii) ensure sustainable and responsible mining production; and (iii) promote local development. RISE is piloting the first of such ETM roadmap in Zambia. Preliminary diagnostics of challenges that may hinder the supply response along the ETM value chain in Zambia are presented in Boxes 1, 2 and 3.

### *Increasing a sustainable, responsible, and fair supply response in mining*

**In a decarbonizing world economy, the African ETM production has competitive advantages.** The African mining industry is often characterized by high-grade deposits and low-carbon footprint due to current and prospective hydroelectric resources (the lowest for copper and cobalt in Zambia and the DRC), which can give the continent an inherent competitive advantage in a low-carbon future.

**A better understanding of geological potential, transparency, and accessibility of geological data is necessary for attracting new sustainable and responsible mining investment.** Mapping of the major mineral belts of the world shows high mineral potential in developing countries. But available detailed geodata in these countries is a fraction of that in the developed world, hindering government efforts to effectively manage and leverage mineral resources in a highly competitive global industry.

**Good governance and capable mining institutions are essential for responsible investors. Transparent and streamlined licensing and permitting procedures can significantly shorten mine development times.** For new and ongoing mining operations, the process to obtain government-approved permits is typically designed to ensure that environmental standards, land use and social development policy priorities are balanced and maintained from the beginning to the end of mining operations, including mine closure. Appropriate steps to streamline licensing and permitting procedures can significantly shorten these timelines without compromising environmental standards and other policy priorities. Well-designed and implemented mining cadaster systems can facilitate the licensing and permitting process, reduce opportunities for corruption and help mining authorities monitor compliance.

**Structuring competitive, fair, predictable, and stable fiscal terms helps attract sustainable and responsible investment in ETM mining.** A well-designed fiscal regime for mining should consider all taxes and non-tax charges as a package as well as other policies and capabilities that drive investment decisions. At the same time, careful management of revenues from mining is key to enhancing spillovers in the economy while ensuring fiscal sustainability and social impact (IMF, 2024).



**Artisanal and Small-Scale Mining (ASM) communities need government support.** ASM can be associated with significant social and conflict-related risks including dangerous working conditions, child labor, human rights violations, gender-based violence, community health and safety, and land rights disputes, contributing to heightened social exclusion and poverty. Local communities are essential partners whose development needs must be addressed through multi-faceted support, ensuring that even the most excluded and vulnerable groups reap tangible benefits from the industry, beyond mere risk mitigation.

**Box 1 – Increasing supply response capability in Zambia: Country context and preliminary findings of RISE Roadmap**

- Zambia’s mining **license management lacks efficiency**. The mining cadaster is congested by licenses that are held speculatively and inhibit larger-scale exploration programs. **The Geological Survey has insufficient access to geological data** acquired through exploration licensees. This creates a barrier to entry for new prospectors and privileges incumbents. **Frequent revisions to mining royalty rates** over the past decade have contributed to an increased investment risk premium, resulting in higher cost of capital for mining projects.
- *The reform agenda includes:* (i) **formalization and automation of workflows in mining license administration** to protect the exploration licensing process from irregularities and establish digitally enabled workflows for applications; (ii) Implementation of phased program of **country-wide geophysical mapping**, starting with six high-potential areas and establishment of a digital interface to ensure public access to geological information; (iii) **review of the mining legislation** focusing on international benchmarks to balance investment attraction with rigorous regulatory oversight; and (iv) designing a **fair and competitive mineral fiscal regime** and structuring state equity participation in mining projects for enhanced governance and performance.

**Ensuring sustainable and responsible mining production**

**ETM-rich countries can leverage the mining sector to accelerate their energy transitions.** Mines often lack access to reliable energy sources due to their distance from urban areas.<sup>iv</sup> Large mining companies benefit from strong balance sheets and credit capacity both of which should be leveraged to anchor base-load off-take contracts for energy infrastructure development to create economies of scale for larger systems that benefit adjacent communities and economic activities.

**Ensuring the traceability of production and processing of ETMs.** The traceability of ETMs is increasingly prominent in the responsible mining agenda, often through private sector led solutions. Traceability increases transparency of ETM value chains, strengthens supply chain resilience by eliminating illicit flows, and improves revenue mobilization from the production and processing of ETMs.

**Box 2 – Ensuring the sustainability of mining production in Zambia: Preliminary findings of RISE Roadmap for Power and Transport.**

- Access to **cost-competitive, reliable electricity is a major constraint for expanding Zambia’s mineral output**, which consumes 50% of all power generated. Moreover, **repeated droughts are causing severe power cuts due to Zambia’s dependence on hydropower**. Hydropower resources need to be complemented by investment in alternative renewables and storage, as well as regional power integration. **Zambia’s environmental management agency (ZEMA) faces resource constraints** for reviewing environmental impact assessments (EIAs), monitoring conditions on mining licenses, and conducting compliance visits. Acceleration in mining exploration and development activity would further stretch existing capabilities. Zambia’s **road network serving mining regions faces strain and degradation from heavy freight traffic**, much of which would be better served by reliable long-haul rail connections from and to processing/manufacturing hubs and import/export ports. Major mining operators are supportive of localizing supply chains for key inputs, such as reagents, explosives, and heavy mining equipment. The provision and sustainability of such transport systems requires a clear transport policy, a sound asset management policy for transport infrastructure, and trade facilitation measures in place.



Partnerships with the private sector would help increase efficiency in transport service delivery as well as increase the available financing.

- *The reform agenda includes: **Restructuring ZESCO**, with a focus on operational efficiency and reduction of its debt burden, which presently constrains its ability to enter into offtake agreements for new generation capacity. The World Bank is also exploring potential support through guarantees or financing to facilitate such power purchase agreements. The World Bank is exploring options to **provide technical advice to streamline processes and scale ZEMA's capabilities**. The World Bank has already supported the design and establishment of the Zambia Revenue Agency's integrated mineral tracking system. Additional support is required for efficient revenue collection and integrating inter-ministry reporting.*

### *Leveraging mining operations for broader local economic development*

**Leveraging mining operations can help address infrastructure gaps.** Much of the existing infrastructure serving mining industries has been neglected and operates at a fraction of capacity, particularly rail transport. Moreover, many mineral reserves in Africa are in remote areas without efficient logistics and adequate connectivity to ports. Spatial development planning facilitates the identification of cross sectoral synergies and investment needs within and across geographic areas at national and regional levels for sustainable and competitive regional development strategies. It also serves to identify the potential for clustering of industries, either as firms in the same sector or as diverse firms in the same location, and to assess the viability and siting of special economic zones or corridors.

#### **Box 3 – How RISE is designing reform strategies: Approach and Application to Zambia**

- **RISE combines country-level and regional approaches and is organized around three interconnected pillars:** Regional analytical work for ETM value chain development including solutions to address shared regional challenges such as trade, transportation, energy and skills development; Preparation of energy transition mineral (ETM) country-level roadmaps (Country Roadmap) to evaluate gaps constraining the scale-up of mineral output and industrial diversification and to propose prioritized interventions (i.e., technical advice and investments) to unlock economic potential; Creation of a collaboration platform (regional and possibly at the country-level) for facilitating investment and multi-stakeholder coordination to enhance ETM value chain development.
- **Applying the Country Roadmap approach to Zambia identifies a reform agenda which includes:** (i) Supporting the Government's ambitious sector reform program to pave the way for increased investment in energy, (ii) Enhanced technical capacity to streamline processes and scale the capabilities of ZEMA to monitor and enforce adequate implementation of environmental and social safeguards. (iii) Enhanced governance to support revenue mobilization. In an ongoing activity, the World Bank is already supporting the design and establishment of the Zambia Revenue Agency's integrated mineral tracking system.
- **RISE will also provide analyses to support prioritization of key strategic corridors for investment to improve the connectivity of mining projects.** Careful economic analyses need to be carried out to establish the comparative advantage of each of the key transport corridors: the Dar es Salaam Corridor, the Nacala Corridor, the Walvis Bay Corridor as well as the Lobito Corridor<sup>v</sup>.

### III. UNLOCKING OPPORTUNITIES FOR VALUE ADDITION AND SUPPLY CHAIN DIVERSIFICATION

#### *Opportunities across the ETM value chain*

**Direct investment and offtake agreements are key to unlock opportunities in mine production and global supply chain diversification.** Offtake agreements are a common arrangement in which the mine operators secure difficult-to-find upfront capital to help build their projects and the offtake investor gets optionality on the output (e.g., of metal concentrate) and security of supply. Offtake agreements govern most metal transactions with spot market transactions constituting only a minor share. It is critical to establish longer-term and balanced offtake agreements with appropriate allocation of benefits and risks, and to avoid competitive restrictions. Negotiating these agreements transparently is vital to secure favorable terms for developing economies and for new players.

**Refining and smelting represent segments with potential for ETM-rich countries in southern Africa.** Exports from the region are mostly concentrates, but refining is already happening for copper. The economic viability of a metal refinery depends on economies of scale and relies on the availability of low-cost and preferably renewable energy, as well as offtake agreements with mining operators to secure continuous feed and with buyers to support financing. Such offtake agreements can cover inputs into clean energy value chains but also into other products beyond clean energy.

**Refined and processed ETMs open the door to production of more sophisticated sub-components and green technology in Africa.** Copper value chains in Africa, particularly in Zambia, are more developed downstream compared to other minerals. Zambia hosts mining, processing, and scrap recycling companies presenting significant untapped expansion opportunities. Geographical proximity to markets, product variety, and shorter delivery times offer Zambian manufacturers of copper-based products, like electrification cables, a local and regional competitive edge. Simulations based on current exports and revealed comparative advantage show that countries in Eastern and Southern Africa have the potential to develop more complex exports that could be integrated into clean energy value chains. More country and mineral specific analytics are needed to identify precise opportunities.

**Regional integration and cross-country collaboration are key to move progressively into manufacturing of clean energy components and products, and to develop advanced support services to these industries.** A preliminary study carried out by the World Bank shows favorable conditions for the development of regional clusters. Among the potential opportunities identified are a battery cluster in eastern and southern Africa; a hydrogen cluster in South Africa, Namibia and Zimbabwe; and an aluminum and iron cluster in West Africa. Regional integration is important to access both inputs (e.g., various ETMs needed for battery manufacturing) and markets.

**Increased efficiency of logistics systems can help unlock domestic and regional production.** This entails better coordination between the various parties in the supply chain<sup>vi</sup>, enhanced tracking systems, optimization, and enhanced workforce skills. Additionally, efforts should be made to improve domestic, regional, and international transport infrastructure including the development of storage and warehousing facilities.

**Productive capabilities—including skills, knowledge, technology, and institutional frameworks—are critical for developing ETM value chains.** Countries with established manufacturing and supportive activities, such as chemicals, machinery, and advanced services, are better positioned to move faster into processing and manufacturing. For example, South Africa and Tanzania can leverage their existing capabilities in machinery, chemicals, or vehicle production for ETM-based industries.

**Upskilling local workers and suppliers is essential.** Mining is capital, skill, and technology-intensive and therefore linkages with other activities tend to be limited by the absorptive capacity and technological capabilities of local suppliers and workers in both middle and low-income countries. By investing in human capital development for mining and related activities, governments can also promote diversification into sectors with similar skill requirements.<sup>vii</sup> There is also an opportunity for knowledge transfer if local policies encourage relationships and curriculum guidance between private sector investors and tertiary institutions.

**Improving access to finance, capital and de-risking instruments will help the entry and growth of local and regional businesses and facilitate investments.** Relevant financing aspects for firms along the value chains span organic sources of finance such as inter-firm trade credit, competitive external financing from local and international financial institutions for working capital, long-term financing for capital equipment, and financial support from policy institutions. IFIs can work with sponsors that are committed to sustainable mineral development and provide financing to support private sector operations. Projects that benefit from well-designed financing packages can access various forms of funding support including the use of guarantees that will leverage additional private capital.

**De-risking private investment in mineral value chains is key to achieving diversification of global supply chains.** Direct investment in all industrial stages of the mineral value chain will be critical. Yet, in many developing economies, a risk premium raises the cost of capital. Industrialized countries will have to carefully balance tradeoffs between optimizing the cost structure of ETM projects and securing resilience of mineral supply chains. Effective integration of developing countries in global mineral value chains will contribute to a diversified and more resilient global mineral supply.

### *ETM value addition in refining and manufacturing: policies and investment needs*

**Governments can sustainably boost competitiveness by implementing reforms to attract, facilitate and retain investment in ETM midstream and downstream value chain segments.** Investing in ETM value chains entails navigating through complex licensing, permitting, and compliance processes. These procedures are often overly lengthy, expensive, and unpredictable in African ETM-rich countries.<sup>viii</sup> Regulatory uncertainty regarding tax incentives, new regulations, and contractual compliance, compounded by inconsistencies between national and local policies, can further complicate the investment landscape. Limited resources and capabilities and overlapping mandates (such as combining regulatory functions with investment promotion), hinder government efforts to promote investment and deliver complementary services. For example, the Zambia Development Agency (ZDA) functions overlap with the Ministry of Mining, the proposed new Mineral Regulation Commission, and the investment arm of the Industrial Development Corporation (SOE holding).

**Governments can attract investments in ETM value chains with targeted investment promotion strategies.** These strategies should be based on in-depth sector studies of the global ETM market and the country's comparative advantages. Investment promotion strategies need to be accompanied by robust action to streamline licensing, permitting and other entry and operation regulations for investors in targeted segments and to strengthen investor rights, contract enforcement, and transparency to de-risk investment. Alignment with WTO's Investment Facilitation Agreement under discussion can be a useful tool to attract and retain investment.<sup>ix</sup> These measures to strengthen investor confidence should be implemented alongside ensuring that robust environment standards and regulatory compliances are met.

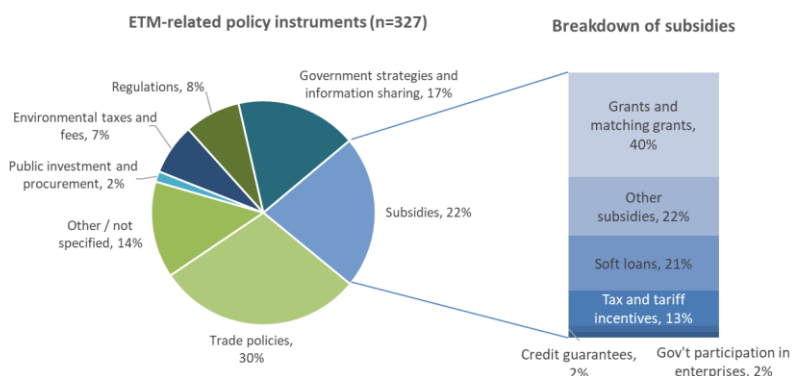
**Green industrial policy is gaining momentum as governments aim to accelerate the green transition.** A review of existing databases that track climate-related government interventions shows that between 2018-2023, more than 500 policy measures were announced or implemented for clean energy products value chains by 52 countries, of which 327 are targeted to ETMs (Figure 3). ETM-related policies primarily

stem from high-income countries, and some emerging economies like China, India, and Türkiye. ETM-rich countries in Africa account for a small share of policies (4%), mainly DRC and South Africa. Low and lower-middle-income countries, which face more fiscal constraints, typically rely on regulations requiring multinationals to invest in local refining/processing capacity or on export restrictions such as taxes or bans on mineral exports.

**Subsidies warrant careful attention and should be limited.** While they may be necessary to foster innovation and R&D such as in EV battery technologies, subsidies risk distorting competition and diversification as they aim to promote local production and sourcing. When subsidies and tax incentives are used, they should be transparent, time-bound, and monitorable. Conditionalities linked to broader social and development co-benefits, such as tax deductions for training programs and R&D, can enhance positive impacts.

**Local Content Policies (LCPs) can only be effective when they are administered to improve local capabilities and are transparent and monitorable** (like Botswana’s employment targets); or when the policy targets increase gradually in line with local capabilities (as in Ghana) and have a phase-out mechanism. LCPs can focus on value addition and technology transfer and be complemented with measures to increase workforce skills (as CORFO in the case of Chile) and facilitate joint ventures of global and local suppliers. Specific agreements can also be reached including government commitments to improve infrastructure and country-level capabilities in exchange for increased reliance on local content (as in Morocco).

**Figure 3. Policy instruments announced or implemented related to clean energy products and ETMs (2018-2023)**

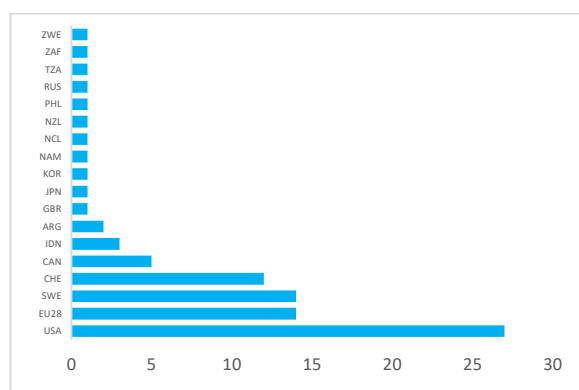


Source: World Bank Green Industrial Policy Database. Preliminary results based on data from four sources: Climate Policy Database, OECD Green Recovery Database, Global Trade Alert, and IEA Critical Mineral Policy Tracker.

Notes: A policy may be tagged to multiple instruments. Subsidies to single firms can be various kinds (e.g., grants, credit guarantees and other subsidies). ETM-related policies are those that target at least one out of a list of 60+ ETMs including rare earths.

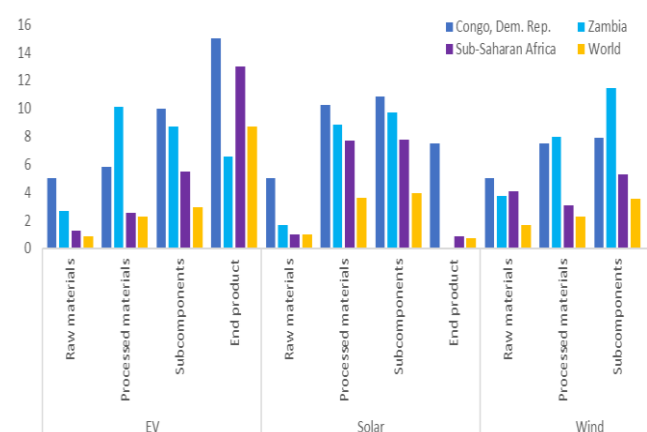
**Export restrictions on ETMs and import tariffs on inputs can be distortive, discourage investments in exploration and mining, and limit global access to ETMs.** These restrictions do not address typical binding constraints, such as high infrastructure costs, lack of skilled labor, or an unfavorable investment climate. They can also affect availability and prices of these materials, reduce export earnings and the possibility of offtake agreements to make investments economically viable (Przemyslaw and Legendre, 2023). As of April 2024, several African countries impose export restrictions on ETMs (Figure 4). In Africa, average import tariffs on components for producing EV, wind and solar products are relatively high, potentially hindering the integration into clean energy products value chains and limiting access to clean energy technologies. Tariffs in ETM-rich Zambia and DRC tend to increase along the value chain, a typical pattern for countries globally but tariffs in Zambia and DRC are much higher than world average (Figure 5).

**Figure 4. Export restrictions on ETMs (April 2024)**



Note: Number of policies in force (export bans, export taxes and export licensing requirements) on copper, nickel, cobalt, lithium, graphite, and rare earths implemented since April 2022.  
Source: Global Trade Alert.

**Figure 5. Average applied tariffs (%) in Zambia, DRC, Sub-Saharan Africa, and World**



Source: 2021 tariff data from World Bank's World Integrated Trade System

**Special Economic Zones (SEZs) are increasingly utilized by developing countries, notably in Africa, to boost manufacturing and promote local processing of natural resources, including ETMs.** SEZs frequently fail to address critical bottlenecks such as inadequate access to reliable power supply and essential infrastructure and are costly. Economic agglomeration can enable knowledge and technology transfer through mutual learning and promote forward and backward linkages. However, SEZs have frequently operated as enclaves with minimal linkages to the surrounding economy that limit the potential for local value addition. They also come at a cost of foregone fiscal revenues which could be used to address infrastructure needs. In Zambia, fiscal incentives have not proven sufficient to compensate for other underlying impediments to investment such as insufficient infrastructure and administrative delays.<sup>x</sup>

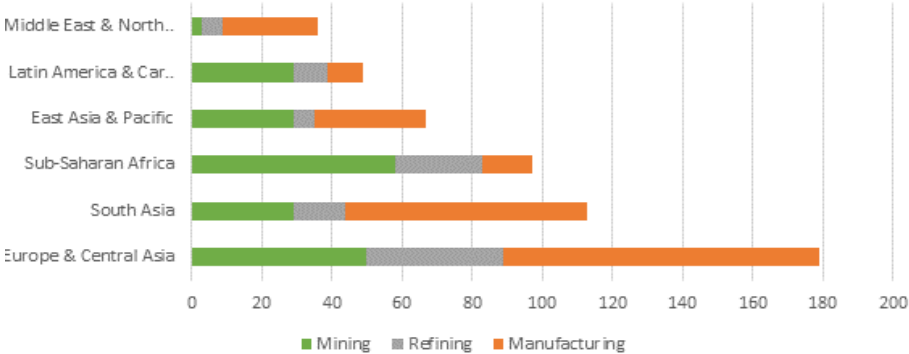
**To facilitate ETM value addition, SEZs should address investors' needs while ensuring macroeconomic stability and fiscal sustainability.** This includes providing superior infrastructure such as robust transport and connectivity to ensure the supply of raw materials from domestic and regional mining areas, as well as reliable energy supply to support energy-intensive processing activities.<sup>xi</sup> SEZs should consider means to increase sustainability including by investing in water treatment and recycling facilities, and reducing environment and carbon footprints important for ETM value chains in line with the Carbon Border Adjustment Mechanism (CBAM) and environmental standards.

**Governments are also taking a renewed interest in acquiring ownership stakes in companies throughout ETM value chains given their strategic importance.** According to the World Bank Business of the State database, 56 countries have at least one company with state shareholdings (BOS) in mining activities, refining of minerals or metal manufacturing in 2019 (Figure 6). In Africa, most of these companies operate in mining, and countries with the highest number of BOS in mining include Zambia with 13 BOS (e.g., in copper), South Africa with 17 (e.g., in iron ore and platinum), and Ghana with 21 (e.g., bauxite and manganese).<sup>xii</sup> Even in countries where BOS exist, the private sector remains pivotal in the industry.<sup>xiii</sup> Fiscal constraints often hamper government's ability to fund their equity interests, therefore, their ownership structure and financial sustainability need to be developed to address these challenges.

**A new wave of government interventions in ETM value chains through SOEs calls for a more detailed understanding of their benefits and risks<sup>xiv</sup>.** These risks include fiscal impacts, institutional capacity

constraints for good performance, and potentially poor governance of SOEs. Public ownership can also lead to low productivity and crowd out the private sector if regulations provide preferential treatment to SOEs and BOS and unlevel the playing field with the private sector. For revenue maximization, improvements in royalties and tax revenue collection may be better-suited approaches. Once SOEs and BOS are operational, it is important to review the sector regulations and maintain a level playing field for both public and private sector players.

**Figure 6. Number of BOS by region and type of activity in the ETM value chain**



Source: World Bank Business of the State  
 Note: Among the top mineral exporters, Peru and Angola do not have BOS in mining.

**IV. HOW CAN THE G7 SUPPORT ECONOMIC TRANSFORMATION IN ETM-RICH DEVELOPING COUNTRIES TO MAXIMIZE THE IMPACT OF RISE**

**Facilitating the participation of developing countries in ETM markets is crucial for global mineral supply chain resilience, and promoting inclusive, sustainable and responsible development.** Supporting ETM-rich developing countries to seize the opportunities opened by the global energy transition will contribute to three global public goods (i) enhancing ETM supply to meet global demand, (ii) improving the efficiency and resilience of supply chains and (iii) promoting inclusive development and poverty eradication which are foundations for peace and security. This can be achieved through a cooperative, transparent and comprehensive approach which holds greater promise than isolated strategies. Several steps can be taken to accomplish this:

- **Identify value-addition opportunities, and policy and planning support to governments in ETM-rich developing countries including through the RISE initiative.** Further technical assistance from international partners is needed to foster regional trade facilitation and the movement of goods and services to support the growth of ETM regional clusters that will enhance the supply response from developing countries. More investment and concessional funding to complement financing by IFIs—importantly for costly enabling infrastructure such as transport and energy – will also be required. The G7 support to develop and operationalize the RISE country roadmaps will play a critical role in moving forward.
- **Direct private investment is key.** Security of supply will be achieved by diversified offtake agreements, including with operators in developing countries. The G7 could explore efficient de-risking mechanisms to facilitate private investment in mineral supply chain resilience in exchange for offtake agreements.
- **Support developing country governments in designing and implementing open and transparent investment regulations and trade policies to attract responsible and sustainable private investments in ETM value chains,** as identified in the RISE roadmaps. This entails providing guidance

on cost-effective incentives, de-risking tools such as investment guarantees, capacity building to bridge information asymmetry regarding investment opportunities, streamlining investment regulations and licensing, and enhancing taxation governance.

- **The G7 could base eligibility for market access on compliance with technical, environmental and social standards, rather than preferential regimes.** This will help promote diversified supply and FDI in ETM-rich African countries, and create incentives to improve the social and environmental sustainability of ETM mining, refining and processing. The G7 could provide technical and financial assistance to ETM-rich economies to facilitate technology transfer and compliance.
- The G7 could also **align standards and regulations and provide assistance to ETM-rich developing countries** to ensure compliance and increased ETM supply. The proliferation of emission standards and various climate policies, including carbon pricing mechanisms along with corporate net-zero targets, is increasing trade costs globally. Substantial support from development partners will be vital to enhance the capabilities of developing country governments and local market players in compliance, thereby fostering sustainable, responsible, and inclusive ETM value chains.



## Annex 1: The RISE Partnership in Southern Africa, Key Milestones

The RISE Partnership managed by the World Bank Group is designed to strengthen global supply chain diversification of clean energy products. The *Positioning East Africa to Benefit from the Global Energy Transition Project*, a RISE pilot program, was launched in November 2023 to implement the RISE Partnership. The pilot program aims to leverage green minerals for economic transformation through a combination of country-level and regional approaches. The Pilot Program, which is expected to be implemented over the next 3 years, is organized around three interconnected pillars:

1. Preparation of regional analytics for regional ETM value chain development including solutions to shared regional challenges such as trade, transportation, energy and skills development. Regional analytics and selected pre-feasibility studies are expected to be completed over the next 24 months. The initial group of countries considered in the Regional Roadmap include: Angola, Botswana, Burundi, DRC, Madagascar, Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe.
2. Preparation of multi-sectoral and multi-agency country-level roadmaps to evaluate gaps constraining the scale-up of mineral output and industrial diversification and to propose prioritized interventions (i.e., technical advice and investments) to unlock economic potential. Completion of the initial phase of roadmaps is expected over the next 12 months;
3. Creation of a platform for facilitating multi-stakeholder coordination to enhance energy transition minerals supply capability and value chain development. The strategy for multi-stakeholder engagement is expected to be finalized over the next 6 months; and

Since commencing this program in November 2023, the World Bank team has advanced on the following activities:

- **Launched regional analysis of:**
  - A geospatial and intertemporal asset-level assessments of ETM potential and output to 2050 under two different scenarios to generate a view of potential output, value addition, and demand for inputs such as skills, energy and transportation.
  - The potential for regional participation in mineral value chains, including input-output mapping for mineral commodities and manufacturing products, and competitive benchmarking of regional production; and
  - Vulnerability of mineral-rich regions to violent conflict and human rights abuses, including identification of interventions to mitigate adverse social impacts from resource development.

Subsequent regional work will leverage the World Bank's regional transportation and energy models to assist in determining bottlenecks to roll-out roadmaps and identification of critical transformational investments in infrastructure.

- **Initiated country-level roadmap projects for Zambia, the DRC, and Malawi.** These countries were targeted for the first phase of roadmaps because of requests from their governments for support of mineral development, their significant mineral potential (particularly for copper, cobalt, nickel, and graphite) and the infrastructure challenges (particularly for energy and transport) constraining new and expanded mining and value addition.
- **Initiated preparations of a Local Information Platform in Africa.** This activity will use the World Bank's convening power to encourage collaboration between governments, investors, multilateral and bilateral development partners, civil society groups, and regional and

international organizations to facilitate development of ETM value chains at scale and further value-addition opportunities locally. As countries sign different MOUs and collaboration agreements with bilateral, multilateral and private sector entities to develop their ETM value chain potential and promote regional integration more generally anchored around ETM value chain opportunities, this activity will promote realization of opportunities identified under collaboration agreements by offering technical assistance and capacity building support to agencies mandated by the parties to operationalize the agreements. This activity will also potentially support advocacy for regional and international arrangements for managing conflict, environmental, and social risks, as well as support events (e.g., workshops and conferences) that help to share knowledge and raise awareness of ETM opportunities and challenges in AFE countries. This activity will ensure collaboration with existing global and continental (e.g., UNECA, UNEP, AU), regional (e.g., SADC) and country level coordination bodies as it pursues collaboration/coordination efforts to maximize synergies.

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<sup>i</sup> This note copper, cobalt, lithium, manganese, nickel, and graphite, which are important energy transition minerals (ETMs) for Eastern African countries, although the list of priority ETMs varies by country.

<sup>ii</sup> IRA in the United States provides tax incentives for EVs that use minerals sourced from FTA countries or recycled in North America. It also offers tax credits to companies if a certain percentage of the value of critical minerals in EV batteries is extracted or processed in the US or FTA partner countries. Similarly, in April 2023, Japan announced that it will cover up to half the cost of mine development and smelting projects for critical minerals by Japanese companies. In February 2023, South Korea issued a list of 33 critical minerals eligible for policy support. South Korea aims to increase its stockpiles from 54 days to 100 days of anticipated demand and will support Korean investment in overseas exploration and development projects through access to loans, guarantee, insurance, and tax credits, reducing risks for Korean investors. The CRMA sets EU diversification targets by 2030 which include sourcing 10% of ETMs from EU extraction, 20% from domestic recycling, 50% from EU processing, and capping single third-country ETM imports at 65%.

<sup>iii</sup> The Notice of Proposed Rulemaking (NPRM) that provides clarity on the eligibility criteria for the US IRA tax credit includes the following countries: Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Japan, Jordan, Korea, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, and Singapore. <https://home.treasury.gov/news/press-releases/jy1379>

<sup>iv</sup> Energy accounts for approximately 30% of total cash operating costs for mining companies. Effective energy management programs that combine efficiency gains with renewable energy sources could reduce energy consumption by 15-20% in existing mines, and up to 50% in new mines (Deloitte, 2016).

<sup>v</sup> The US is currently financing a pre-feasibility study for a connection from Zambia to the Lobito corridor railway in Angola to primarily support mining and other activities in Zambia's Western Province where substantial growth in copper and nickel production is projected.

<sup>vi</sup> Third-party logistics (3PL) providers providing door to door multi-modal solutions.

<sup>vii</sup> For instance, Chile has implemented the Mining Skills Council (CCM) that identifies required skills and develops training programs, CORFO's, Chilean economic development agency, Supplier Development Program that provides technical assistance and funding to local suppliers, a dual education system combining classroom learning with on-the-job training, and the METS Ignited initiative that promotes collaboration and innovation in the mining equipment, technology, and services sector.

<sup>viii</sup> OECD FDI Restrictiveness Index, SADC Investment Climate Scorecard. In fact, ETM rich African countries are more restrictive on OECD's FDI Restrictiveness Index, including in the mining and manufacturing sectors.

<sup>ix</sup> In line with the WTO's Investment Facilitation for Development Agreement currently under negotiation. ETM rich African countries such as Angola, Zambia, DRC, Mozambique, Zimbabwe are already participating in the discussions.

<sup>x</sup> A 2021 joint monitoring exercise by the Zambia Development Agency (ZDA) and the Ministry of Finance and National Planning of a sample of companies which had been granted fiscal incentives highlighted poor infrastructure, with inadequate electricity provision and limited road access as the key challenges to their activity. Other issues highlighted were land ownership within MFEZs/IPs, delays in getting VAT refunds, and access to finance. Other hindrances relate to administrative delays and barriers in getting various licenses and permits (IMF Country Report No. 23/257).

<sup>xi</sup> This does not require a special trade or tax regime characteristic of SEZs, and could be achieved by fostering the development of standard industrial parks focusing on the provision of serviced industrial land and services to tenants.

<sup>xii</sup> State ownership in ETM companies in SSA primarily consists of minority stakes (10-25%), which accounts for almost 60% of total ownership structure, contrasting with the global average, which is about half.

<sup>xiii</sup> Chile's Codelco, the state-owned copper enterprise, has historically competed with private firms and maintained good performance. However, it is currently grappling with issues such as limited investment, declining production, cost overruns, and financial weakness.

<sup>xiv</sup> For instance, Zambia is considering establishing a new SOE to engage in joint ventures with the private sector in copper; Indonesia established the Indonesia Battery Corporation in 2022 to develop an integrated EV supply chain and become an EV battery producer and exporter. However, it is currently facing issues of commercial viability. In Chile, the existing framework does not permit mining concessions for lithium, and the government has announced plans to partially nationalize its lithium industry by acquiring stakes in existing mining companies with long-term contracts. Similarly, Mexico has created a national monopoly for the exploration and mining of lithium, requiring investors to give the SOE LitoMx a majority stake.