Confidential

Independent Market Research on Global Non-ferrous Metal Industry

For

Jinxun stock
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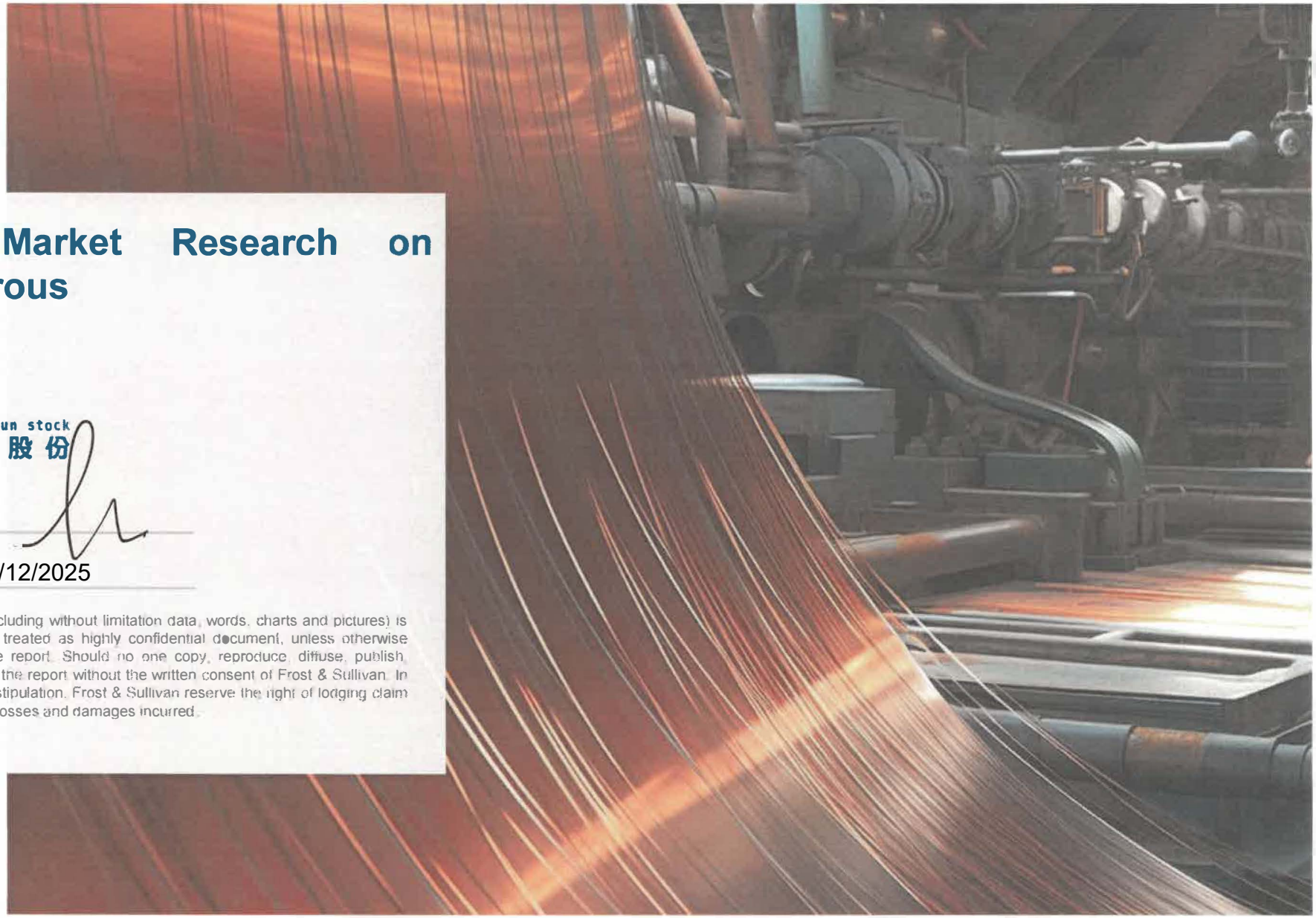

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Global Non-ferrous Metal Market Overview

Definition and Importance of Non-ferrous Metals

Definition of Non-ferrous Metals

- Non-ferrous metals are all metals except iron, manganese and chromium, representing a category of metals with a wide range of industrial uses. Based on physical and chemical properties, non-ferrous metals can be divided into base metals (e.g. copper, aluminum, lead, zinc), precious metals (e.g. gold, silver, platinum group metals) and rare metals (e.g. cobalt, lithium, tungsten, molybdenum). In addition, they can be classified according to their density into light metals (e.g. aluminum, magnesium) and heavy metals (e.g. copper, lead). The diversity of non-ferrous metals makes them widely used in various industrial fields and is an important pillar of modern industrial production and scientific and technological development.

Importance of Non-ferrous Metals

Fundamental Pillar of Industrial Production

- Non-ferrous metals are essential raw materials in modern industry, with wide-ranging applications in power generation, construction, transportation, and manufacturing. For example, copper, known for its excellent electrical and thermal conductivity, is a core material in power transmission and electronic products. Aluminum, with its lightweight and high-strength properties, is extensively used in the automotive, aerospace, and construction sectors. Non-ferrous metals provide irreplaceable support for traditional industries and infrastructure development.

Cornerstone for Emerging Industries

- In emerging fields such as new energy, electronic information, and intelligent manufacturing, the role of non-ferrous metals has become increasingly significant. For instance, lithium and cobalt are key materials in lithium batteries, forming the foundation of the electric vehicle and energy storage industries. Rare earth metals are widely used in high-performance magnetic materials, lasers, and wind turbines. Non-ferrous metals drive the rapid advancement of new technologies and facilitate the global economic transformation and upgrading.

Drivers of Technological Progress and National Defense Development

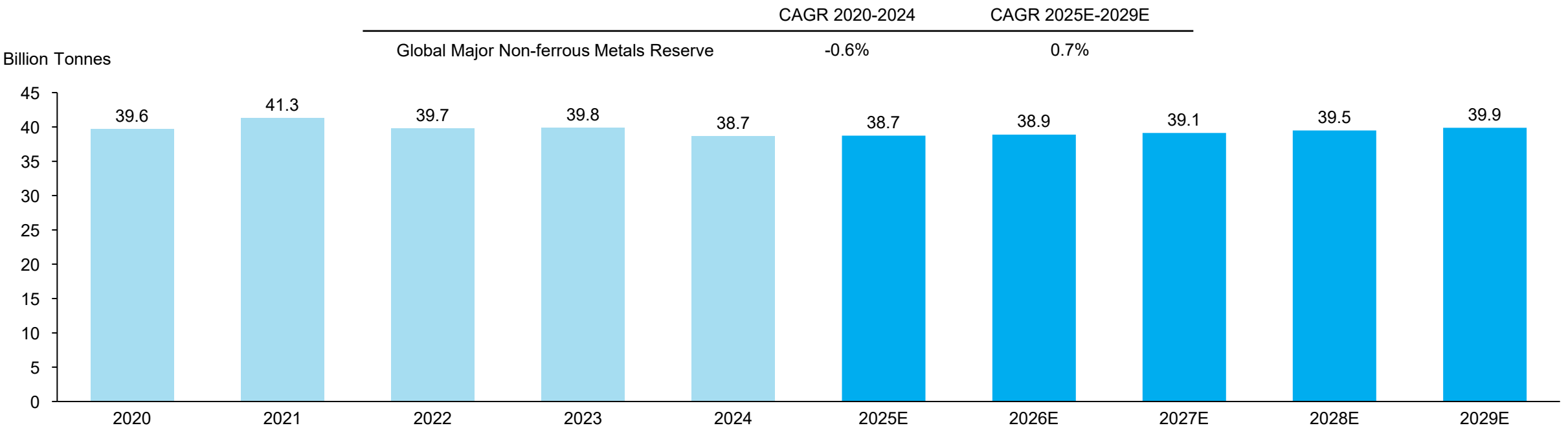
- Due to their unique properties, non-ferrous metals play a crucial role in high-tech industries and national defense. For example, titanium alloys, known for their high strength and excellent corrosion resistance, are widely used in aerospace and submarine manufacturing. Precious metals like platinum and gold are vital in catalysts and semiconductor chip production. Non-ferrous metals contribute to national technological competitiveness and security.

Source: Frost & Sullivan

Global Non-ferrous Metal Market Overview

Global Major Non-ferrous Metals Reserve

Major Non-ferrous Metals Reserve (Global), 2020-2029E



- The global major non-ferrous metals reserve refers to the economically extractable quantities of major non-ferrous metals, that is, are deemed recoverable under current technological and economic conditions. The global reserve of major non-ferrous metals have remained relatively stable over the past year. From 2020 to 2024, global reserve of major non-ferrous metals decreased from 39.6 billion tonnes to 38.7 billion tonnes, with a CAGR of -0.6%. This reduction may be attributed to accelerated industrial consumption during the post-pandemic recovery, along with supply chain disruptions and insufficient investment in mining exploration. Looking ahead, driven by steady investment in global exploration activities in resource-rich regions such as South America and Africa, as well as advances in geological exploration technologies such as deep-earth imaging and remote sensing, global reserve of major non-ferrous metals expect to increase to 39.9 billion tonnes by 2029, with a CAGR of 0.7% from 2025 to 2029.

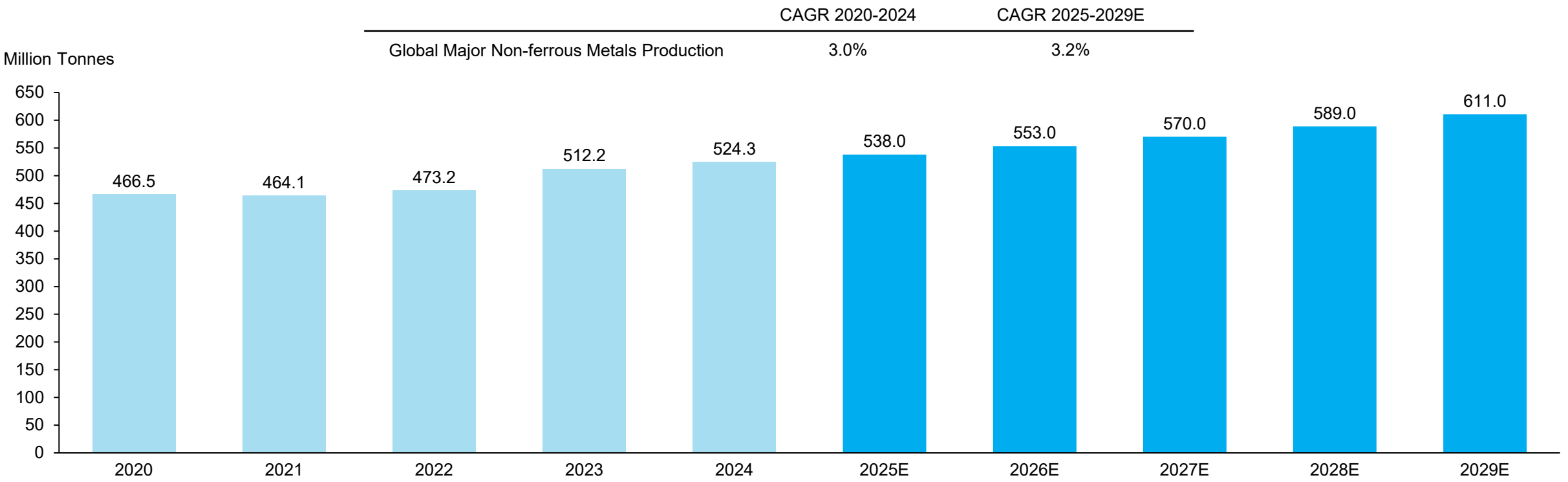
Note: Major non-ferrous metals in the chart refers to copper, aluminum, lead, zinc, nickel, tin, antimony, magnesium, titanium based on industrial prevalence and data availability.

Source: USGS, Frost & Sullivan

Global Non-ferrous Metal Market Overview

Global Major Non-ferrous Metals Production

Major Non-ferrous Metals Production (Global), 2020-2029E



- The global production of major non-ferrous metals has shown a steady upward trend in recent years, driven by increasing infrastructure investments and rising demand for key metals in renewable energy technologies. Global production of major non-ferrous metal increased from 466.5 million tonnes in 2020 to 524.3 million tonnes in 2024, with a CAGR of approximately 3.0%. This growth has been fueled by expanding urbanization, the transition to clean energy, and the growing need for materials such as copper, aluminum, and lithium in electric vehicles and energy storage systems. In the future, it is projected to reach 611.0 million tonnes in 2029, representing a CAGR of 3.2% from 2025.

Note: Major non-ferrous metals in the chart refers to copper, aluminum, lead, zinc, nickel, tin, antimony, magnesium, titanium based on industrial prevalence and data availability.

Source: USGS, Frost & Sullivan

Global Non-ferrous Metal Market Overview

Market Drivers and Development Trends

1 Rapid Growth in Demand Driven by the New Energy Industry

- The rapid development of the new energy industry, particularly in electric vehicles, energy storage and photovoltaic sector, has significantly increased the demand for non-ferrous metals such as copper, cobalt, and aluminum. Copper plays an irreplaceable role in electrical equipment and batteries; cobalt is a key raw material for lithium battery cathodes; and aluminum has become an essential material for electric vehicles due to its lightweight and corrosion-resistant properties. As the global transition to green energy accelerates, the demand for these metals is expected to continue growing at a high rate.

2 Technological Advancements Drive Expansion of High-end Applications

- Technological advancements in high-end fields such as 5G communications, artificial intelligence, and aerospace continuously elevate performance requirements for non-ferrous metals, thereby expanding their application scope and driving overall demand. Breakthroughs in these sectors necessitate advanced material properties, for instance, ultra-high-purity copper for low-loss signal transmission in 5G infrastructure, specialized aluminum alloys for thermal management in AI servers, and cobalt or rare earths with precise magnetic characteristics for semiconductor manufacturing and high-efficiency motors. As innovations enable next-generation applications, such as miniaturized chips, satellite systems, and solid-state batteries, they simultaneously broaden the consumption of non-ferrous metals across emerging industries and intensify material specifications. This evolution creates demand for high-value-added products, which are premium-grade non-ferrous metals or components engineered to meet extreme technical standards, such as radiation-resistant aluminum for aerospace structures or nanostructured rare-earth magnets for EV drivetrains. These products command significantly higher prices due to stringent purity thresholds, specialized processing, and their critical role in enabling high-margin technologies, thereby transforming raw materials into economically elevated solutions.

3 Deepening Global Industrial Chain Collaboration

- The non-ferrous metals industry is highly globalized in both production and consumption, with upstream mineral resources and downstream processing industries increasingly working in close coordination. For example, the abundant copper and cobalt resources in Africa and South America complement major manufacturing and processing hubs such as China. Meanwhile, deeper international cooperation and technological exchange have further enhanced industry efficiency and resource utilization.

4 Green and Intelligent Development Becomes the Industry Mainstream

- In response to stricter environmental regulations and the growing demand for a low-carbon economy, the non-ferrous metals industry is accelerating its transition toward greener and smarter operations. Companies are adopting clean energy, increasing recycling rates, and optimizing production processes to reduce carbon emissions and environmental pollution. Additionally, the application of digital technologies and AI in mining, smelting, and processing is enhancing production efficiency and resource utilization, driving the industry toward high-efficiency development.

Source: Frost & Sullivan

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Global Copper Cathode Market Overview

Definition and Classification of Copper Cathode

Definition of Copper

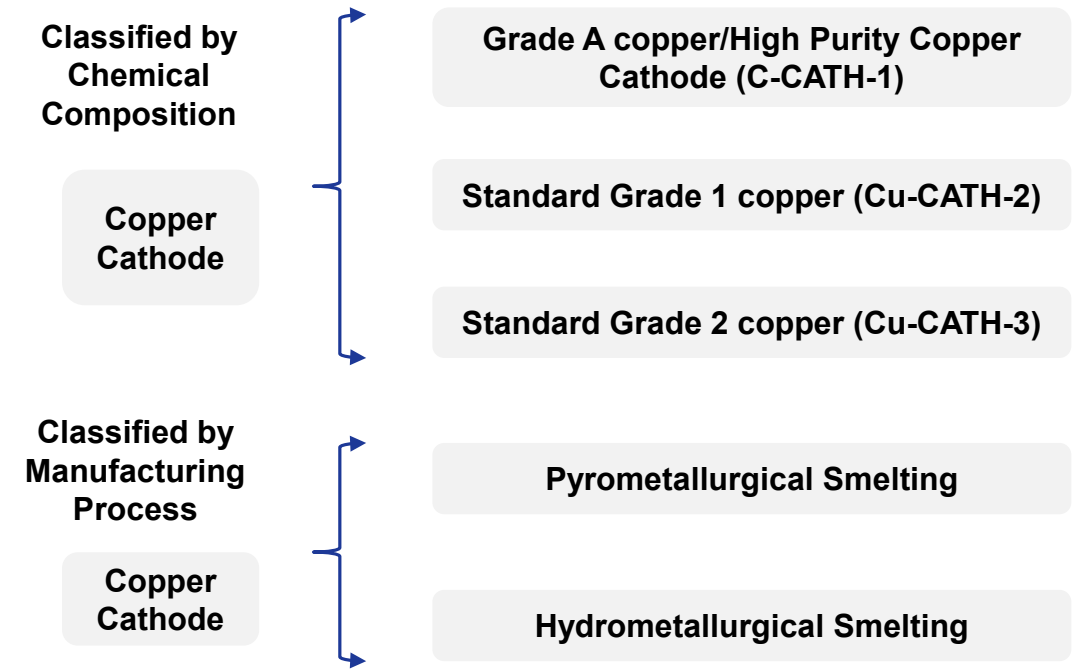
- Copper is a chemical element with a distinctive rose-red metallic luster (freshly cut surfaces exhibit an orange-red hue). Renowned for its excellent electrical and thermal conductivity, corrosion resistance, and ductility, it is one of the earliest metals known to humankind and is widely used in the manufacture of various products, including electrical and electronic components, construction materials, and machinery. Copper primarily occurs in nature as sulfide and oxide ores, which, after extraction, smelting, and refining, can be processed into various forms of copper materials, such as copper cathode, copper alloys, and fabricated copper products, and applied in multiple critical industries.

Definition of Copper Cathode

- Copper cathode, is high-purity copper produced through pyrometallurgical or hydrometallurgical refining method. During the electrolysis process, copper ions deposit on the stainless steel or titanium cathode plates, high-purity copper sheets. After stripping, copper cathode needs to be melted, cast, and rolled to eliminate impurities and porosity, ultimately being processed into dense materials such as copper rods and copper pipes. This refined copper serves as a critical raw material for high-end conductive applications, including superconducting cables, vacuum devices, and electronic components.

Global Standard	Detailed Description
ASTM B115-10(2021)	This specification establishes the requirements for electrolytic copper cathode by U.S. specifically with copper content ≥ 99.95%
GB/T 467-2010	This represents the Chinese national standards, with classification into copper into standard grade (Cu≥99.95%) and high-purity grade (Cu≥99.9935%).
EN 1978:1998	This European Standard specifies the composition and property requirements for cathodes of two copper grades, designated Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A).

Classification of Copper Cathode



FROST & SULLIVAN 沙利文

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Importance of Copper Cathode

Key Raw Material for Industrial Manufacturing

Copper cathode, due to its exceptional electrical conductivity, thermal conductivity, and ductility, plays a pivotal role in the global industrial landscape, finding extensive applications across critical sectors such as infrastructure, consumer electronics, construction, and transport, etc. It serves as a fundamental raw material for global industrial production, providing a solid material foundation for the vigorous development of modern industry. Specifically, in the infrastructure industry including power and telecom, core products such as wires and cables, transformers, and motors rely heavily on high-purity copper cathode, with its quality directly determining the performance and reliability of these products. In the electronics industry, copper cathode is a crucial material for manufacturing printed circuit boards, integrated circuits, and other electronic components, where its purity and conductivity directly impact the operational efficiency of electronic devices. In the construction industry, copper cathode is widely used in piping, roofing, decorative materials, with its corrosion resistance and aesthetic appeal adding lasting value to modern buildings. Furthermore, with the rapid development of electric vehicles and rail transit, the application of copper cathode in areas such as batteries, motor drive systems, and electrified railways is expanding, becoming a vital force in promoting green transportation.

Essential Components for the New Energy Industry

As a vital core material in the new energy sector, copper cathode plays a crucial role in green energy applications such as electric vehicles, wind power, and solar energy, due to its high purity. From the robust batteries powering electric vehicles to the efficient transmission systems for wind and solar electricity, copper cathode ensures stable and reliable performance. With the global shift toward sustainable energy accelerating, the new energy industry is experiencing rapid growth, driving a sharp rise in copper cathode demand. This surging market need presents both significant opportunities and new challenges for the copper cathode industry.

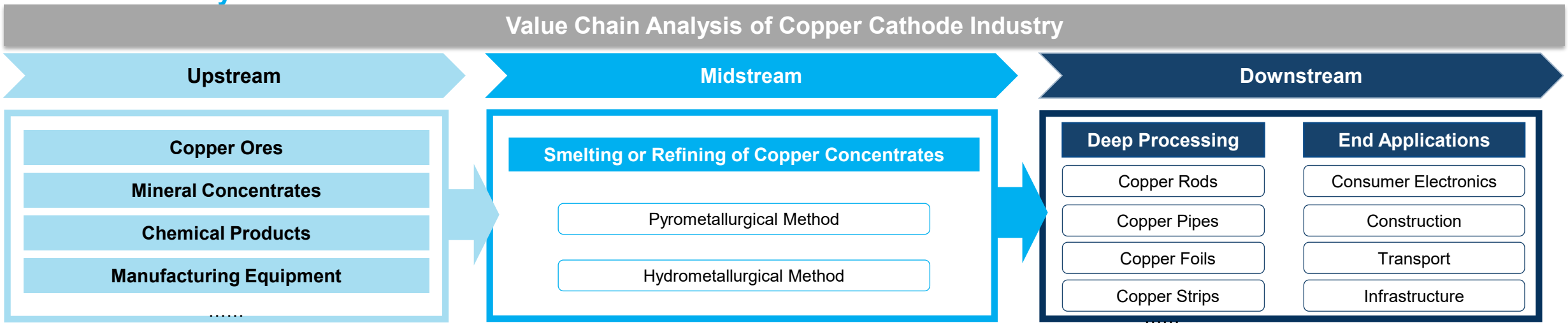
Critical Indicators of Global Trade and Economy

Copper cathode, a vital trading commodity in the international non-ferrous metals market, not only reflects the global economic landscape through its supply and demand dynamics and price fluctuations but also profoundly reveals the pulse of industrial upgrading. For increasingly interconnected global industrial chain at present, the stable supply and reasonable pricing of copper cathode are of irreplaceable strategic significance for maintaining the stability of the global industrial chain and promoting sustained economic growth. Particularly against the backdrop of burgeoning emerging industries like new energy and intelligent manufacturing, the demand for copper cathode is exhibiting robust growth momentum, further highlighting its strategic position in the global economic framework.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Value Chain Analysis



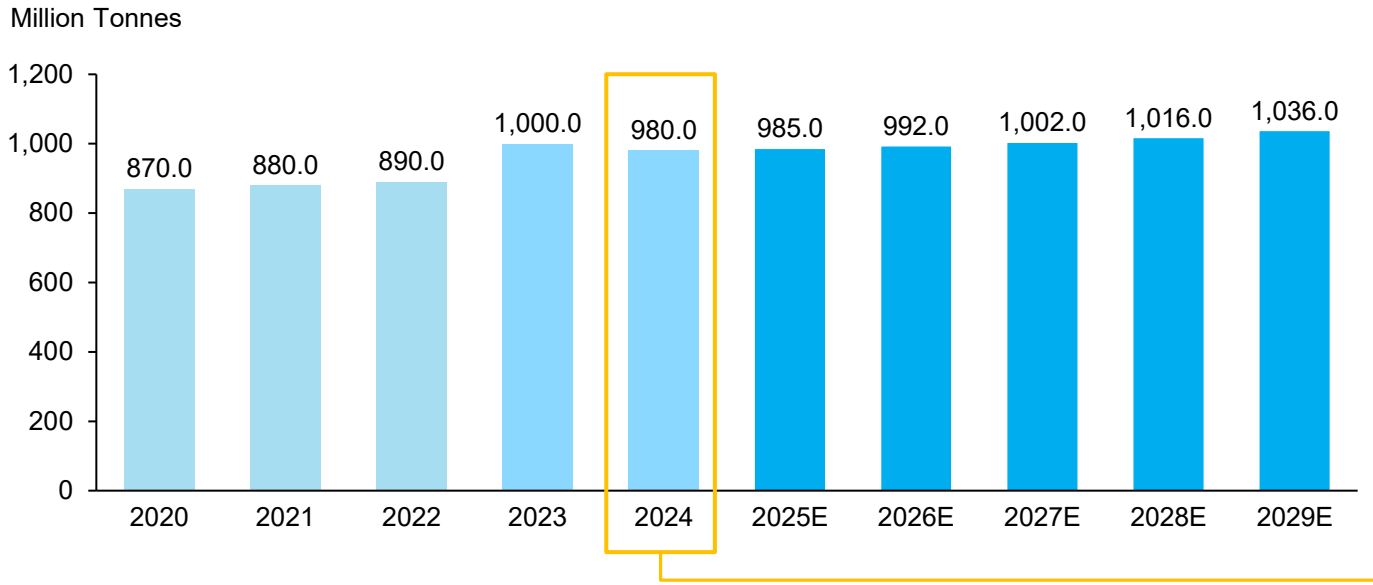
- The upstream of copper cathode industry includes copper mining and primary processing of copper ore resources. The production of copper cathode begins with the extraction and beneficiation of copper ore resources. Core players in the upstream market primarily include copper mining companies, copper primary processing enterprises, and manufacturing equipment producers. The main types of copper ore include sulfide copper ores and oxide copper ores. Through exploration, mining, and beneficiation, high-grade copper concentrate is extracted. In addition to resource development and processing, copper concentrate trading plays a critical role in connecting global supply and demand. As an intermediate commodity, copper concentrate is often traded internationally before entering smelting facilities, and its price fluctuations have a direct impact on cost control and procurement strategies of smelters. The core value of this stage lies in improving the ore grade through technical means, providing high-quality raw materials for subsequent smelting processes. Factors such as resource reserves, ore grade, and geographical location directly affect supply chain stability and cost structure.
- The midstream of copper cathode industry engages in the smelting or refining of copper concentrate, mainly including pyrometallurgy and hydrometallurgy methods. Core players in the midstream market primarily include copper concentrate processors. Pyrometallurgy is mostly used for sulfide ores, removing impurities through high-temperature smelting, and subsequently requires electrolytic refining to purify it into copper cathode with a purity of 99.95% or higher. Hydrometallurgy is more suitable for oxide ores, directly producing copper cathode through solvent extraction and electrowinning, without the need for additional refining. The value-added in the midstream segment mainly depends on the advancement of smelting technology and large-scale production capacity. Low-energy consumption and low-pollution smelting technologies have become the focus of industry development.
- The downstream associates with deep processing and end-use applications of copper cathode. Core players in the downstream market primarily include copper deep processing enterprises, as well as enterprises in applications such as NEV and electronics manufacturers. Copper cathode is the core raw material for copper processing, and through processing, it is made into copper rods, copper pipes, copper foils, etc., which are widely used in industries such as consumer electronics, infrastructure, construction, and transport. Downstream demand is driven by the rapid development of those industry, leading to a gradual increase in the demand for high-performance copper materials. The stringent requirements of the end market for the quality and functionality of copper materials promote technological innovation and industrial upgrading in downstream segments.

Global Copper Cathode Market Overview

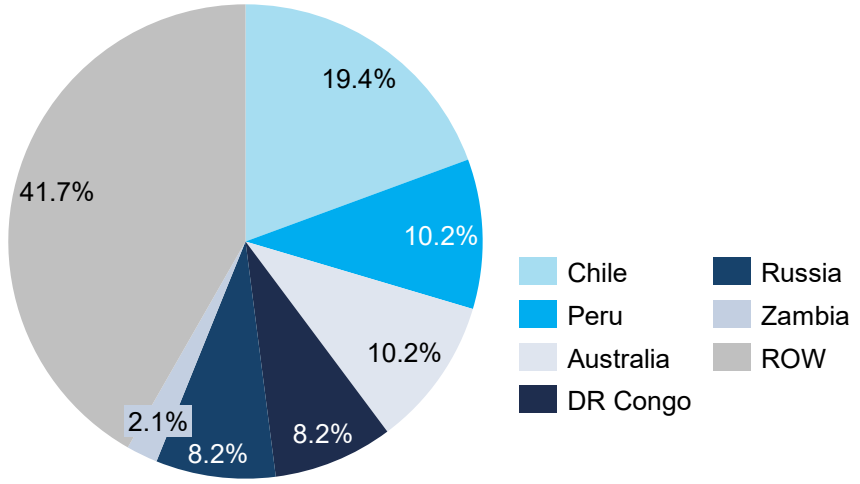
Global Copper Reserve

Copper Reserve (Global), 2020-2029E

	CAGR 2020-2024	CAGR 2025E-2029E
Global Copper Reserve	3.0%	1.3%



Breakdown of Copper Reserve in Major Countries and Regions Worldwide, 2024



- Copper has become a major industrial metal due to its high ductility, malleability, thermal and electrical conductivity, and resistance to corrosion. Copper serves as a core material in the manufacturing of essential products and infrastructure, from electricity transmission and electronic devices to construction, transportation, and renewable energy technologies. Global copper reserve has increased from approximately 870.0 million tonnes in 2020 to approximately 980.0 million tonnes in 2024, representing at a CAGR of 3.0%. The major countries in global copper reserves are Chile, Peru, Australia, and the DR Congo, among others. In Africa, copper reserves are mainly concentrated in the DR Congo and Zambia. As of 2024, the copper reserves of the DR Congo and Zambia account for approximately 10% of the global copper reserves.

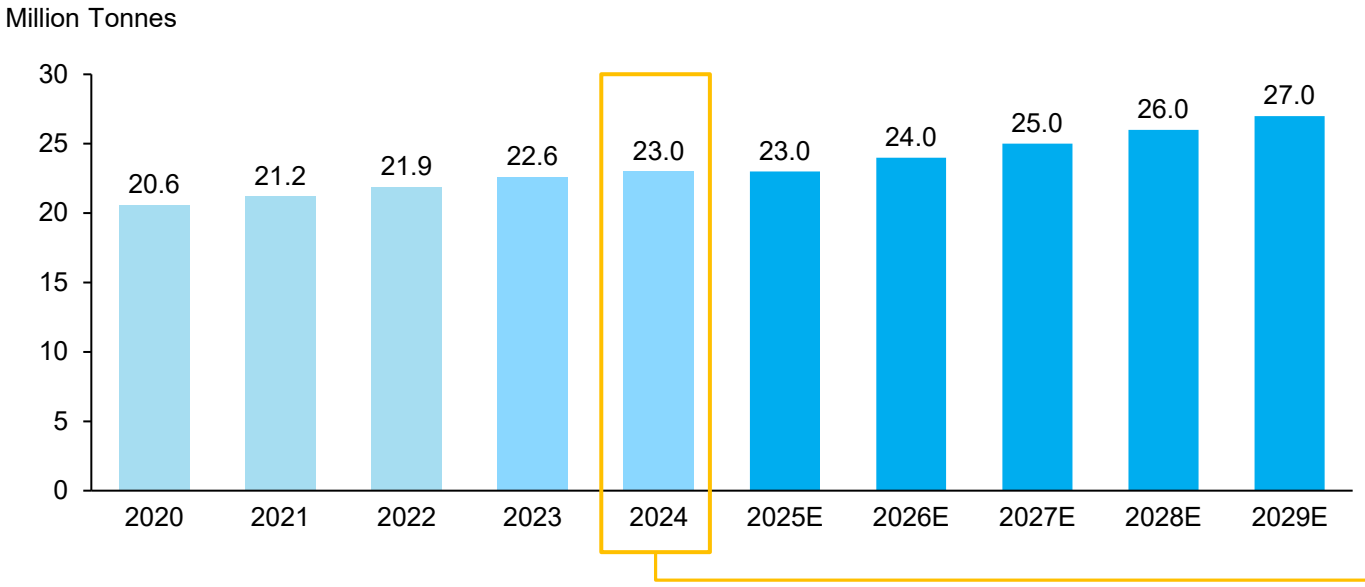
Source: ICSG, Frost & Sullivan

Global Copper Cathode Market Overview

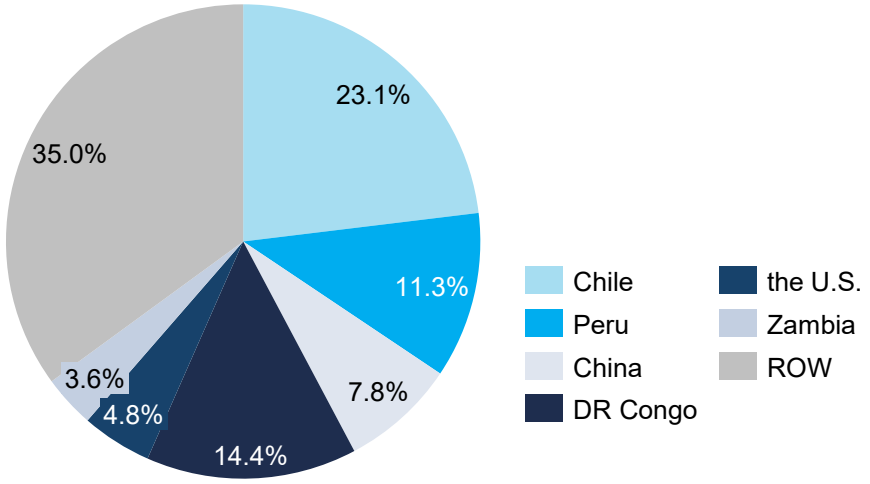
Global Copper Production

Copper Production (Global), 2020-2029E

	CAGR 2020-2024	CAGR 2025E-2029E
Global Copper Production	2.8%	4.1%



Breakdown of Copper Production in Major Countries and Regions Worldwide, 2024



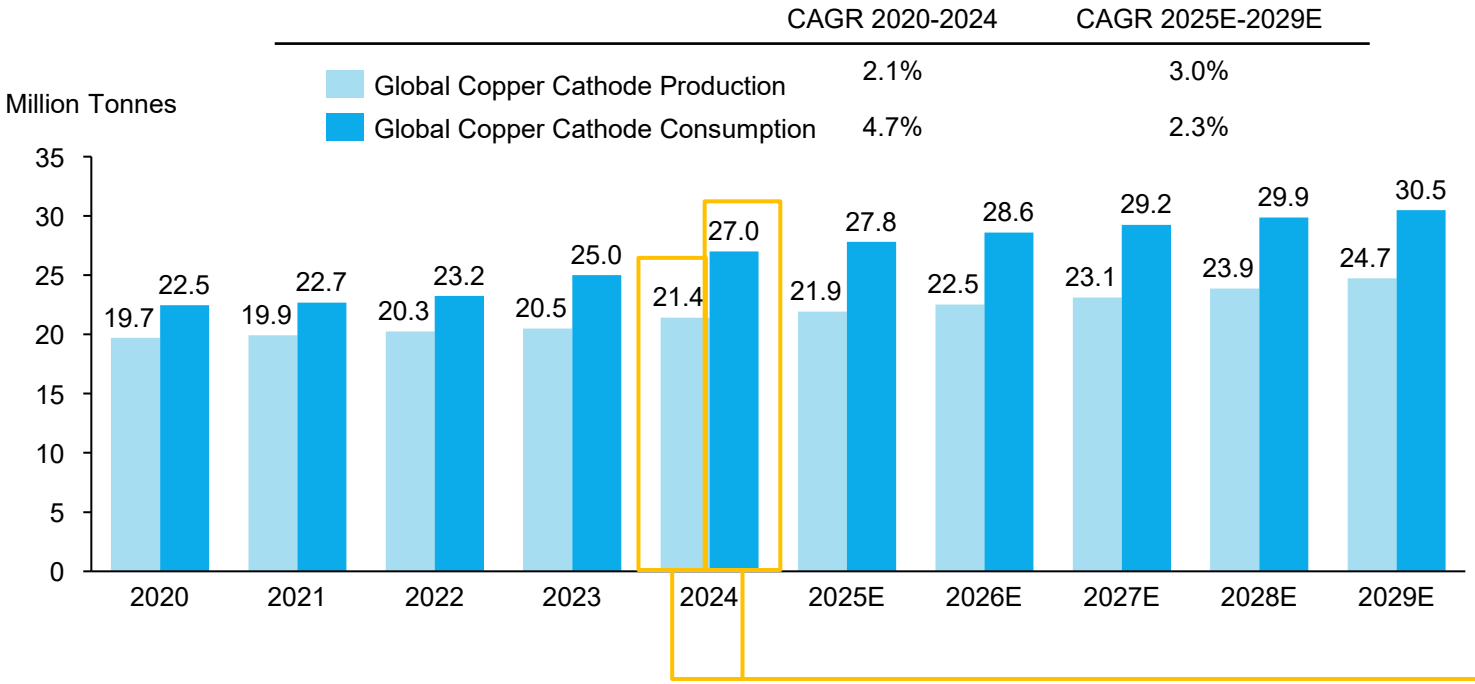
- With the continuous development of the global economy, demand for copper is experiencing sustained growth, pulling the sustained increase of global copper production. Global copper production volume has increased from 20.6 million tonnes in 2020 to 23.0 million tonnes in 2024, representing at a CAGR of 2.8%. It is expected that the global copper production volume will increase from 23.0 million tonnes in 2025 to 27.0 million tonnes in 2029, representing at a CAGR of 4.1%. The major countries with global copper production volume are Chile, DR Congo, Peru, and China, among others. In Africa, copper production volume are also mainly concentrated in DR Congo and Zambia. As of 2024, the copper production volume of DR Congo and Zambia account for approximately 18% of the global copper production volume.

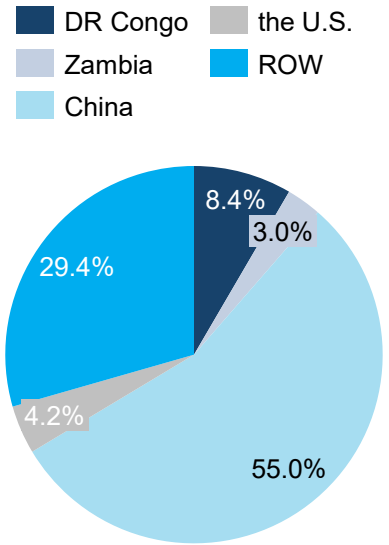
Source: ICSG, Frost & Sullivan

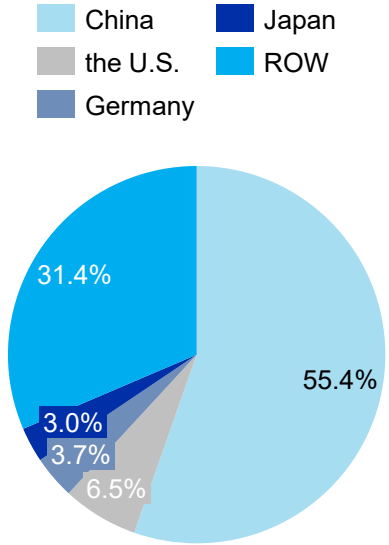
Global Copper Cathode Market Overview

Global Copper Cathode Consumption

Copper Cathode Consumption (Global), 2020-2029E







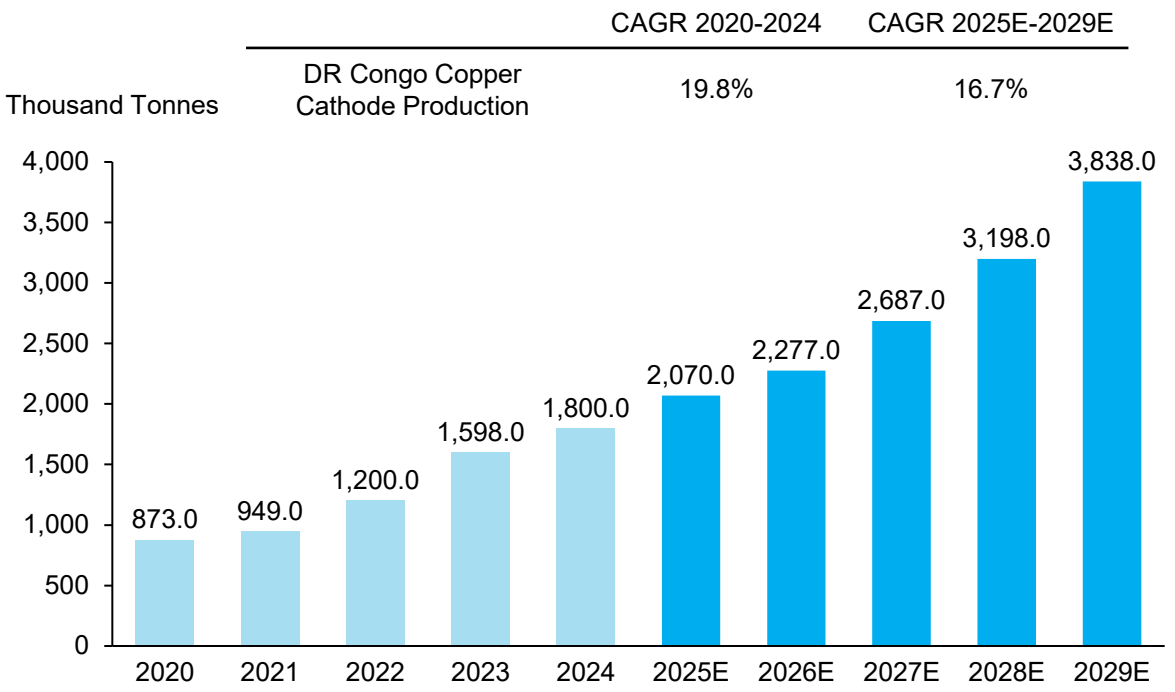
- Production of copper cathode is a significant indicator of a country's or region's level of industrialization and economic vitality. High production usually signifies that the area possesses strong non-ferrous metal smelting capabilities and a sound industrial system, capable of meeting domestic and international market demands. Global copper cathode production volume has increased from 19.7 million tonnes in 2020 to 21.4 million tonnes in 2024, representing at a CAGR of 2.1%. It is expected that the global copper cathode production volume will increase from 21.9 million tonnes in 2025 to 24.7 million tonnes in 2029, representing at a CAGR of 3.0%.
- Primarily driven by surging demand from renewable energy and electric vehicle sectors, and infrastructure spending in emerging economies, global copper cathode consumption has demonstrated strong growth from 22.5 million tonnes in 2020 to 27.0 million tonnes in 2024, reflecting a CAGR of 4.7%. In the future, global copper cathode consumption is projected to grow sustainably and reach 30.5 million tonnes in 2029 from 27.8 million tonnes in 2025, with a CAGR of 2.3%. The persistent trend of demand outpacing supply is anticipated to result in a supply shortage of approximately 5.8 million tonnes by 2029, driving up global copper prices.
- In 2024, China, DR Congo, Zambia, United States and ROW accounted for market shares of 55.0%, 8.4%, 3.0%, 4.2% and 29.4%, respectively, in global cathode production; China, the United States, Germany, Japan and ROW accounted for market shares of 55.4%, 6.5%, 3.7%, 3.0% and 31.4%, respectively.

Source: ICSG, Frost & Sullivan

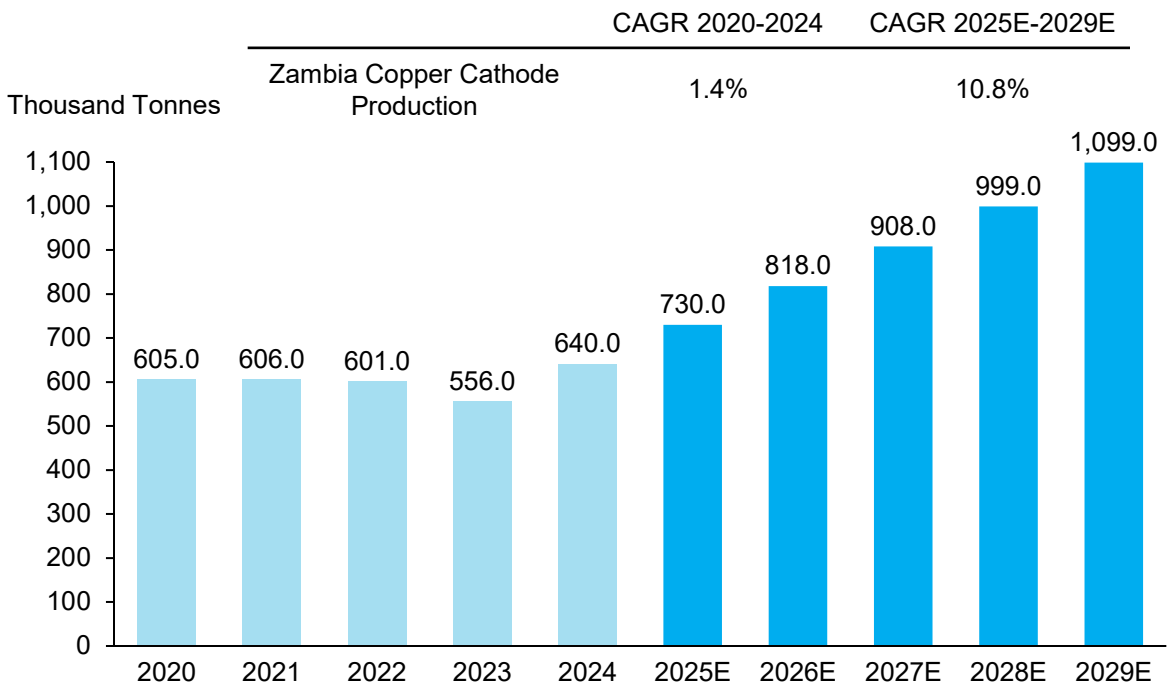
Global Copper Cathode Market Overview

Global Copper Cathode Production (1/2)

Copper Cathode Production (DR Congo), 2020-2029E



Copper Cathode Production (Zambia), 2020-2029E



- The major countries with global copper cathode production volume are China, DR Congo, and Zambia, among others. Driven by rich reserves, rising investment from Chinses companies and expanding local capacity, the copper cathode production in both DR Congo and Zambia has achieved 1,800.0 and 640,0 thousand tonnes in 2024. As of 2024, the copper cathode production volume of DR Congo and Zambia account for approximately 11% of the global copper cathode production volume. Moving forward, it is expected that copper cathode production in DR Congo will reach over 3,500 thousand tonnes in 2029 with a CAGR of 16.7% from 2025. Also, rebounding from prior declines caused by power shortages, Zambia is expected to produce over 1,000 thousand tonnes of copper cathode in 2029 with ongoing infrastructure upgrades and diversified energy investments, with a CAGR of 10.8% from 2025.

Source: ICSG, Frost & Sullivan

Global Copper Cathode Market Overview

Global Copper Cathode Production (2/2)

- Copper cathode production in the DR Congo and Zambia is poised to gain a stronger foothold in the global market, driven by a combination of structural advantages and evolving market dynamics.
- The average grade of copper ores in the DR Congo and Zambia is significantly higher than the global average, offering these countries a notable competitive advantage in the global copper industry. While the global average copper ore grade typically ranges between 0.4% and 0.6%, deposits in DR Congo and Zambia often exceed 2%, particularly in high-quality sulfide and oxide reserves. This higher ore grade translates into lower unit production costs, higher metal yield per ton of ore processed, and improved economic viability for mining projects. As a result, both countries attract strong investment interest and play a vital role in securing stable, high-grade feedstock for smelters worldwide, reinforcing their strategic importance in the copper supply chain.
- Furthermore, the region enjoys a relatively low-cost production base, supported by favorable labor and energy costs such as Zambia's reliance on hydroelectric power. This positions local producers to offer competitively priced cathodes on the global market.
- With established trade routes to key global consumers and growing interest from downstream sectors such as EVs and renewable energy, copper cathodes from DR Congo and Zambia are becoming increasingly strategic. As both countries continue to invest in infrastructure, compliance, and capacity expansion, their role as competitive, reliable suppliers of copper cathode is expected to strengthen significantly from 2025 onward.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Market Drivers and Development Trends

Rapid Growth of the New Energy Industry

As the global transition to green energy accelerates, the rapid development of the new energy sectors including electric vehicles, wind power, and PV energy has significantly increased the demand for copper cathodes. Due to its excellent electrical and thermal conductivity, copper is a key material in electric vehicles motors, charging stations, PV systems, and wind power generation equipment. In particular, each electric vehicles requires approximately 2.5 to 4 times more copper than a conventional internal combustion engine vehicle, mainly due to the extensive use of copper in batteries, wiring, and power electronics. The expansion of global electric vehicles production, alongside policies promoting renewable energy, is expected to drive copper demand steadily. Additionally, large-scale investments in power grids and energy storage solutions to support the integration of renewables further contribute to copper consumption growth. Government initiatives, such as tax incentives for electric vehicles purchases, subsidies for charging infrastructure, and mandates for increased renewable energy capacity, continue to create a robust demand outlook for copper cathodes. For example, for NEVs purchased in China between January 1, 2024, and December 31, 2025, the vehicle purchase tax will be exempted. The tax exemption limit for each new energy passenger vehicle is RMB30 thousand. For energy storage industry, under the U.S. Inflation Reduction Act (IRA), energy storage projects can receive an investment tax credit (ITC) of up to 30%.With these factors in consideration, the copper market is set to remain a critical enabler of the clean energy transition.

Urbanization and Infrastructure Development

The ongoing global urbanization process and large-scale infrastructure projects provide long-term support for copper cathode demand. Copper cathode, known for its excellent electrical conductivity and corrosion resistance, is widely used in power infrastructure. It's a key material in components like cables, transformers, and power distribution equipment, ensuring efficient and stable electricity transmission. In addition, copper cathode is also used in construction for pipes, roof waterproofing materials, and communication network infrastructure, enhancing durability and signal transmission efficiency, thereby contributing to the development of smart cities. In developing countries, particularly in regions like Africa, Southeast Asia and Latin America, rapid urbanization is driving the expansion of electricity grids, water supply systems and transportation networks, all of which require substantial copper inputs. For example, the electrification of rural areas in emerging markets increases copper consumption in power lines, transformers, and substations. At the same time, in developed economies, aging infrastructure necessitates extensive upgrades to power grids, high-speed rail systems, and broadband networks. Many countries have announced large-scale infrastructure investment plans, such as the U.S. Infrastructure Investment and Jobs Act and China's Belt and Road Initiative, both of which emphasize sustainable infrastructure and smart cities, further boosting copper demand. Additionally, as buildings adopt more energy-efficient designs, copper-intensive systems such as HVAC (heating, ventilation and air conditioning) and smart home wiring are becoming more prevalent, reinforcing copper’s indispensable role in global urbanization and infrastructure expansion.

Digitalization and Technological Advancements

The adoption of digital technologies and advancements in manufacturing processes are transforming the copper cathode industry, enhancing efficiency and value creation across the supply chain. The integration of big data, AI, and the Internet of Things (IoT) has optimized key processes such as copper ore exploration, smelting control, and logistics management. AI-driven geological surveys improve the efficiency of mineral exploration, allowing for more precise identification of copper ore deposits and reducing extraction costs. Smart automation in copper smelters enhances metallurgical processes, ensuring higher purity cathodes while reducing energy consumption and emissions. Leading copper cathode companies are leveraging machine vision and sensor technology to automatically inspect indicators such as copper cathode plate thickness and surface defects, thus securing product consistency and reducing manual intervention.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Entry Barrier Analysis (1/2)

Entry Barrier Analysis of Copper Cathode Industry

Raw Material Supply Barrier

As global copper mining continues to develop, the overall ore grade is declining, leading to higher extraction costs and increased supply uncertainties, posing challenges for copper cathode production. Africa, as a key copper-producing region, has attracted significant investment from major copper companies. Leading enterprises strengthen their control over high-grade mines by establishing long-term supply chain partnerships, ensuring a stable raw material supply and effectively reducing procurement costs. This strategic approach enhances their resilience against market fluctuations, giving them a competitive edge in securing raw materials.

Capital Barrier

The copper cathode industry requires substantial capital investment, as it involves multiple capital-intensive processes such as smelting and refining. The construction and operation of smelting facilities demand billions of dollars in investment, with long payback periods adding financial pressure. Additionally, large incumbent firms benefit from significant economies of scale, making it difficult for new entrants to establish a competitive foothold in the short term. As a result, high financial requirements act as a major barrier to entry, limiting market access to only well-funded players.

Technological Barrier

The production of copper cathodes involves complex pyrometallurgical and hydrometallurgical processes, requiring advanced technical expertise and specialized equipment. Cutting-edge smelting or refining technologies not only improve resource efficiency but also reduce energy consumption and environmental impact. However, these technologies are often mastered by a few leading companies. New entrants must invest heavily in research and development or acquire technology through licensing agreements, significantly raising the barriers to entry. The high technical threshold makes it difficult for newcomers to compete with established industry leaders

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Entry Barrier Analysis (2/2)

Entry Barrier Analysis of Copper Cathode Industry

Environmental Barrier

Stringent environmental regulations present another significant hurdle for new entrants. The copper smelting and refining process generates large amounts of waste gas, slag, and wastewater, posing environmental challenges. Governments worldwide have been tightening environmental compliance requirements, compelling companies to invest in state-of-the-art pollution control equipment and sustainable production technologies. These regulatory demands not only increase initial capital expenditures but also require strong operational capabilities to maintain compliance. As a result, environmental standards serve as a significant entry barrier, favoring established players with the resources to meet strict sustainability requirements.

Supply Chain Barrier

Strong customer and supply chain relationships further restrict entry into the copper cathode market. Major downstream industries such as infrastructure, construction, consumer electronics, and automotive manufacturing place a high priority on supply chain stability. Established companies often maintain long-term contracts with key suppliers and customers, securing raw materials and sales channels in advance. New entrants face considerable challenges in breaking into these entrenched market relationships, making it difficult to establish a reliable supply chain and customer base in the short term. This entrenched market structure increases the difficulty for newcomers to gain a competitive position.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Policies and Regulations

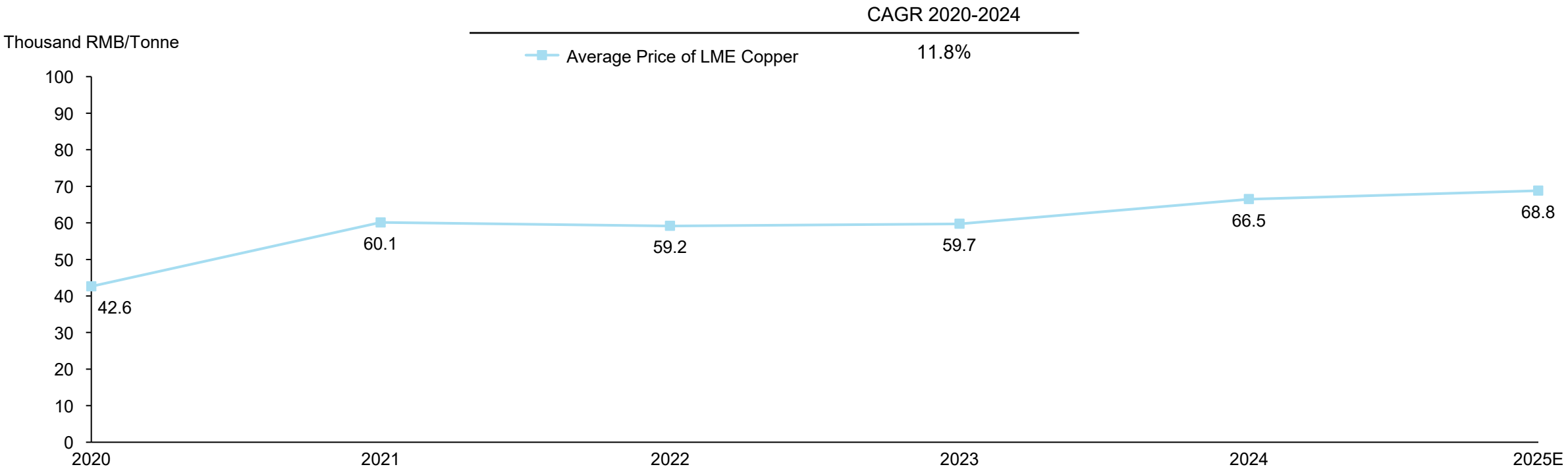
Policy	Release Year	Issuing Agency/Country	Content
Implementation Plan for High-Quality Development of the Copper Industry (2025–2027) 《铜产业高质量发展实施方案（2025—2027年）》	2025	China (Ministry of Industry and Information Technology (MIIT) and 10 other departments)	By 2027, increases domestic copper ore reserves by 5%-10%, develop green and efficient utilization technologies, foster competitive enterprises, enhance supply chain resilience, and aim for global leadership by 2035.
Work Plan for Stable Growth of Nonferrous Metals Industry 《有色金属行业稳定增长工作方案》	2023	China (MIIT and 6 other departments)	Cultivate copper and other important nonferrous metal enterprises, benchmark against world-class enterprises in terms of resource allocation, brand value, innovation capability, internationalization, etc., and enhance the overall competitiveness of enterprises. Support enterprises that meet the industry norms to carry out processing trade such as copper concentrate. Increase the import of raw materials such as copper concentrate.
"Made in China 2025" Strategy “中国制造2025”战略	2015	China (State Council)	Boost demand for copper in electric vehicles, industrial motors, and renewable energy infrastructure, with projected copper demand increasing by 232,000 tons by 2025.
European Green Deal	2019	EU (European Commission)	Aim to make Europe the first climate-neutral continent by 2050, including boosting clean technologies and green energy industries, providing subsidies to critical raw materials such as copper.
Infrastructure Investment and Jobs Act	2021	The U.S. (U.S. Congress)	Allocate USD7.5 billion for the development of domestic clean energy and critical mineral extraction, supporting copper production to strengthen supply chains for electric vehicles and renewable energy systems.
Mining Code Reform	2018	DR Congo (DRC Government)	Aim to boost foreign investment in the mining sector, providing favorable tax treatment for copper mining and refining projects, with an emphasis on local processing and value-added production.
Mineral and Petroleum Resources Development Amendment Act	2018	South Africa (Department of Mineral Resources and Energy)	Promote exploration and sustainable development of the country's mineral resources, including copper, with incentives for clean mining practices and technology upgrades.
Copper Industry Promotion Law	2020	Chile (Chilean Government)	Introduce tax incentives for copper producers investing in environmentally sustainable mining and refining technologies, including improvements in cathode copper production.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Price Analysis of Copper

Average Price of Copper in LME, 2020-2025E



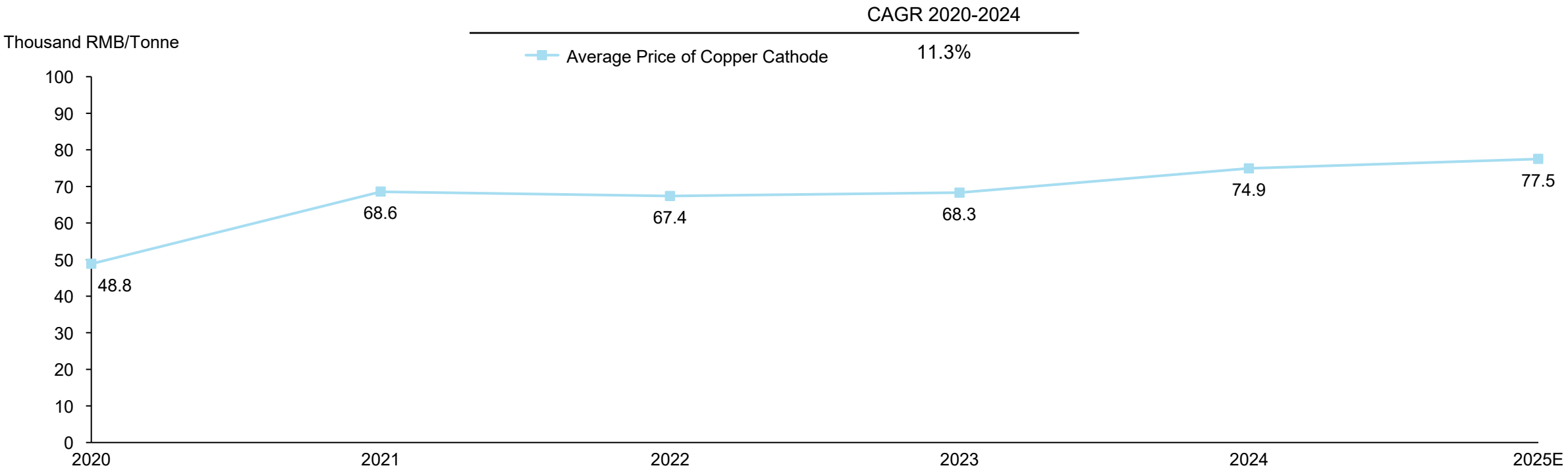
- The rapid development of clean energy infrastructure, electric vehicles, and digital technologies has significantly driven up copper demand, given copper's critical role in power grids, batteries, and electronic devices. Reflecting this strong and growing demand, the global price of copper has shown a steady upward trend over the past few years, rising from RMB42.6 thousand per tonne in 2020 to RMB66.5 thousand per tonne in 2024. At present, the copper market remains in a state of tight supply-demand balance, as supply growth struggles to keep pace with accelerating consumption. This tension is expected to sustain upward pressure on prices in the short term.

Source: LME, Frost & Sullivan

Global Copper Cathode Market Overview

Price Analysis of Copper Cathode

Average Price of Copper Cathode (China), 2020-2025E



- As the world's largest producer and consumer of cathode copper, China has experienced a long-term upward trend in cathode copper prices. From 2020 to 2024, the average price increased from RMB48.8 thousand per tonne to RMB74.9 thousand per tonne, representing a CAGR of 11.3%. Considering the ongoing recovery of the global economy and the expansion of global downstream demand, it is anticipated that the average price of cathode copper in China will further increase to RMB77.5 thousand per tonne in 2025.

Source: Frost & Sullivan

Global Copper Cathode Market Overview

Competitive Landscape Analysis of Copper Cathode Producers in DR Congo and Zambia

- The competitive landscape of the cathode copper industry in the DR Congo is highly fragmented, featuring both global mining giants such as Glencore and First Quantum Minerals, and an expanding cohort of Chinese enterprises. Historically, international companies have secured substantial market share by accessing high-grade copper reserves and investing heavily in large-scale processing facilities. These operations are typically structured through long-term mining concessions and joint ventures with Gécamines, the DR Congo's state-owned mining company, granting them operational control without direct ownership of the land.
- Following the enactment of the 2002 Mining Code, which lifted restrictions on private and foreign investment in the mining sector, DR Congo experienced a surge of inbound capital and project development. Chinese enterprises, in particular, seized this opportunity by accelerating their overseas expansion through acquisitions, equity investments, and joint ventures in DR Congo. Leveraging advantages such as relatively low-cost financing, vertically integrated supply chains, and strong alignment with China's rising copper demand, Chinese companies have rapidly increased their operational control over mining and smelting assets. These structural strengths have enabled them to deepen their influence in DR Congo's copper sector and increasingly challenge traditional incumbents in both market share and industrial presence.
- Similarly, the competitive landscape of the cathode copper industry in Zambia is also fragmented, with both international mining giants and Chinese enterprises playing key roles. Major global players such as First Quantum Minerals, Glencore, Barrick, and Vedanta have long-established operations, primarily through large-scale projects like Kansanshi, Sentinel, and Konkola. These companies typically operate under long-term mining licenses and partnerships with Zambia's state-owned companies, allowing them access to high-grade copper reserves and advanced processing facilities. Government involvement remains significant, both through ownership stakes and regulatory frameworks aimed at increasing local beneficiation and value capture. Chinese enterprises are rapidly expanding their presence and influence in Zambia's copper sector, driven by strategic investments, cost advantages, and long-term supply commitments aligned with China's industrial demand. As Chinese firms continue to deepen their operational footprint and contribute to national output targets, they are reshaping Zambia's copper landscape and emerging as strong competitors.

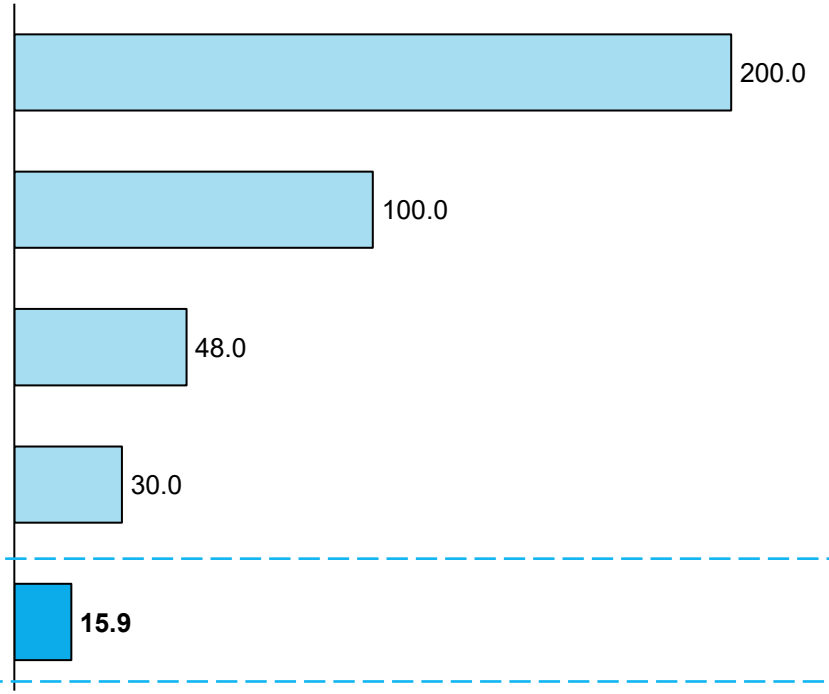
Source: Frost & Sullivan

Global Copper Cathode Market Overview

Top Five China Copper Cathode Producers in DR Congo

Top Five China Copper Cathode Producers by Production Volume (DR Congo), 2024

Ranking	Company Name	Production Volume in 2024 (Thousand Tonnes)	Market Share (%)	State-owned / Private Company
1	China Railway Resources Group Co., Ltd.	200.0	11.1%	State-owned
2	Chengtun Mining Group Co., Ltd.	100.0	5.6%	Private
3	China Molybdenum Co., Ltd.	48.0	2.7%	Private
4	MMG Co., Ltd.	30.0	1.7%	State-owned
5	**The Company**	**15.9**	**0.9%**	**Private**



- The competition in copper cathode in DR Congo is relatively fragmented. The annual production volume of copper cathode in DR Congo reached approximately 1,800 thousand tonnes in 2024, with the top five China producers accounting for over 20% of the total. The Company with a production volume of 15.9 thousand tonnes, ranked fifth in the industry, accounting for 0.9% of the total production volume in DR Congo. In copper cathode industry measured by production volume in DR Congo, The Company ranked third among private producers based in China.

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Source: Frost & Sullivan

Global Copper Cathode Market Overview

Top Five China Copper Cathode Producers in DR Congo

Top Five China Copper Cathode Producers by Production Volume (DR Congo), 2024

Ranking	Company Name	Production Volume in 2024 (Thousand Tonnes)	Market Share (%)	State-owned / Private Company
1	Company A	200.0	11.1%	State-owned
2	Company B	100.0	5.6%	Private
3	Company C	48.0	2.7%	Private
4	Company D	30.0	1.7%	State-owned
5	**The Company**	**15.9**	**0.9%**	**Private**

- The competition in copper cathode in DR Congo is relatively fragmented. The annual production volume of copper cathode in DR Congo reached approximately 1,800 thousand tonnes in 2024, with the top five China producers accounting for over 20% of the total. The Company with a production volume of 15.9 thousand tonnes, ranked fifth in the industry, accounting for 0.9% of the total production volume in DR Congo. **In copper cathode industry measured by production volume in DR Congo, The Company ranked third among private producers based in China.**

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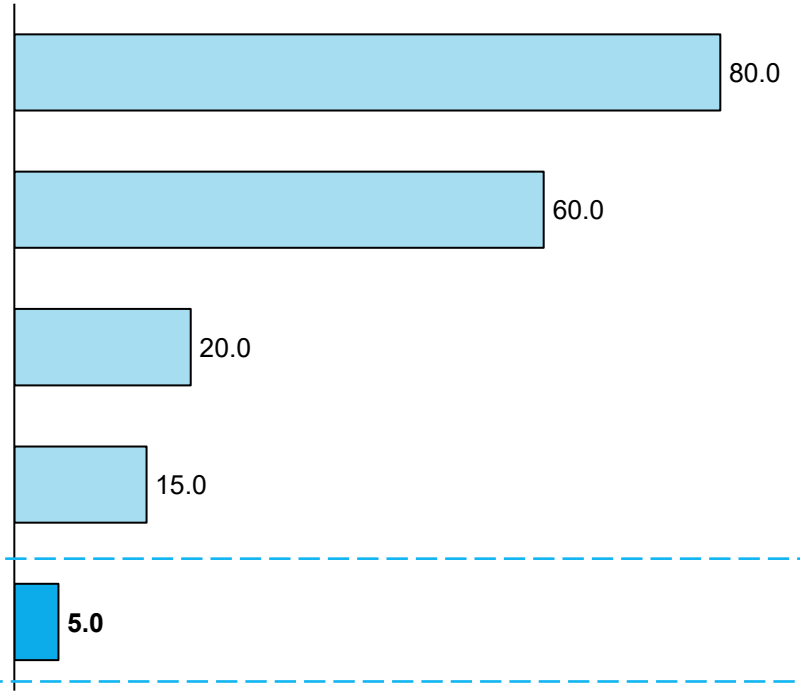
Source: Frost & Sullivan

Global Copper Cathode Market Overview

Top Five China Copper Cathode Producers in Zambia

Top Five China Copper Cathode Producers by Production Volume (Zambia), 2024

Ranking	Company Name	Production Volume in 2024 (Thousand Tonnes)	Market Share (%)	State-owned / Private Company
1	Wanbao Mining Co., Ltd.	80.0	12.5%	State-owned
2	Jinchuan Group International Resources Co. Ltd	60.0	9.4%	State-owned
3	China Nonferrous Mining Co. Ltd	20.0	3.1%	State-owned
4	Jiangxi Copper Co. Ltd	15.0	2.3%	State-owned
5	**The Company**	**5.0**	**0.8%**	**Private**



- The competition in copper cathode in Zambia is also relatively fragmented. The annual production volume of copper cathode in Zambia reached approximately 640 thousand tonnes in 2024, with the top five China producers accounting for over 25% of the total. The Company with a production volume of 5.0 thousand tonnes, ranked fifth in the industry, accounting for 0.8% of the total production volume in Zambia. In copper cathode industry measured by production volume in Zambia, The Company ranked first among private producers based in China.

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Source: Frost & Sullivan

Global Copper Cathode Market Overview

Top Five China Copper Cathode Producers in Zambia

Top Five China Copper Cathode Producers by Production Volume (Zambia), 2024

Ranking	Company Name	Production Volume in 2024 (Thousand Tonnes)	Market Share (%)	State-owned / Private Company
1	Company E	80.0	12.5%	State-owned
2	Company F	60.0	9.4%	State-owned
3	Company G	20.0	3.1%	State-owned
4	Company H	15.0	2.3%	State-owned
5	**The Company**	**5.0**	**0.8%**	**Private**

- The competition in copper cathode in Zambia is also relatively fragmented. The annual production volume of copper cathode in Zambia reached approximately 640 thousand tonnes in 2024, with the top five China producers accounting for over 25% of the total. The Company with a production volume of 5.0 thousand tonnes, ranked fifth in the industry, accounting for 0.8% of the total production volume in Zambia. In copper cathode industry measured by production volume in Zambia, **The Company ranked first among private producers based in China. The Company is also the sole producer based in China that ranks among the top five copper cathode producers in both the DR Congo and Zambia.**

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Source: Frost & Sullivan

Global Copper Cathode Market Overview

Profile of China Major Copper Cathode Manufacturers

Company Name	Listed or Unlisted	Year Established/HQ	Business Introduction
Yunnan Jinxun Resources Co., Ltd. 云南金浔资源股份有限公司	Listed(NEEQ : 870844)	2010, Kunming, Yunnan	The company commits to become a developer and operator of the non-ferrous metal new energy and new materials industry chain, integrating the washing, smelting and deep processing of non-ferrous metal new energy materials.
Jiangxi Copper Co., Ltd. 江西铜业股份有限公司	Listed(600362.SH)	1979, Nanchang, Jiangxi	The company engages in the mining, smelting, and processing of copper and other non-ferrous metals.
China Nonferrous Mining Co., Ltd. 中国有色矿业有限公司	Listed(1258.HK)	1983, Beijing	The company is a vertically integrated copper and cobalt producer operating mainly in Zambia, with a focus on overseas resource development.
Wanbao Mining Co., Ltd. 万宝矿产有限公司	Unlisted	2004, Beijing	The company specializes in overseas copper and cobalt resource development, operating major mining projects in Africa and Asia.
China Railway Resources Group Co., Ltd. 中铁资源集团有限公司	Unlisted	2007, Beijing	The company is a mining enterprise under China Railway Group, engaged in exploration and development of non-ferrous and ferrous mineral resources.
Chengtun Mining Group Co., Ltd. 盛屯矿业集团股份有限公司	Listed(600711.SH)	1992, Xiamen, Fujian	The company focuses on the investment, mining, and processing of cobalt, copper, nickel, and zinc resources, with a growing presence in new energy materials.
China Molybdenum Co., Ltd. (CMOC) 洛阳栾川钼业集团股份有限公司	Listed(603993.SH) (3993.HK)	1969, Luoyang, Henan	The company is a globally active mining group involved in molybdenum, copper, cobalt, and other key mineral resources, with assets across multiple continents.
MMG Co., Ltd. 五矿资源有限公司	Listed(1208.HK)	2009, Hongkong	The company is a global base metals miner focused on copper and zinc, operating major projects in South America, Africa, and Australia.
Jinchuan Group International Resources Co. Ltd 金川国际资源有限公司	Listed(2362.HK)	2001, Hongkong	The company manages Jinchuan Group's overseas operations, focusing on the exploration, mining, and trading of copper and cobalt.

Source: Frost & Sullivan

Agenda

1 Global Non-ferrous Metal Market Overview

2 Global Copper Cathode Market Overview

3 **Global Cobalt Market Overview**

4 Appendices

Global Cobalt Market Overview

Definition and Importance of Cobalt

Definition of Cobalt

- Cobalt (symbol: Co) is a silvery-white, hard metal that belongs to the ferromagnetic elements. It possesses excellent high-temperature resistance, corrosion resistance, and magnetic properties. Cobalt is commonly found in nature in ore form, often coexisting with copper and nickel, and is considered an important strategic metal. Cobalt is primarily used in battery materials, alloy manufacturing, catalysts, magnetic materials, and other high-tech fields. It is one of the key raw materials for modern industry and high-tech industries.

Importance of Cobalt

Core Material for Lithium-ion Batteries

- Cobalt is a crucial raw material in the production of battery cathodes, where its excellent stability and high conductivity significantly improve the energy density and cycle life of batteries. As the adoption of new energy electric vehicles and energy storage systems accelerates, the demand for cobalt continues to rise, making it an indispensable strategic resource in the new energy industry.

Key Element for High-Performance Alloy Manufacturing

- Cobalt is widely used in the production of high-performance alloys, including superalloys, hard alloys, and corrosion-resistant alloys. In superalloys, cobalt enhances the mechanical strength and thermal stability of materials in extreme environments. This makes it essential in high-tech fields such as aerospace, gas turbines, and nuclear industries.

Core Component in Catalysts and Chemical Materials

- Cobalt is a key component in various catalysts, widely used in petrochemical, fertilizer production, and plastic synthesis industries. For example, cobalt catalysts in the Fischer-Tropsch synthesis process are used to efficiently produce liquid fuels. Its importance in the chemical industry is irreplaceable.

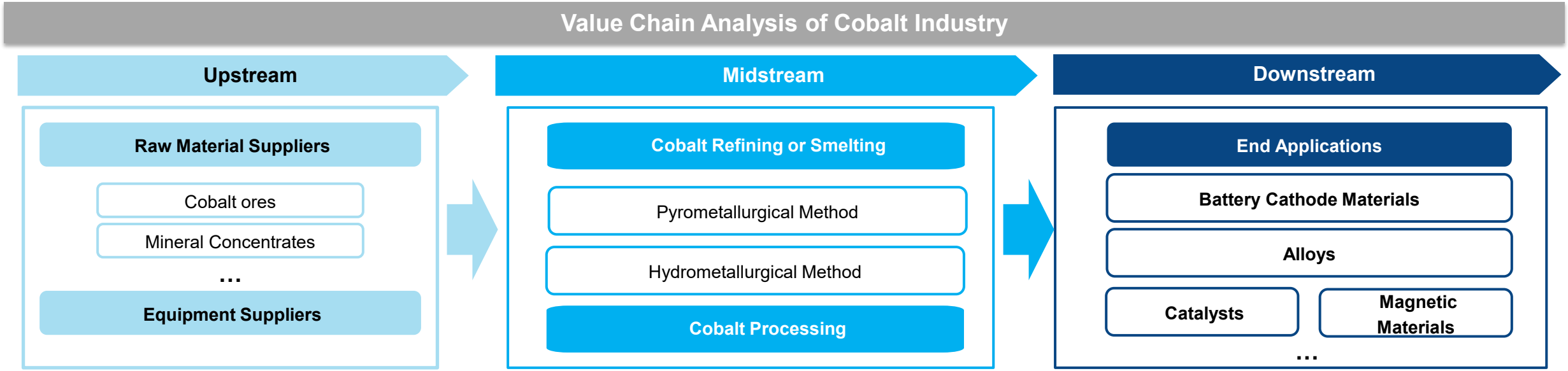
Strategic Resource Status

- Cobalt holds significant strategic importance due to its limited resource distribution and high application dependence. The global cobalt supply is highly concentrated in Africa, particularly in the Democratic Republic of Congo (DRC). The imbalance between supply and demand makes cobalt a focal point in international resource competition, directly influencing the development of multiple high-tech industries.

Source: Frost & Sullivan

Global Cobalt Market Overview

Value Chain Analysis



- The upstream segment of the cobalt industry involves the mining and initial processing of cobalt ores. The majority of global cobalt production is concentrated in Africa, particularly in the DR Congo, which accounts for over 70% of the world's cobalt production. After mining, the ores undergo processes such as crushing and flotation to produce cobalt concentrates, which serve as raw materials for the midstream refining sector. Due to the uneven distribution of cobalt resources and the high technological barriers to extraction, the upstream sector holds significant control over supply, playing a crucial role in global cobalt availability.
- The midstream sector consists of refining cobalt concentrates, purification, and the production of cobalt-based chemical products. Refining processes are categorized into pyrometallurgical and hydrometallurgical methods, which yield high-purity metallic cobalt or cobalt compounds (e.g., cobalt hydroxide, cobalt sulfate). This stage requires advanced technology, strict environmental standards, and complex processing techniques. To enhance product quality and resource efficiency, companies must continuously innovate and optimize their production methods.
- Cobalt has a wide range of applications in downstream industries, primarily in battery cathode materials, high-performance alloys, catalysts, and magnetic materials. Among these, the rapid growth of electric vehicles and energy storage batteries has significantly increased cobalt consumption in the battery sector. Additionally, cobalt-based high-performance alloys and catalysts are extensively used in high-value industries such as aerospace and petrochemicals. Technological advancements in these downstream applications directly drive the demand for cobalt.
- As cobalt is a scarce resource and global environmental awareness rises, recycling and reusing cobalt have become essential components of the industry chain. The extraction of cobalt from used batteries not only alleviates the pressure on primary resources but also aligns with sustainability goals. Furthermore, supporting services such as logistics and supply chain management play a critical role in improving cobalt resource utilization and ensuring a stable supply.

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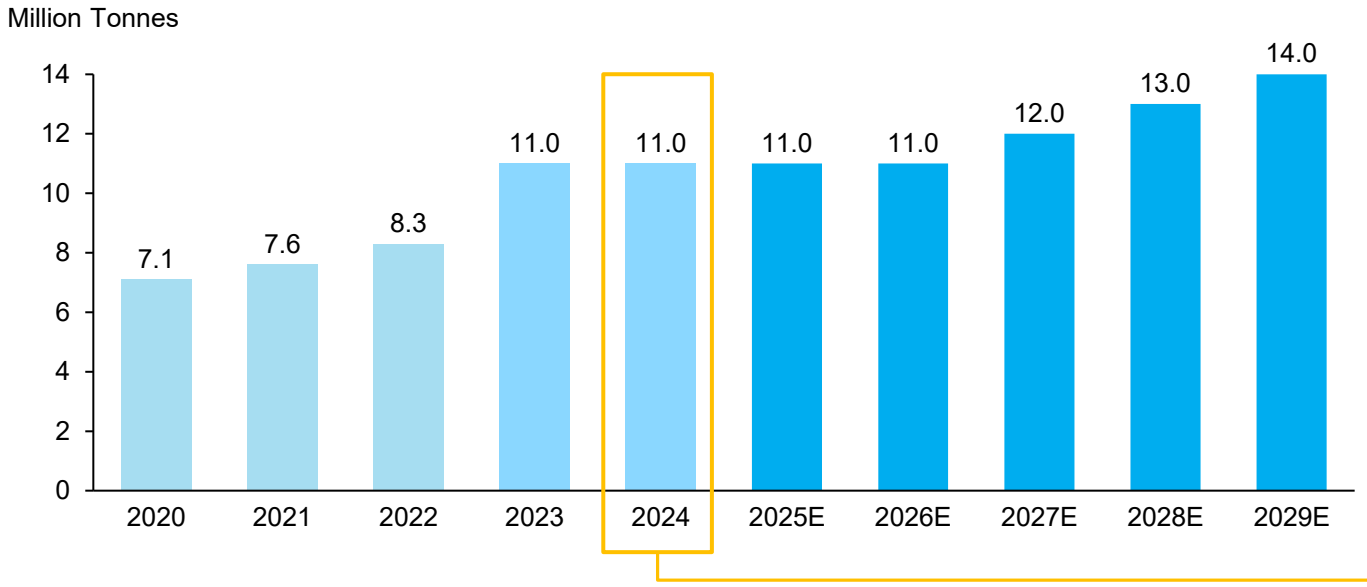
Source: Frost & Sullivan

Global Cobalt Market Overview

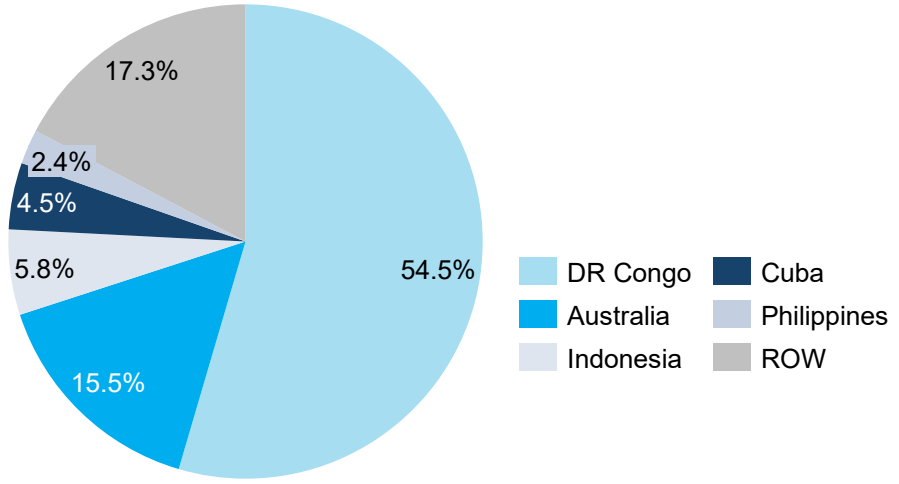
Global Cobalt Reserve

Cobalt Reserve (Global), 2020-2029E

	CAGR 2020-2024	CAGR 2025E-2029E
Global Cobalt Reserve	11.6%	6.2%



Breakdown of Cobalt Reserve in Major Countries and Regions Worldwide, 2024



- The development and utilization of cobalt-rich seabed resources remain unfeasible due to current exploration and extraction technologies as well as economic constraints. Moreover, land-based cobalt deposits suitable for industrial use are highly unevenly distributed, with most cobalt reserve concentrated in just a few countries, including the DR Congo, Australia, Indonesia, Cuba, the Philippines, etc. As a result, cobalt's strategic importance has been increasingly recognized by nations worldwide, and many countries have designated it as a strategic mineral resource. The global cobalt reserve has steadily increased from 2020 to 2024 and reached 11.0 million tonnes in 2024. DR Congo has the largest copper reserves of any country, accounting for 54.5% of the global cobalt reserve, which is nearly over three times the reserves of Australia. The top 5 countries by cobalt reserve in 2024 accounted for 82.7% of the global cobalt reserve.

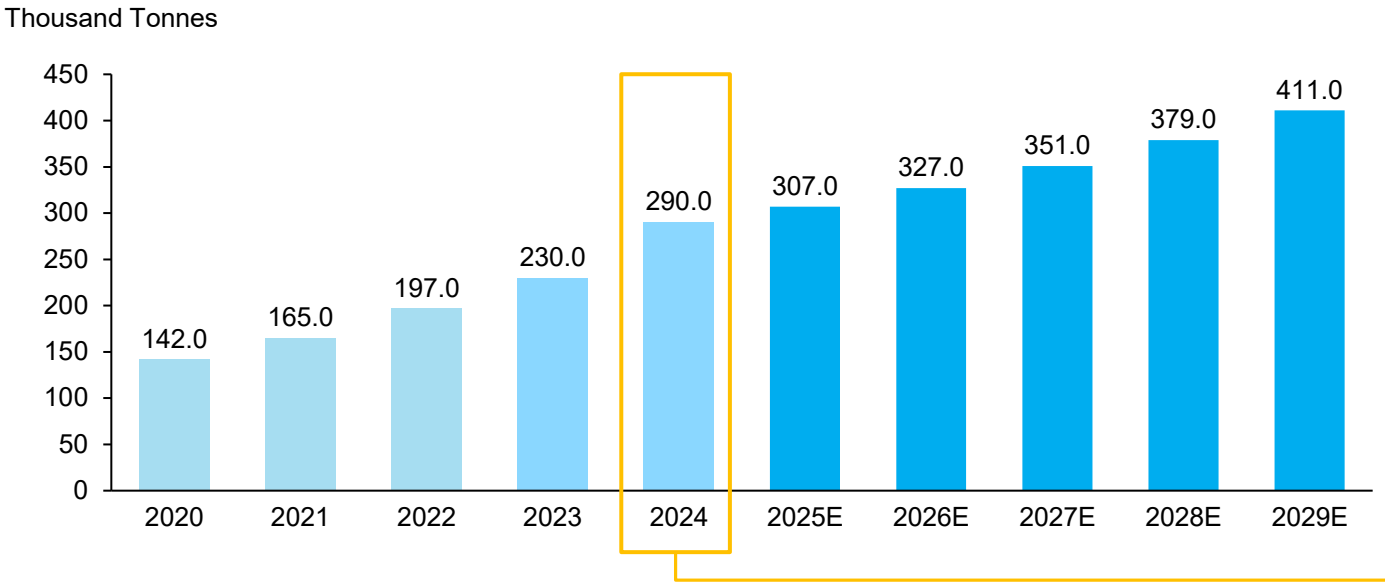
Source: USGS, Frost & Sullivan

Global Cobalt Market Overview

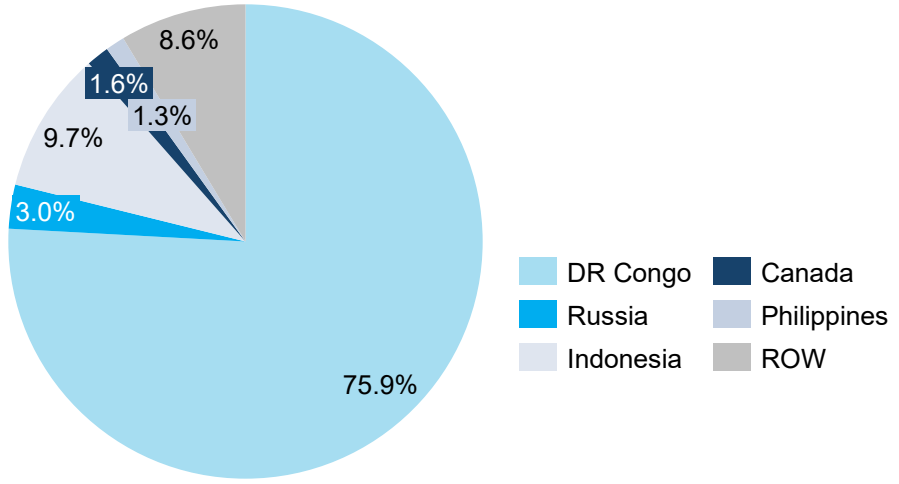
Global Cobalt Production

Cobalt Production (Global), 2020-2029E

	CAGR 2020-2024	CAGR 2025E-2029E
Global Cobalt Production	19.5%	7.6%



Breakdown of Cobalt Production in Major Countries and Regions Worldwide, 2024



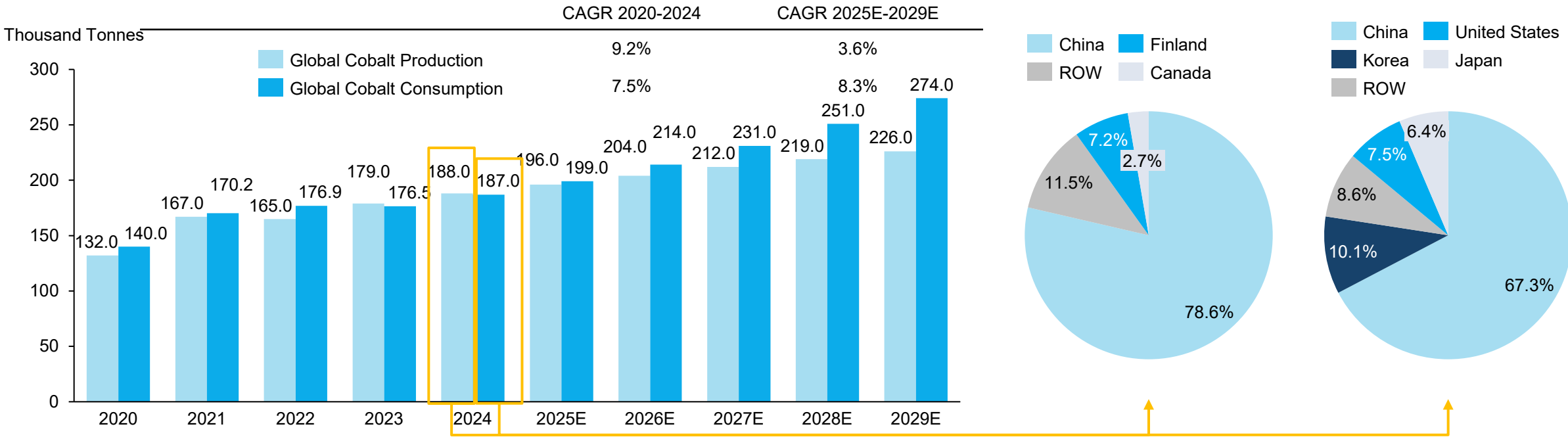
- Between 2020 and 2024, global cobalt production volume grew significantly from 142.0 thousand tonnes to 290.0 thousand tonnes, reflecting a robust CAGR of 19.5%. This surge was primarily driven by the rapid expansion of the electric vehicle and energy storage sectors, which heavily rely on cobalt-rich batteries. The DR Congo remained the dominant player in the cobalt supply chain, accounting for 75.9% of global production in 2024, due to its abundant cobalt reserves and established mining infrastructure.
- Looking ahead, global cobalt production volume is projected to reach 307.0 thousand tonnes in 2025 and 411.0 thousand tonnes by 2029, indicating a CAGR of 7.6%. As demand for high-energy-density batteries and energy transition technologies continues, cobalt will remain a critical raw material, with supply concentration in DR Congo.

Source: USGS, Frost & Sullivan

Global Cobalt Market Overview

Global Refined Cobalt Production and Consumption

Refined Cobalt Production and Consumption (Global), 2020-2029E



- From 2020 to 2024, driven by booming demand from electric vehicles, energy storage systems, and consumer electronics, the global refined cobalt market has experienced steady growth. Refined cobalt production volume rose from 132.0 thousand tonnes in 2020 to 188.0 thousand tonnes in 2024, reflecting a CAGR of 9.2%, while consumption volume increased from 140.0 thousand tonnes to 187.0 thousand tonnes over the same period at a CAGR of 7.5%. Cobalt's wide application across batteries, aerospace, alloys, and the petrochemical industry is supported by its unique physical and chemical properties such as high hardness, corrosion resistance, ferromagnetism, and electrochemical performance. Looking ahead, global refined cobalt consumption is projected to reach 274.0 thousand tonnes in 2029 compared to 226.0 thousand tonnes of production. This growing gap underscores the risk of future supply shortages, making cobalt a critical and strategic resource in the global transition to clean energy.
- In 2024, China, Finland, Canada and ROW accounted for market shares of 78.6%, 7.2%, 2.7% and 11.5%, respectively, in global refined cobalt production; China, Korea, United States, Japan and ROW accounted for market shares of 67.3%, 10.1%, 7.5%, 6.4% and 8.6%, respectively.

Source: Cobalt Institute, Frost & Sullivan

Global Cobalt Market Overview

Market Drivers and Trend Analysis

Growing Demand Driven by Electric Vehicles and Energy Storage	The rapid expansion of the global electric vehicle market and energy storage systems is significantly fueling the demand for cobalt. As a critical raw material for batteries, cobalt plays an indispensable role, particularly in electric vehicles. With governments worldwide accelerating electric vehicles adoption and implementing carbon neutrality policies, cobalt demand is projected to experience sustained growth. Cobalt's role in battery production is crucial due to its ability to enhance energy density and battery stability, making it a key component in high-performance batteries. As battery technology advances, demand for high-quality cobalt is rising, further driving its market value. Leading battery manufacturers are prioritizing high-energy-density battery solutions to extend the range and efficiency of electric vehicles, strengthening the reliance on cobalt-based cathode materials. Additionally, the development of large-scale energy storage systems is another significant factor contributing to cobalt's increasing demand. With the global transition to renewable energy sources such as solar and wind power, the need for efficient energy storage solutions has surged. Cobalt-based batteries are widely used in grid-scale storage systems due to their long cycle life and high efficiency. This trend underscores cobalt's strategic importance in achieving energy sustainability.
Sustainable Development and Advancements in Eco-Friendly Production Technologies	Amid increasing global environmental pressures, the cobalt industry is facing stricter environmental regulations. Companies are shifting towards more sustainable mining and production methods, incorporating advanced smelting technologies and more efficient resource recycling techniques to enhance resource utilization. With ongoing technological innovations, energy consumption and carbon dioxide emissions in the production process have been effectively controlled. This transition toward environmentally friendly practices not only ensures regulatory compliance but also strengthens cobalt's market competitiveness. As sustainability becomes a key factor in industrial development, eco-friendly cobalt production is expected to gain further traction, reinforcing its long-term growth prospects.
Supply Chain Security and Implications for Future Development	The global cobalt supply chain is highly concentrated in a few countries, with the DR Congo being the largest producer. To mitigate the supply risks and reduce dependence on a single source, mining companies are increasingly focusing on diversifying their supply chains. Efforts to explore new cobalt mining sources in other regions and improve extraction efficiencies are gaining momentum. Countries with untapped cobalt deposits, such as Australia, Canada, and the Philippines, are seeing increased interest from mining companies seeking to secure more stable and diverse supply routes. Furthermore, technological advancements in mining and processing are helping to increase the efficiency of cobalt extraction, reducing costs and environmental impact while increasing the overall supply. These initiatives not only help stabilize the cobalt supply but also ensure that demand from industries such as electric vehicles and energy storage systems can be met without major disruptions. As the need for cobalt continues to grow, especially in the context of the global shift towards sustainable energy solutions, securing a reliable and diversified cobalt supply chain will be crucial for the long-term viability of the industry.

Source: Frost & Sullivan

Global Cobalt Market Overview

Market Drivers and Trend Analysis

Technological Innovation and Improvements in Production Efficiency	As the demand for cobalt continues to rise, technological innovation within the industry is accelerating. Companies are enhancing smelting technologies and refining production processes to increase the output and quality of cobalt and cobalt hydroxide, while simultaneously reducing production costs. Breakthroughs in extraction efficiency and green smelting technologies are playing a critical role in driving the sustainable development of the industry. These advancements have allowed for more efficient and environmentally friendly processes, contributing to a reduction in the energy consumption and environmental impact of cobalt production. Additionally, improvements in smelting processes have increased the purity of cobalt and cobalt hydroxide, making them more suitable for high-performance applications such as batteries for electric vehicles and energy storage systems. As new technologies are adopted, the cost of producing cobalt and cobalt hydroxide is expected to gradually decline. This reduction in production costs, coupled with the continued growth in demand for cobalt, will further facilitate market expansion. Technological advancements in production efficiency will support the continued evolution of the cobalt industry, ensuring that it meets the growing demand from industries like electric vehicles, energy storage, and high-tech electronics, all while maintaining sustainability and profitability.
Policy Support in Downstream Applications	Government policies supporting electric vehicles, renewable energy, and decarbonization are directly boosting demand for cobalt. For instance, the U.S. Inflation Reduction Act (IRA) provides up to $7,500 in tax credits for EV purchases and includes sourcing requirements for critical minerals such as cobalt from domestic or free-trade partners. This has led to increased investment in local refining capacity and cobalt supply chain development. In the E.U., new battery regulations mandate that industrial batteries must include a minimum proportion of recycled cobalt by 2031, directly stimulating cobalt recycling and remanufacturing. In Africa, countries like South Africa, Zambia, and the DR Congo are promoting EV and battery value chains through local manufacturing incentives and the development of special economic zones focused on battery production, with cobalt as a key resource. In Asia, countries are scaling EV adoption through subsidies and infrastructure investment, indirectly driving cobalt demand through the expansion of battery usage. These Subsidies, tax incentives, and industrial development programs are accelerating the adoption of high-performance batteries that rely on cobalt-based materials. As global green transition policies expand, the cobalt industry particularly cobalt hydroxide used in batteries is expected to benefit from increased downstream demand and long-term structural support.

Source: Frost & Sullivan

Global Cobalt Market Overview

Entry Barrier Analysis

Entry Barrier Analysis of Cobalt Industry

Resource Barrier

Cobalt reserves are heavily concentrated in a few regions, particularly DR Congo, which accounts for over 70% of global production. This geographic monopoly presents major challenges for new entrants, including political instability, regulatory complexity, and high costs of securing mining rights. Without access to these critical resources, it is extremely difficult for new players to enter and scale in the industry.

Technological and Capital Barrier

The cobalt industry requires significant capital investment and advanced processing capabilities. From exploration to refining, operations involve high fixed costs and complex technologies, especially to produce battery-grade cobalt. New entrants often lack the financial strength and technical expertise needed to develop efficient, compliant, and scalable supply chains, creating a steep barrier to entry.

Market Access Barrier

Established players typically maintain long-term offtake agreements and vertically integrated operations, securing steady demand from battery manufacturers and OEMs. These relationships not only ensure stable revenue streams but also limit raw material access for new entrants. Without strong customer ties or downstream integration, newcomers face challenges in market entry, pricing power, and long-term competitiveness.

Source: Frost & Sullivan

Global Cobalt Market Overview

Competitive Landscape Analysis of Cobalt Producers in DR Congo and Zambia

- Competitive Landscape Overview of Global Cobalt Industry- DR Congo and Zambia hold dominant positions in global cobalt production, driven by their control over key cobalt assets. Major players such as China Molybdenum Co., Ltd. (CMOC) and Glencore command significant shares of cobalt output through ownership and operational control of critical mining and processing facilities. A number of Chinese mining companies have actively developed mineral resources in both countries, leading to a concentration of skilled talent and fostering the growth of supporting industries such as engineering contracting, equipment supply, trade, and logistics. These enterprises typically operate integrated mining, beneficiation, and smelting operations, producing cathode copper as the main product while recovering cobalt as a valuable by-product. Additionally, they procure copper-cobalt ores from local traders and mining companies to process into refined copper and intermediate cobalt products like crude cobalt hydroxide.

- Chinese companies' involvement not only enhances production capacity but also strengthens local value chains by integrating upstream mining and midstream processing activities. Leveraging relatively low-cost financing, technological capabilities, and strong alignment with China's growing demand for cobalt, these enterprises have become influential players and their expanding footprint supports regional cobalt supply stability and promotes broader industrial development in DR Congo and Zambia.

Source: Frost & Sullivan

Agenda

1 Global Non-ferrous Metal Market Overview

2 Global Copper Cathode Market Overview

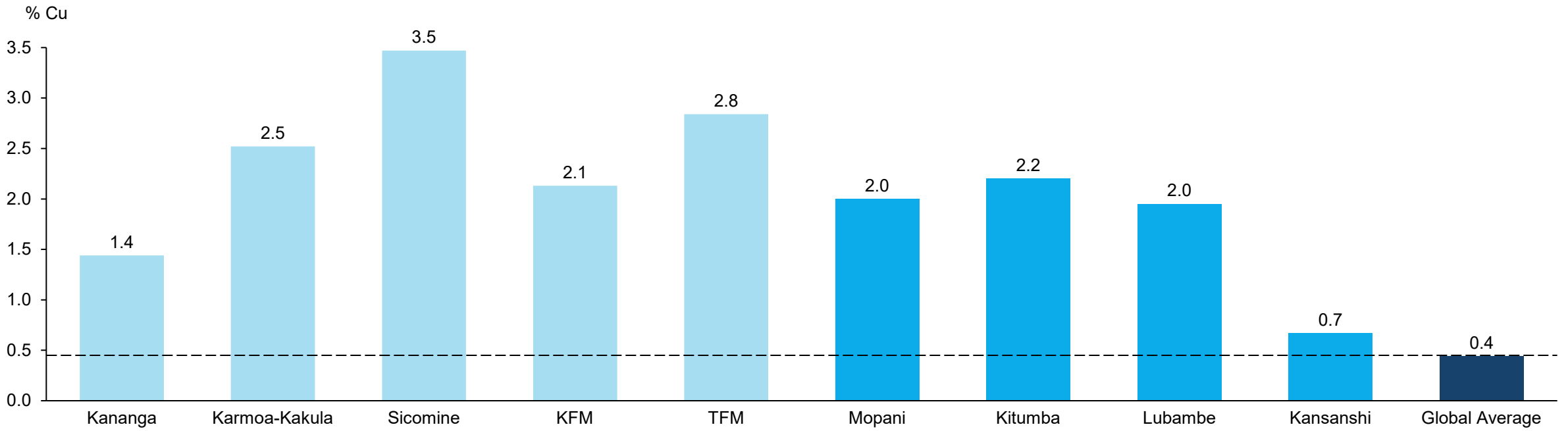
3 Global Cobalt Market Overview

4 Appendices

Supporting Statement

Average Grade Analysis of Copper Ores in DR Congo and Zambia

Average Grade Analysis of Copper Ores in DR Congo and Zambia



- The average grade of copper ores in the DR Congo and Zambia is significantly higher than the global average, offering these countries a notable competitive advantage in the global copper industry. While the global average copper ore grade typically ranges between 0.4% and 0.6%, deposits in DR Congo and Zambia often exceed 2%, particularly in high-quality sulfide and oxide reserves. This higher ore grade translates into lower unit production costs, higher metal yield per ton of ore processed, and improved economic viability for mining projects. As a result, both countries attract strong investment interest and play a vital role in securing stable, high-grade feedstock for smelters worldwide, reinforcing their strategic importance in the copper supply chain.

Source: Frost & Sullivan

Supporting Statement

- Financial turmoil in any emerging market country tends to adversely affect prices in the financial markets of other emerging market countries, such as Zambia and DR Congo. As has happened in the past, financial problems or an increase in the perceived risks associated with investing in other emerging economies could dampen foreign investment and adversely affect the economy of Zambia and DR Congo. In addition, during such times, companies that operate in emerging markets can face severe liquidity constraints as foreign funding sources are withdrawn.
- Companies with operations in countries in an emerging market such as Zambia and DR Congo may be particularly susceptible to disruptions in the capital markets and the reduced availability of credit or the increased cost of debt, which could result in them experiencing financial difficulty. In addition, the availability of credit to entities operating within an emerging market such as Zambia and DR Congo is significantly influenced by levels of investor confidence in such market as a whole and so any factors that impact market confidence (for example, a decrease in credit ratings or state or central bank intervention) could affect the lost or availability of funding for entities within such market.
- current and expected supply and demand dynamics of copper and cobalt, which are primarily based on resources availability, discovery of new mines, competitive landscape of the copper and cobalt industries, end market demands for products in which copper and cobalt are used, technological developments, government policies and global and regional economic conditions.
- The current or expected supply of copper and cobalt may fluctuate, depending on resource availability in the copper and cobalt markets. The majority of copper and cobalt raw materials are produced by only a few suppliers. A number of companies in the copper and cobalt industries either self-explore raw materials and/or directly purchase and refine raw materials from suppliers.
- The global economy and financial markets have experienced significant disruptions in recent years. Economic growth in many countries, particularly in the European Union member states, continues to be adversely affected. There is considerable uncertainty over the long-term effects of the expansionary monetary and fiscal policies adopted by the central banks and financial authorities of the world担 leading economies.
- One of the main environmental issues in the mining industry is waste water and tailings management. Waste water and tailings can contain substances that are potentially harmful to people and the environment, especially in large quantities.
- In DR Congo, non governmental organizations are involved in identifying the environmental risks associated with mineral exploitation. DR Congo government regularly works with non-governmental organizations to implement environmental policies. The work of these various non governmental organizations complements the numerous environmental laws and regulations in DR Congo.
- Smelting and processing of mineral resources is capital intensive.
- The disruptions, uncertainty or volatility in the capital and credit markets resulting from the global financial crisis which have resulted in tighter lending policies.
- It is not uncommon in the mining industry in DR Congo for raw material suppliers to designate a third-party payee for receiving payments for goods.
- According to Frost & Sullivan, as of December 31, 2024, we ranked fifth among PRC copper cathode producers by production volume in both DR Congo and Zambia, and were the only PRC company to rank among the top five in both jurisdictions.
- The Company produced 15.9 thousand tonnes and 5.0 thousand tonnes of copper cathode in DR Congo and Zambia, accounting for approximately 0.9% and 0.8% of the total local production, respectively. Among PRC non-state-owned enterprises, the Company ranked third in DR Congo and first in Zambia.
- China continues to be the world's largest copper consumer, with long-standing strong demand stemming from extensive power grid development, construction, and home appliance manufacturing. The copper market has historically experienced a supply-demand imbalance, which has been further exacerbated in recent years by the rapid growth of wind and solar power. The Chinese government's increasing investments in power generation, transmission, and distribution infrastructure to support renewable energy expansion have further driven copper consumption. Additionally, the copper intensity in electric vehicles is significantly higher than in traditional vehicles, and with China being the world's largest producer, consumer, and exporter of new energy vehicles, copper demand has surged even further. The rise of artificial intelligence (AI) and other emerging technologies has also fueled copper demand, with data centers and 5G base stations becoming a new growth driver for the industry. As a result, global copper consumption has remained strong, increasingly outpacing supply and widening the long-standing gap between demand and production.

Source: Frost & Sullivan

Supporting Statement

- As a result of the proliferation of electric vehicles, energy storage systems and consumer electronics, global refined cobalt consumption is projected to grow significantly, reaching 274.0 thousand tonnes by 2029, while global production is expected to be only 226.0 thousand tonnes. This projected shortfall highlights a persistent and intensifying supply-demand imbalance, reinforcing cobalt's role as a critical and strategic resource in the ongoing global energy transition.
- Hydrometallurgical techniques process is optimal for oxide-rich African ores and ensures superior product quality and cost-efficiency, according to Frost & Sullivan.
- The Company are a leading manufacturer of high-quality copper cathode, with a strong presence in DR Congo and Zambia. According to Frost & Sullivan, as of December 31, 2024, we ranked fifth among PRC copper cathode producers by production volume in both DR Congo and Zambia, and were the only PRC company to rank among the top five in both jurisdictions. Specifically, we produced 15.9 thousand tonnes and 5.0 thousand tonnes of copper cathode in DR Congo and Zambia, accounting for approximately 0.9% and 0.8% of the total local production, respectively. Among PRC non-state-owned enterprises, we ranked third in DR Congo and first in Zambia. These rankings underscore our strong operational capabilities, cost competitiveness, and growing international influence, particularly among Chinese producers expanding into resource-rich African markets.
- The Company are also the fastest-growing company with the highest return on investment in China's copper smelting and trading industry, according to Frost & Sullivan.
- The averages of a year-on-year revenue growth and a return on equity are 5.0% and 9.3% recorded by comparable PRC-headquartered listed companies engaged in non-ferrous metal procurement and trading, and the industry average of gross profit margin is 17.6%.
- Resource-rich regions in Africa, particularly in DR Congo and Zambia offer abundant high-grade copper ore reserves.
- China remains the world's largest copper consumer, accounting for over 60% of global copper demand.
- Traditional copper production enterprises, where copper ore typically accounts for around two-thirds of total production costs.
- With global copper mine grades continuously declining since 2015, as noted by S&P Global,
- Yunnan Province, known as the "Kingdom of Metals," is one of China's most prominent hubs for non-ferrous metal production and trading. The region is endowed with abundant mineral resources, particularly in copper, lead, zinc, and tin, making it a key pillar of China's metallurgical industry.
- Beyond industrial advantages, Yunnan boasts a rich talent pool, with several leading universities and research institutes specializing in metallurgy, materials science, and engineering.
- There is an intensifying competition in global copper and cobalt markets.
- Copper concentrate is the concentrate obtained from copper ore through beneficiation and enrichment processes, usually containing 25% to 30% copper, which is one of the raw materials for electrolytic copper production.
- Cobalt is a by-product generated during the copper smelting process.
- As of December 31, 2024, we ranked fifth among PRC copper cathode producers by production volume in both DR Congo and Zambia, and were the only PRC company to rank among the top five in both jurisdiction.
- The Company produced 15.9 thousand tonnes and 5.0 thousand tonnes of copper cathode in DR Congo and Zambia, accounting for approximately 0.9% and 0.8% of the total local production, respectively.
- There is future rise in the copper demand as a result of the proliferation of electric vehicles, energy storage systems and consumer electronics, the rise of AI and other emerging technologies which demand cooper.
- The copper price quoted on the London Metal Exchange increased from RMB42,600 per tonne in 2020 to RMB66,500 per tonne in 2024 at a CAGR of 11.8%.
- The global copper cathode consumption increased from 22.5 million tonnes in 2020 to 27.0 million tonnes in 2024 at a CAGR of 4.7% and is expected to increase to 30.5 million tonnes in 2029 at a CAGR of 2.5%.
- USGS: United States Geological Survey, a scientific agency of the U.S. federal government.
- ICSG: International Copper Study Group, an intergovernmental organization to promote transparency and cooperation in the global copper market.
- ROW: rest of the world, all other countries or regions not explicitly listed on graphs.

Source: Frost & Sullivan

Supporting Statement

- The average of revenue growth of a CAGR recorded by comparable PRC-headquartered listed companies engaged in non-ferrous metal procurement and trading during the same period is 1.7%.
- During 2024, the industry average gross profit margin is 17.6%.
- The Company's DR Congo factory has reached an ore recycle rate of 98%, higher than the industry average in DR Congo.
- ·Driven by the rapid expansion of high-performance lithium-ion power batteries and other new energy applications, global cobalt demand is projected to grow significantly -- from 187,000 tons in 2024 to 274,000 tons in 2029. Based on this trajectory, the global cobalt market could potentially face a 17.5% supply shortage by 2029.
- ·Sourcing certain commodities in Peru through sourcing or processing agents in connection with nonferrous metal trading business to secure favorable prices and stable supplies is in line with the industry practice.
- ·The key barriers to entering into the copper industry include, among others: material supply barrier, capital barrier, technological barrier, environmental barrier and supply chain barrier.
- There are the average revenue growth rate of 5% and return on equity of 9.3% among the comparable listed enterprises specializing in non-ferrous metal procurement and industry in the PRC and (ii) a gross profit margin of 20.8%, beating the average gross profit margin of 17.6% among the comparable listed enterprises in the PRC in the same year.
- Due to the nature of our business, certain of our five largest suppliers, or their subsidiaries, were also our customers, which is an industry norm in the copper cathode and non-ferrous metal industries.
- The designed grade of acid-soluble copper entering the mill in the first phase of the project is nearly 2%, lower than the industry average of about 3% and represents a promising cost advantage when purchasing raw materials; (ii) the leaching rate of acid-soluble copper in production process is approximately 98%, surpassing the average rate of nearly 95% among traditional copper production enterprises; (iii) the unit consumption of sulfuric acid is 1.5 tons per ton of copper, which is superior than that the average sulfuric consumption at nearly 3 tons per ton of copper among traditional copper production enterprises; (iv) the power consumption is 2650kwh per ton of copper, slightly better than that the average power consumption of 2700kwh per ton of copper among traditional copper production enterprises; (v) the total recovery rate of acid-soluble copper is roughly 94%, which is higher than the average recover rate of 90% reported by traditional copper production enterprises and (vi) the electrolytic current efficiency is approximately 95%, outperforming the rate of around 92% among traditional copper production enterprises.
- The ore recycle rate in production refers to the recovery rate of valuable metals, which represents one of the most crucial technical and economic indicators of metallurgical enterprises. The recovery rate calculated in our production is usually the total recovery rate, which is demonstrated in the below formula. Our total recovery rate of acid-soluble copper is roughly 94%, which exceeded the average recover rate of 90% reported by local copper production enterprises in DR Congo.
- It is an industry norm to have sales and purchases with other players
- The increase in revenue from copper production and processing throughout the Track Record Period was primarily driven by factors spanning (i) increased production of copper cathodes following the production facilities in DR Congo commenced operation; (ii) a spike of average selling price as a result of the higher copper prices quoted on the LME and (iii) the supply shortage facing by the global copper market.
- The use of third-party agents with strong financing capabilities is a widely adopted and mature practice in international non-ferrous metal trading markets, particularly in commodity-intensive jurisdictions such as Peru.
- In the global copper mining industry, the average ore grade typically ranges between 0.4% and 0.6%, reflecting the widespread depletion of high-grade copper reserves. Against this backdrop, the average ore grade in the DR Congo and Zambia stands out as exceeding 2% particularly in regions with abundant oxide and sulfide copper reserves. Despite the natural ore richness, many local producers do not standardize their production processes based on a consistent feed-grade benchmark, instead processing a wide range of ore qualities depending on market availability and cost considerations.

Source: Frost & Sullivan

Supporting Statement

- In contrast, the Company has adopted a unique 2-degree feed-grade approach as a consistent processing standard. Specifically, this means the copper ore entering our production line contains a minimum of 2% copper metal. This clearly differentiates the Company from industry peers, who lack a fixed-grade input strategy or operate at a lower-grade baseline. By designing and calibrating our entire production line around this 2-degree feed-grade standard, the Company secures both technical efficiency and cost predictability. On the procurement side, this allows for tighter control over input quality and pricing, reducing the cost per unit of recovered copper and improving overall competitiveness.
- From a processing perspective, the 2-degree feed-grade standard enables a more optimized and stable metallurgical flow. The Company employs an advanced SX-EW process, which is particularly well-suited to high-grade oxide ores. Compared to conventional heap leaching or flotation techniques often used on lower-grade ores, the process ensures greater extraction efficiency and lower reagent consumption. Furthermore, the Company integrates high-efficiency ion-exchange resins to enhance impurity separation, thereby producing consistently high-purity copper cathodes with reduced waste and environmental impact.
- In terms of results, this integrated and feed-grade-specific approach delivers a significantly higher recovery rate. The Company's total recovery rate of acid-soluble copper reaches approximately 94%, outperforming the local industry average of around 90%. This efficiency is a reflection of better process design and a result of tighter quality control at the input stage. As a result, the Company achieves a rare combination of high output purity, strong cost control, and reduced environmental burden, establishing a clear competitive edge in the copper production landscape of DR Congo and Zambia.
- The purity and quality of the Company's copper products are demonstrated by key competitive indicators. First, the Company achieves an ore recycle rate of approximately 98% and a total recovery rate of acid-soluble copper of 94%, significantly exceeding industry averages in DR Congo and Zambia, where recycle rates generally fall below 95% and recovery rates hover around 90%. Second, the Company's DR Congo smelting facility produces copper cathodes that consistently meet 100% Class A high-purity standards, which is the highest purity grade recognized globally. In contrast, majority of local producers deliver copper with purities ranging between 99.90% and 99.95%, positioning the Company among an elite group with superior product quality. Third, amid the global trend of declining copper ore grades averaging between 0.4% and 0.6%, global producers struggle to maintain processing efficiency. The Company's unique raw material sourcing and processing strategy enables efficient handling of mid-grade ores with feed grades between 1.5% and 2.0%, a capability rarely matched in the industry. This approach showcases the Company's technological adaptability and commitment to sustainable resource utilization, maintaining the high product purity.
- The global non-ferrous metal trading industry is characterized by a diverse of players, ranging from pure trading houses to vertically integrated producers. While large trading firms specialize in arbitrage, logistics, and market access, integrated producers increasingly build trading capabilities to capture more value along the supply chain. Geographically, trading activity is concentrated in hubs such as Switzerland, Singapore, London, and Shanghai, reflecting both financial infrastructure and proximity to demand centers.
- In this landscape, the Company stands out through its dual identity as both a producer and trader of non-ferrous metals. It shares many operational similarities with traditional traders, including global sourcing, price risk management, and flexible contract structures. However, its access to self-owned or secured upstream production gives it a significant edge in supply stability in an environment of rising geopolitical risk and increasing scrutiny over raw material traceability.
- Moreover, the Company benefits from integrated margin capture across mining, refining, and trading stages, enhancing profitability and allowing for more strategic pricing. The ability to operate flexibly as either a merchant trader or a value chain integrator further increases its resilience to market volatility.
- In summary, as global trends shift toward supply chain localization, green transition, and responsible sourcing, the Company's hybrid role as both a producer and trader positions it favorably as it combines the agility of a trading house with the reliability of a producer, offering customers and partners a more secure, transparent, and strategic approach to non-ferrous metal supply.
- In the context of the "Belt and Road Initiative", the cooperation between China and African countries such as Zambia and DR Congo in the copper and cobalt industry is reflected in multiple fields, including mining development investments, technological upgrading support, industrial park construction, and trade markets, etc.

Source: Frost & Sullivan

Supporting Statement

- Zambia and the DR Congo possess abundant mineral resources. Chinese enterprises participate in the development of mineral resources in Zambia and the DR Congo through direct investment or by establishing joint ventures with local enterprises. In addition, resource-for-loan models are utilized to obtain mining rights or secure resource supplies. In terms of technological support and industrial upgrading, China introduces advanced mining technologies and expertise to Zambia and the DR Congo, improving the efficiency and added value of local mineral development. It also supports Zambia and the DR Congo in extending their mining industry chains and developing mineral deep-processing industries. At the same time, China builds industrial parks in Zambia and the DR Congo based on the raw materials industry, attracting enterprise clusters, providing one-stop services to park enterprises, and promoting collaboration among enterprises.
- China is one of the world's leading producers and consumers of copper and cobalt. It imports large quantities of mineral resources and other raw materials from Zambia and the DR Congo, while exporting equipment, technology, and services required for mining production and processing to these countries. In addition, China invests in raw material processing enterprises in Zambia and the DR Congo, conducting deep processing of primary products for export, thereby increasing export revenues and enhancing the international competitiveness of local industries. In terms of financial cooperation and capital mobilization, China provides preferential loans to support the development of the raw materials industry in Zambia and the DR Congo. Through financial institutions, it offers funding support while exploring approaches such as resource securitization to raise capital, and innovating project financing models. In the area of talent development and technology exchange, China provides talent training programs related to the raw materials industry for Zambia and the DR Congo, cultivating professional technical and managerial personnel. At the same time, it carries out technology exchange activities with Zambia and the DR Congo, jointly developing technologies and equipment suited to local conditions to enhance the efficiency and sustainability of resource development.
- In addition to high-grade sulfide ores, DR Congo and Zambia also possess a certain proportion of oxide ore resources with relatively lower copper grades (ranging from approximately 0.8% to 2.5%). These ores are characterized by ample reserves and low purchase prices in DR Congo and Zambia.
- since we have strategically shifted toward utilizing lower-grade ores with abundant reserves, which offer more stable supply advantages compared to high-grade ores.
- This was primarily due to DR Congo's higher price levels, stronger financial capacity, higher logistics costs, heavier tax burden, as well as higher raw material costs resulting from higher ore grades compared to Zambia.
- Our cost of raw materials further decreased from RMB178.0 million in 2022 to RMB158.0 million in 2023, primarily due to a decline in raw material procurement costs corresponding to the lower average copper prices quoted on the LME and an increase in the utilization of tailings of Rong Xing Investments in Zambia.
- Our cost of raw materials surged significantly from RMB158.0 million in 2023 to RMB490.3 million in 2024, mainly driven by a substantial increase in raw material procurement costs resulting from the increased copper cathode production in DR Congo in 2024, coupled with a steady rise in average copper prices quoted on the LME.
- For critical production equipment, we proactively adopt technologically advanced models with higher efficiency per unit output. For example, while industry-standard equipment for equivalent processing capacity typically employs traditional thickeners with diameters up to 30 meters, we utilize high-efficiency thickeners with a diameter of only 22 meters that can deliver outstanding processing capacity and sedimentation efficiency within the same footprint.

Source: Frost & Sullivan

Supporting Statement

- Copper tailings are solid waste with an inferior copper content (typically measured at 0.2% to 0.8%) discharged after copper ore processing. They mainly consist of gangue minerals, unrefined copper minerals, and small amount of other metallic impurities. They are regarded as one of the major byproducts of copper mining and processing which usually stored in tailings ponds as slurry. By way of technical upgrades, we are able to further utilize tailings to extract valuable metals, albeit lower than the original ore, to reduce our upfront costs associated with mining, stripping, and transportation. Specifically, tailings can be directly extracted from tailings ponds through simple pretreatment, lowering costs in resource acquisition compared to conventional ore mining. Furthermore, since tailings have already undergone preliminary crushing and grinding, they can enter the smelting process directly, simplifying operational procedures and reducing reagent consumption costs.

- Frontier metals are a category of metals that break through the limitations of traditional metals, possess critical applications in advanced, emerging technology fields (such as high-end manufacturing, new energy, and national defense), feature high technological barriers, and demonstrate significant future demand potential.

- Our exceptional cost efficiency is demonstrated by our robust gross profit margin. In particular, the gross profit margin for our trading of non-ferrous metal product business reached 2.3%, 3.8%, 5.5% and 8.6% in 2022, 2023, 2024 and the six months ended June 30, 2025, respectively, substantially outperforming the average gross profit margins among our comparable industry peers of 1.3%, 1.6%, 1.5%, and 2.7% in the same periods, respectively.

- Furthermore, certain suppliers became our five largest suppliers shortly after their commencement of business relationships with us, as we strategically shifted to establish partnership with specialized ore suppliers possessing mining experience, stable supply capabilities, and ore grades that meet our production requirements to maintain stable raw material supply, considering that most established foreign and state-owned mining companies tend to operate their own smelters and process their ores internally rather than selling them externally in recent years.

- The local financing environment in Peru primarily relies on banking channels, with relatively limited financing instruments available.

Research Methodologies

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage includes automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.
- The Frost & Sullivan's report includes information on non-ferrous metal industry.
- Frost & Sullivan has conducted detailed primary research which involved discussing the status of the industry with certain leading industry participants and conducting interviews with relevant parties. Frost & Sullivan has also conducted secondary research which involved reviewing company reports, independent research reports and data based on its own research database. Frost & Sullivan has obtained the figures for the estimated total market size from historical data analysis plotted against macroeconomic data as well as considered the above-mentioned industry key drivers.
- Frost & Sullivan's Market Engineering Forecasting Methodology integrates several forecasting techniques with the Market Engineering Measurement-based System. It relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements include:
  - ✓ Expert-opinion forecasting methodology
  - ✓ Integration of market drivers and restraints
  - ✓ Integration with the market challenges
  - ✓ Integration of the Market Engineering Measurement trends
  - ✓ Integration of econometric variables
- In compiling and preparing the Report, Frost & Sullivan has adopted the following assumptions:
  - ✓ The social, economic and political environment of the globe and China is likely to remain stable in the forecast period
  - ✓ Related industry key drivers are likely to drive the market in the forecast period

Source: Frost & Sullivan