## Research Report: How Copper Mining Companies Earn Money During the Exploration Stage

Copper is one of the most important metals driving the worldwide move to sustainable energy. With rising demand for electric vehicles, renewable energy, and modernizing electrical networks, the globe will require record amounts of copper in the next decades. At the same time, copper supply is constrained owing to underinvestment in new mines, resource nationalism, and environmental opposition to mining operations. This supply-demand mismatch creates the conditions for a new copper supercycle that might span years. For investors, exposure to copper through mining equities provides tremendous potential upside.

The renewable energy shift releases a new commodities supercycle, with copper at its core.

Clean energy technologies require significantly more copper compared to traditional fossil fuel infrastructure. For instance, electric vehicles use three times the amount of copper as gasoline-powered cars. Renewable energy systems like wind and solar also demand large quantities of copper wiring. As nations set ambitious goals for vehicle electrification and renewable energy adoption, copper demand is expected to surge.

According to Sberbank analyst Mikhail Shevelev, "In 10 years, green demand will account for about a quarter of total copper consumption." Consulting firm Wood Mackenzie forecasts that copper demand could reach 50 million tonnes per year by 2040, doubling the demand projected for 2024.

To illustrate this growth, the average battery-electric vehicle contains 83 kg of copper, compared to just 23 kg in a conventional internal combustion engine vehicle. Fully electric buses can use between 224 kg and 369 kg of copper. As more governments transition away from gasoline-powered vehicles toward EVs, this shift will result in millions of additional tonnes of annual copper demand.

Renewable energy systems are similarly copper-intensive. Offshore wind farms require approximately 15 tonnes of copper per megawatt of capacity, while a single 3-megawatt wind turbine contains 4.7 tonnes (9,400 pounds) of copper. Solar panel arrays use around 5.5 tonnes of copper per megawatt.

The International Energy Agency estimates that achieving the Paris Climate Agreement goals will require 200 million electric vehicles on the road by 2030, up from just 3 million in 2017. To meet these goals, annual clean energy investments will need to surpass $2 trillion by the late 2020s, with a significant portion of that directed toward copper-intensive renewable energy projects.

However, the rising demand for copper is not limited to clean energy. Copper is widely used in construction, electrical equipment, appliances, brass and copper alloys, and telecommunications infrastructure. The global rollout of 5G networks and the continuing expansion of electronics will add further pressure on copper demand. Additionally, antimicrobial copper alloys are seeing increased use in hospitals and public spaces to help reduce the spread of infections.

## 1. Introduction

Mining companies face significant challenges in generating revenue during the exploration stage. Copper, as a key industrial metal, requires extensive exploration before extraction begins. The exploration stage involves identifying viable deposits, estimating resource quantities, and evaluating the feasibility of mining operations. This phase can take years, and companies must adopt creative strategies to sustain cash flow and offset operational expenses before transitioning into production.

## 2. Understanding Stages

### The Lifecycle of a Mine

Understanding the life cycle of a mine is essential for investors with an interest in the mining sector. This process usually consists of multiple stages, each presenting distinct challenges, risks, and potential opportunities.

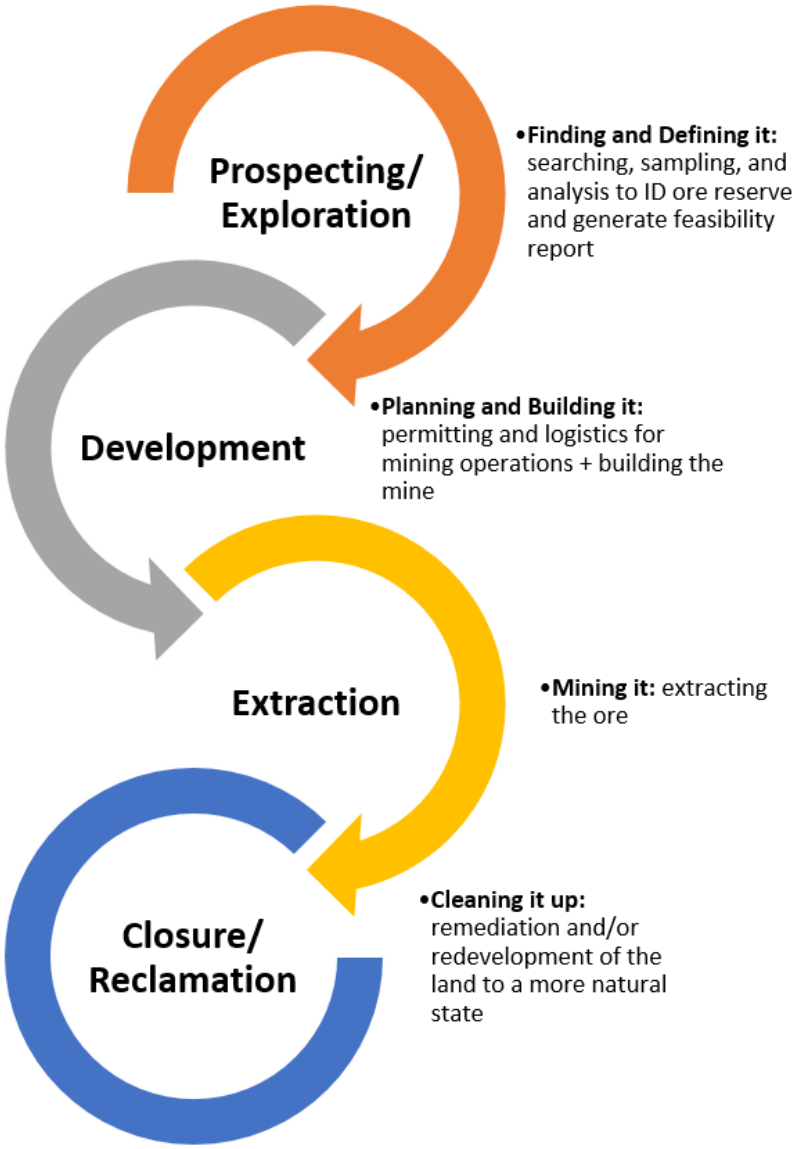
The Life Cycle of a Mine

The stages in the life cycle of a mine are:

a) Prospecting and Exploration
b) Development
c) Extraction
d) Closure/Reclamation

Each of the stages may overlap with the next and is very lengthy and expensive.

Source:
https://superfund.arizona.edu/resources/modules/copper-mining-and-processing/life-cycle-mine



## 3. Challenges in the Exploration Stage

Copper mining companies, especially those focused on exploration, typically face these challenges:

- **High upfront costs**: Costs include geological surveys, drilling, environmental assessments, and legal compliance.
- **Long timelines**: The exploration stage can last several years before a company transitions to production.
- **No direct revenue**: During this phase, mining companies generally don't generate revenue from copper sales.

Despite these challenges, there are several ways in which copper mining companies can secure funding and even generate income during exploration.

## 4. Key Revenue and Financing Strategies

#### A. Joint Ventures and Strategic Partnerships

Mining companies often form joint ventures (JVs) with larger firms or institutional investors. This model allows the company to:

- **Share exploration costs**: By partnering with larger, more established players, copper exploration companies can split the financial burden of costly exploration activities.
- **Gain expertise**: Strategic partners may bring technical expertise and access to capital, speeding up the exploration and feasibility process.
- **Receive milestone payments**: Partner companies sometimes pay exploration firms for meeting specific targets, such as discovering promising reserves.

#### B. Equity Financing and Initial Public Offerings (IPOs)

Exploration companies frequently raise capital through:

- **Private placements**: They issue shares to investors to finance exploration.
- **IPOs**: If the exploration company is at a mature enough stage, going public can provide significant funding. Investors are drawn to the potential for long-term returns when the company transitions into production.
- **Rights issues**: Existing shareholders can be offered additional shares to raise capital.

#### C. Royalties and Streaming Deals

Copper exploration companies can sell **royalty** or **streaming agreements** to raise funds:

- **Royalties**: The exploration company sells future rights to a portion of the copper produced at a specific project, earning immediate cash while still retaining operational control.

- **Streaming**: In a streaming deal, the company agrees to sell a portion of its future production (or the proceeds from sales) at a predetermined, often discounted price. This model helps secure funds upfront, ensuring liquidity during exploration.

#### D. Government Grants and Incentives

Many countries offer incentives and grants to support mining exploration, especially for critical metals like copper. For example:

- **Tax credits**: Governments may provide tax deductions or credits for exploration expenses, which allows companies to reduce financial risks.
- **Exploration grants**: In some jurisdictions, local or national governments provide direct financial aid to promote mineral discovery and extraction, boosting the industry.

#### E. Asset Sales or Option Agreements

Exploration companies can sell off non-core assets to finance their primary projects. They may also enter into **option agreements** where a larger mining company purchases the rights to a deposit after further exploration or feasibility assessments, with initial payments covering exploration costs.

#### F. Technology and Data Licensing

With technological advancements, many exploration companies use cutting-edge methods, such as 3D modeling and AI for resource estimation. Selling or licensing the data and technology they develop can provide a source of income during the exploration stage. These datasets may be valuable to other firms involved in mining or resource development.

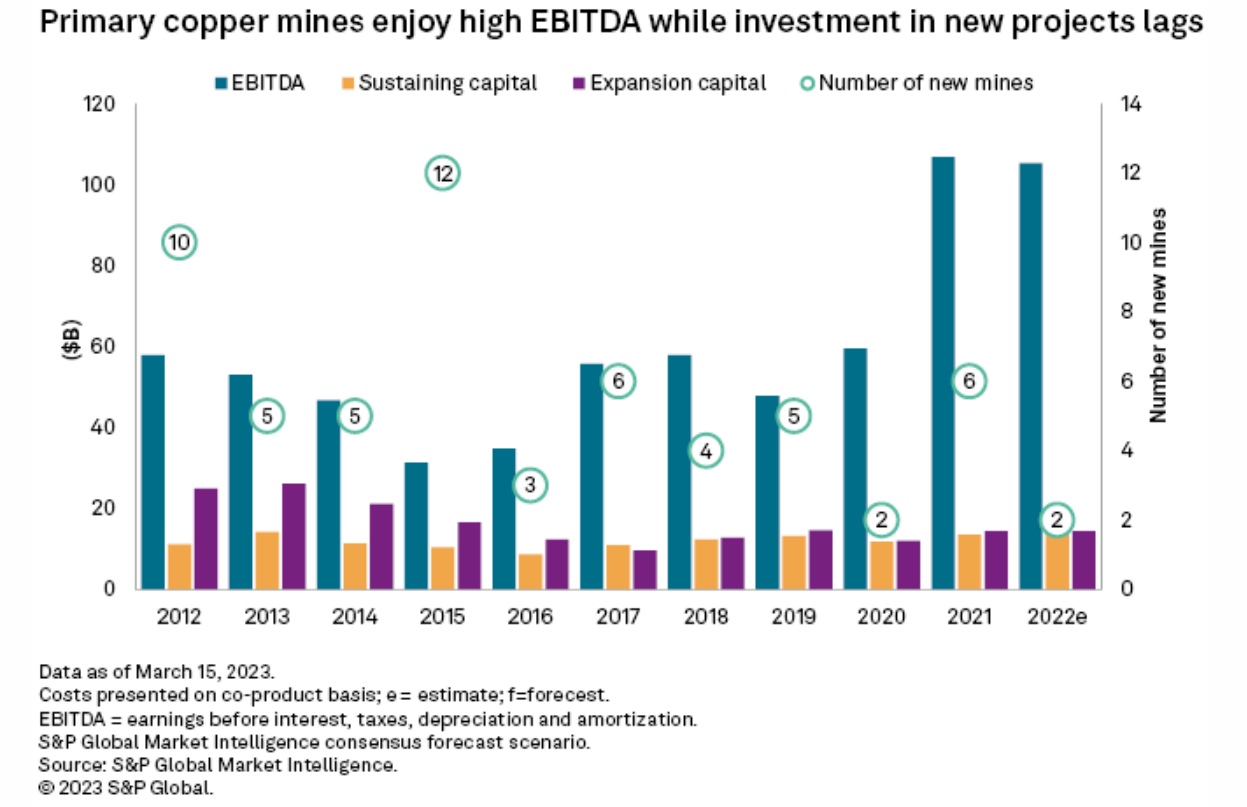
## 5. Statistics on Copper Mining Revenues in Australia

Australia is one of the world's largest producers of copper, and while most revenue comes from active production, exploration plays a vital role in sustaining the country's mining industry.

- **Total copper exports from Australia in 2023** were valued at approximately **AUD 12.5 billion**, driven by global demand for copper in electronics, renewable energy, and construction. Copper ranks among Australia's top mineral exports, contributing significantly to the country's GDP.
- In **2022**, Australia produced **960,000 metric tons** of copper, with major mining regions such as South Australia and Western Australia leading production efforts. The country's major copper mines include Olympic Dam and Mount Isa.
- **Exploration expenditure**: The Australian government reported a **12% increase in mineral exploration expenditure** in 2022, with much of this focused on copper exploration. Total copper exploration expenditure in Australia during 2022 reached approximately **AUD 675 million**, reflecting the industry's commitment to expanding future production.

- **Employment and contribution to economy**: The copper mining sector employs over **10,000 people directly** and contributes billions in taxes and royalties to both state and federal governments, underscoring its importance to the Australian economy.
- **Future outlook**: With the growing global push toward green energy, electric vehicles, and sustainable infrastructure, copper demand is expected to rise significantly. Australia's copper mining companies are positioned to benefit from these trends. Exploration is critical to ensuring that Australian companies can meet this demand and continue to grow the industry's contribution to the national economy.

## 6. Case Studies




### A. First Quantum Minerals (FQM)

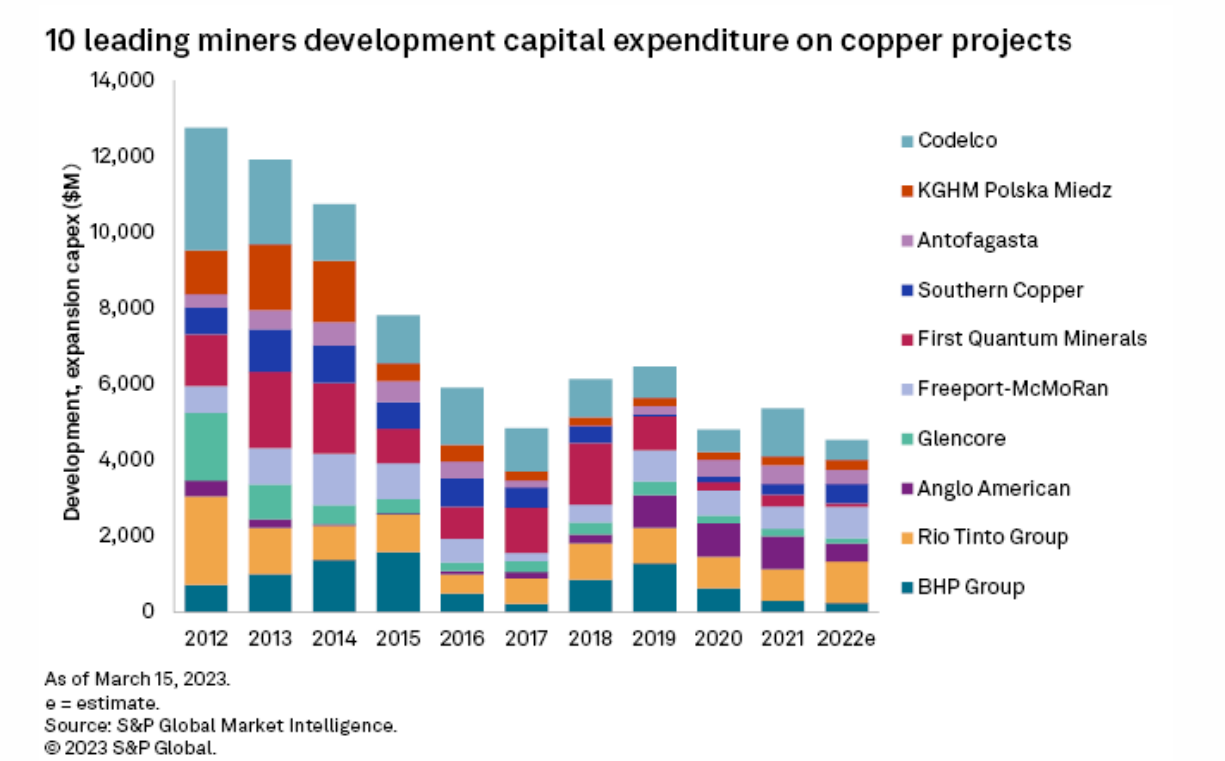
First Quantum Minerals is a prominent copper producer that has utilized a mix of equity financing and joint ventures to fund exploration. Before it transitioned to full-scale production at the Sentinel Copper Mine in Zambia, the company secured joint ventures to help finance the high costs of exploration. First Quantum's ability to raise capital through strategic partnerships and issuing shares allowed it to move from exploration to production effectively.

**B. Sandstorm Gold Ltd.**

Sandstorm Gold Ltd. is a royalty and streaming company that provides upfront financing to mining companies in exchange for future production. Sandstorm has entered into multiple streaming deals with copper exploration firms, allowing them to raise capital during the exploration stage without diluting shareholder value. These deals offer mining companies much-needed liquidity during early-stage exploration and development.

**C. Rio Tinto and Western Copper and Gold**

In a recent example, Rio Tinto entered into a strategic partnership with Western Copper and Gold, focusing on the Casino copper deposit. Rio Tinto invested to help fund exploration and development in exchange for a stake in the project, aligning interests while providing cash flow to Western Copper and Gold during the exploration stage.




Source: https://www.spglobal.com/marketintelligence/en/news-insights/research/copper-miners-enjoy-high-profits-but-development-capital-expenditure-lag

## Worldwide Copper Mining Market Highlights

- A new copper supercycle is forming, propelled by electrification, national security concerns, environmental legislation, supply restrictions, and deglobalisation.
- Copper demand is increasing as a result of the renewable energy transition, but supply is falling behind, with significant deficits expected by 2025.

- Resource nationalism in major copper-producing countries such as Peru, Panama, and Chile worsens supply interruptions.
- Environmental constraints make it difficult to put new copper mines into production quickly enough to fulfill demand.
- Copper prices are likely to rise due to high inflation and a weakening US currency as the Fed gradually lowers interest rates.

**Why invest in the Australian mining industry?**

According to RationalStat, the Australian mining sector is expected to rise at an 11% CAGR to $53.6 billion between 2023 and 2030. The country is home to global mining behemoths, and investors may obtain exposure to the industry through several techniques.

**Copper Ore Mining in Australia industry analysis**

Copper ore mining revenue is expected to have increased at an annualised 3.5% over the five years through 2023-24, to $9.6 billion. This robust growth is due to higher copper prices, and strengthened demand growth from China for copper used in construction, communications and manufacturing. China's commitment to clean energy – particularly in the solar panels, electric vehicles (EVs), and batteries sectors – has significantly escalated the country's demand for copper. Highly advanced economies, like Japan, have also supported demand growth through raised domestic production volumes. Australia is one of the world's major copper mining countries, behind Chile, Peru, China, the Democratic Republic of Congo and the United States.

**7. Conclusion**

While the exploration stage of copper mining is financially challenging, companies can utilize several strategies to mitigate the costs and sustain their operations. Joint ventures, equity financing, royalty agreements, government incentives, and innovative partnerships allow exploration companies to secure the necessary funds without generating direct revenue from copper production. These strategies are crucial for companies to bridge the gap between exploration and mining production, ensuring long-term financial viability and the eventual development of viable copper projects.

Additionally, Australia's copper mining industry serves as a prime example of how exploration contributes to long-term revenue generation. With significant exploration investments and rising global demand for copper, Australia's mining companies are poised to continue playing a leading role in the global copper supply chain. The combination of exploration investments, partnerships, and innovative financing models ensures the sustainability and profitability of the industry during the exploration stage.