

Meeting the metals mining shortfall

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Moving away from fossil fuels to meet essential global carbon reduction targets means mining for metals and minerals will need to increase significantly over the coming years. Electric vehicles, wind turbines, solar panels, and overall electrification are all areas of increased demand, meaning metals like copper, iron, and zinc will be continuously required.



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How the need for more metals will be met with our current infrastructure is uncertain. Taking copper as an example, production is predicted to reach a crisis point by 2030 with an annual deficit of five million tonnes. Stemming from a surge in demand driven by the exponential growth in electric vehicles and a myriad of other electrification applications, surpassing current production capacity, this is an alarming prognosis that would ultimately impede global sustainability goals.

Demand for refined copper to meet global decarbonization efforts is poised to nearly triple by 2050, compared to the 2020 production levels. This means the world is challenged with sustaining an annual increase in copper production of between 20% to 30% within the next seven years — that is a capacity on par with the current outputs of major producers Chile and Peru combined.

Canada is viewed by the world as a frontrunner when it comes to the adoption of technologies for the energy transition. It has a healthy copper market, particularly in its province of British Columbia, highlighted by major projects, including one in which ABB provided electrification technologies and expertise with Copper Mountain Mining. The country regularly produces more than 500,000 tonnes of copper per year — around 3% of the world's production — and its exports of the material are valued at approximately \$10 billion per year.

Infrastructure investment: A ticking clock

New mining operations are an increasingly urgent necessity, and there are several industry projects awaiting decisions, yet many investors are waiting until the price is right. With highly specialist equipment required and only a small number of industry players, the risk with this approach is a major bottleneck on the horizon.

On top of the challenge of timely investment, mining companies are processing ore grades that are increasingly low, with one tonne of copper in every 100 tonnes of rock at best. They typically do this with advanced and scalable grinding technology solutions. The industry workhorse for driving mills has been the gearless mill drive (GMD), which facilitates the extraction of copper from raw materials through grinding processes in the most efficient way.

ABB is the market leader of GMDs in the world and building these very large units takes time. This equipment challenge becomes two-fold when considering the forecasts of future ore grades being even lower than present, so much so that double the ore will need to be processed for the same amount of copper.

Increasing extraction and decreasing emissions

The integration of technology, alongside investments in new mining ventures, will be pivotal in ensuring that the world secures the essential metals required for the energy transition while maintaining cost-effectiveness and limiting the environmental impact of extraction.

The need to extract and process additional metals, while mitigating the already precarious and prominent issues associated with global warming this presents, is a formidable challenge for the sector. Mining currently contributes around 7% of total greenhouse gas (GHG) emissions globally, with diesel combustion in machinery alone responsible for half of this substantial environmental footprint.

Efforts by mining enterprises to reduce carbon encompass multiple initiatives to shift machinery from diesel to electric wherever feasible. Additionally, they are actively engaged in designing machinery fueled by alternative energy sources like hydrogen and ammonia. This concerted endeavor aims to significantly curtail, if not eliminate, the reliance on fossil fuels in mining equipment such as trucks, loaders, and excavators.

Unlocking value with artificial intelligence (AI) and digital technology

The digital transformation of equipment, systems, and procedures, with the primary objective of optimizing operational efficiency within mining operations, is another crucial imperative for the sector. For instance, within the domain of GMDs, numerous predictive analysis systems have already been implemented to monitor equipment. These advanced systems enable companies to proactively address maintenance requirements, ensuring peak availability and efficiency for their machinery.

Artificial intelligence (AI) is ushering in a new era of innovation in mining equipment, empowering advanced performance and operational analyses. This transformative technology provides a more comprehensive range of insights, particularly in machine operation. This enables proactive measures to prevent issues and, importantly, facilitates in-depth assessments of processed ore quality.

The shift towards digitalizing operations is imperative because of the heightened demand, prompting mining companies to prioritize maintenance procedures and preemptive failure mitigation. In this environment, even the slightest efficiency improvement holds significant value.

Embracing digital transformation becomes not just a necessity but a strategic advantage, enabling mining entities to proactively address challenges, optimize processes, and

ultimately enhance overall operational performance. It is this evolution, alongside investments in novel mining ventures, that will help the world secure the essential metals required for the energy transition.

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