

File name: **Abstract submission ID number**_Primary author's family name_First_Four_Words_of_Title
432_FREELE_The_Crucial_and_Paradoxical

The Crucial and Paradoxical Role of Mining in the Energy Transition

Introduction

The world is currently transitioning towards a low-carbon economy, and critical minerals such as lithium, cobalt, nickel, copper, and rare earth elements are essential components of the renewable energy technologies required for this transition away from fossil fuels. The mining industry extracts these raw materials required for renewable energy technologies such as solar panels and electric vehicles. However, the extraction and processing of these minerals pose significant environmental and social challenges, making mining's role in the green transition paradoxical. This paper explores the paradoxical role of mining in the green transition, with a focus on the crucial role of critical minerals in the energy transition, the importance of ESG and the industry's persistent risks related to rights and communities.

The Crucial Role of Critical Minerals in the Energy Transition

Critical minerals play a crucial role in the green transition by providing essential components for renewable energy technologies. The demand for critical minerals is expected to increase significantly in the coming years. While scenarios are dependent on policy, innovation and myriad other factors, by 2040, the International Energy Agency (IEA) predicts that total mineral demand from clean energy technologies globally will double and could even quadruple. To meet the demand for electric vehicles and battery storage growth alone, demand is expected to increase from ten to thirty fold over the period, and demand for certain critical minerals (graphite and lithium in particular) is forecasted to rise by up to 500%ⁱ. Over the next 30 years, more than three billion tons of metals and minerals need to be mined to power the energy transition.

Without a drastic and highly unlikely radical change in human consumption patterns, humanity has little choice but to meet the predicted mineral demand with a vast expansion of mining activity. Exploration of the industry's newest frontiers, the deep sea and asteroid mining, are ongoing but not yet commercialized.

Ongoing Mining Industry Challenges

This demand puts significant pressure on the mining industry to produce more minerals. Yet the industry is already under extraordinary pressure, suffering from a persistent lack of investment the early-stages of mineral exploration. Operators are still having to navigate highly cyclical market conditions, ever lower grades and more remote or difficult to access ore bodies, as well as high degrees of competition and minimal innovation. The industry has an aging workforce and scant talent pool, as it continuously struggles to attract and retain skilled new candidates, especially younger workers crucial to the future of the industry. Meanwhile regulatory and public pressures are increasing on economic, environmental and social factors, while at a macro level, growing geopolitical instability and social unrest pose risks of operational disruptions and other challenges in many parts of the world.

Rights and Communities Impacts

Mining activities can have significant impacts on human rights, including economic and physical displacement and violations of workers' and communities' rights. Participation of communities and

Indigenous Peoples whose land hosts critical minerals is essential to powering a low-carbon future. However, recent years have seen a rise in human rights-related allegations coming from such communities, especially in some of the more "new frontier" areas of critical mineral extraction. Indigenous peoples can be especially affected, as they often face the prospect of mineral development projects on or near their ancestral lands. The most recent update of the Transition Minerals Tracker for example showed 495 allegations of human rights abuse (2010 to 2021) and 61 new allegations in 2021 aloneⁱⁱ. Moreover, despite many studiesⁱⁱⁱ, standards^{iv}, and individual company efforts, there is little evidence or documentation indicating that the mining industry has succeeded in contributing to sustainable development in a meaningful and lasting way^v. Some recent studies further suggest that the industry continues to fall far short of societal expectations in both environmental and social performance in mining^{vi}.

This context contributes substantially to the industry's ongoing challenges with social acceptability as well as attraction of talent and new types of capital crucial to its growth. It can be argued that the current industry model still appears to work against certain fundamental just transition themes at a community level, including regarding resilient livelihoods and rights. Social resistance will likely continue to escalate if the mining industry cannot collectively and authentically improve environmental and social performance, which is something humanity cannot afford.

Mining and the Just Transition

The crucial role of critical minerals in the green energy transition is undeniable. However, discourse has recently moved to the notion of ensuring that this transition is "just". The so-called "Just Transition" is a process that ensures that humanity's transition to a low-carbon economy is as fair and inclusive as possible for everyone concerned. A Just Transition means greening the economy in a way that secures sustainable livelihoods, supports local resilience, and upholds universal human rights. Within mining, the just transition discussion has mainly focused on the loss of jobs related to coal mining. However, mineral-hosting communities also need to be considered^{vii}.

A recent University of Queensland study^{viii} of 5,097 mining projects involving about 30 minerals needed in the energy transition found that some 54% are located on or near Indigenous peoples' lands, raising concerns about future risks related to more mining on ecologically and culturally valuable territories; these lands are intrinsic to Indigenous peoples' identity and way of life, and they must have a genuine say in where and how energy transition minerals are extracted to tackle climate change.

Investor and Regulator Pressure on Environmental, social, and governance (ESG)

Environmental, social, and governance (ESG) considerations are essential for responsible mining practices, as well as enterprise risk mitigation. Investors are increasingly focusing on ESG factors when evaluating investment opportunities, recognizing that companies that address these risks and opportunities are more likely to be resilient and generate long-term value. Some of the most material ESG topics in mining include climate change, water usage, community relations and human rights. This pressure can include shareholder resolutions, engagement with management, or divestment risks. A high profile recent example is the global pressure for adoption of the GISTM, led by the Church of England, which in its most recent update intended to vote against the chairs of over 100 mining company boards that had not committed to the standard^{ix}. This standard was developed in response to the growing number of tailings dam failures in recent years, some of them with catastrophic impacts and consequences.

Meanwhile, companies are also becoming subject to ESG litigation over such topics, in particular related to greenwashing and human rights impacts. Regulators and legislators are beginning to act. For example, in 2023 the US Securities and Exchange Commission (SEC) charged Vale over misleading disclosures prior to the deadly Brumadinho dam collapse^x. England courts recently also allowed a class action lawsuit against BHP, which as of March 2023 had been named the “the largest in history” (in English courts), with compensation demands that could mount to £36 billion (\$66 billion USD).

The adoption of risk-mitigating industry ESG standards and frameworks is raising the industry bar for performance, leading to better outcomes for the environment, society, and local economies. However, the vast majority of industry ESG pressure still does not come from a so-called “double materiality” lens at present, meaning its primary focus continues to be on protecting enterprise value. In contrast, double materiality recognizes not only risks to enterprise value but impacts that mining can have on the environment, society and the economy. This more holistic approach to corporate sustainability strategy is critical to moving towards more sustainable mining practices, enhancing the industry’s role in a just transition and tackling its ongoing challenges with social acceptability, for the sake of all humanity.

Conclusion

The urgent global issue of climate change requires immediate action; the future of our species depends on our ability to transition to a greener future. The mining industry has a crucial role in fueling this transition, but its role continues to be paradoxical as it struggles to meet current and evolving expectations regarding social and environmental performance, and missing opportunities to contribute to collective resilience. However, this can be achieved, in particular through investor and company adoption of a double materiality approach, greater multi-stakeholder collaboration, a more diverse talent pool, improved governance, application of a systems lens in corporate strategy, and a shift from mere compliance and disclosure to action and outcomes. By prioritizing respect for rights, doing no harm, and supporting sustainable livelihoods and community resilience, mineral resource development can accelerate the transition to a just and equitable future.

ⁱ World Bank. “Climate-Smart Mining: Minerals for Climate Action.” <https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action>.

ⁱⁱ Business and Human Rights Resource Centre. “TMT 2021.” <https://www.business-humanrights.org/en/from-us/briefings/tmt-2021/>.

ⁱⁱⁱ Sustainable Development Solutions Network. “Mapping Mining to the Sustainable Development Goals: An Atlas.” <https://resources.unsdsn.org/mapping-mining-to-the-sustainable-development-goals-an-atlas>.

^{iv} International Council on Mining and Metals. “Supporting the Sustainable Development Goals.” <https://www.icmm.com/en-gb/our-work/supporting-the-sustainable-development-goals>.

^v Responsible Mining Foundation and Columbia Center on Sustainable Investment. “Mining and the Sustainable Development Goals: An Atlas.” https://www.responsibleminingfoundation.org/app/uploads/RMF_CCSI_Mining_and_SDGs_EN_Sept2020.pdf.

^{vi} Responsible Mining Foundation. “Responsible Mining Index 2022.” <https://2022.responsibleminingindex.org/en>.

^{vii} Davies, Richard A., and Gavin M. Mudd. “Clean Energy: The World’s Demand for Copper Could Be Catastrophic for Communities and Environments.” *The Conversation*, February 14, 2022. <https://theconversation.com/clean-energy-the-worlds-demand-for-copper-could-be-catastrophic-for-communities-and-environments-157872>.

^{viii} The University of Queensland Sustainable Minerals Institute. “54 Per Cent of Projects Extracting Clean Energy Minerals Overlap Indigenous Lands.” <https://smi.uq.edu.au/article/2022/12/54-per-cent-projects-extracting-clean-energy-minerals-overlap-indigenous-lands>.

^{ix} The Church of England. “Investor 3.” <https://www.churchofengland.org/about/leadership-and-governance/church-england-pensions-board/pensions-board-investments/investor-3>.

^x U.S. Securities and Exchange Commission. "SEC Charges Mining Company and Executives with Fraudulent Scheme to Overstate Financial Results." Press release, April 18, 2023. <https://www.sec.gov/news/press-release/2023-63>.