Beyond Extraction:

Transforming Mine Waste Into A Net Zero, Multibillion–Dollar Opportunity

Authors:

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Executive Summary

A multibillion–dollar opportunity that strengthens mining's role in delivering the energy transition

The mining industry has a unique multibillion–dollar opportunity to leverage its resources and capabilities to become a leading provider of high–quality carbon removals. This represents a significant lever for achieving global decarbonization goals.

- Carbon removal credits, which have become the gold standard in carbon markets, are the route for mining companies to realize this revenue. The carbon credit market has grown tenfold over the past two years and is forecasted by McKinsey, a leading consulting firm, to be worth up to USD 1.2 trillion by 2050[1].

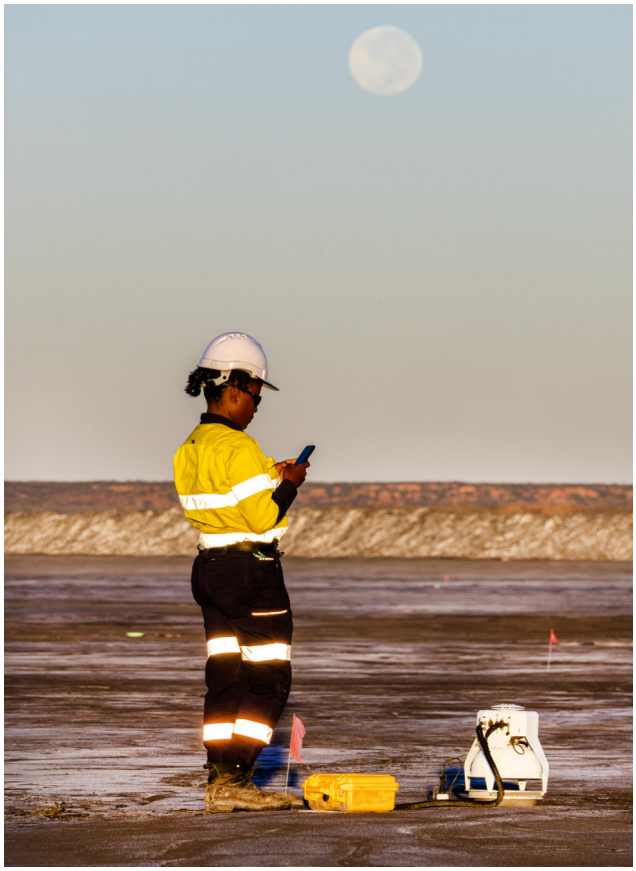
- Mafic / ultramafic rocks – hosting nickel, diamond, chromium, and many other mined ores – are a key feedstock for the carbon removal underpinning these credits. Companies that mine these ores sit on **one of the great untapped resources for a low–carbon economy**.

- Tailings storage facilities around the world already contain mafic / ultramafic rock at a scale that can meaningfully remove carbon dioxide from the atmosphere. This untapped resource will only grow over the next decade as miners extract more ore to supply the energy transition.

- Carbon mineralization technology partners can help mining companies capitalize on the opportunity, deploying new methods for carbon removal grounded in decades of academic research. Some of these technologies are already deployed on operational mine sites and independently certified.

With these components in place, a growing waste stream can become a carbon sink, which can, in turn, become a revenue stream. Indeed, mineralization of mine waste is one of the most permanent, scalable and valuable paths to remove carbon from the atmosphere.

Supplying an unprecedented volume of metals and minerals required for electrification, the mining sector is already instrumental to delivering a green economy. The carbon removal opportunity stands to take this role much further. By providing built infrastructure, leaning into its industrial and geological expertise, and repurposing vast tailings facilities, mining is better positioned than other heavy–industrial sectors to deliver the billions of tonnes of carbon removal that scientific consensus demands. In the process, its reputation and social license to operate stand to improve even faster.



This paper will explore:

- **The growing demand for carbon removal credits**
- **The unique advantages of mine waste mineralization**, compared to other carbon removal methods
- **The commercial opportunities** for miners of mafic / ultramafic ores, with the potential to valorize mine tailings as assets, sometimes alongside an upcycling strategy
- **The sustainability opportunities** for mining companies, whether in meeting their own targets or helping other companies meet theirs
- **Recommendations to realize the opportunity** and shape the future.

There is little time to meet Net Zero goals, and strong evidence suggests that carbon mineralization can be a major player for both the carbon removal credits market and climate impact. As such, 2025 will be a key year: the technology is scientifically proven and independently certified, and the carbon market is ready to further accelerate its global growth. Mining companies are the prime movers in this opportunity and now is the time to shape the future.

> ***"Carbon removal is going to have to be operating at the scale the oil and gas industry operates today. It represents transformative business opportunities as well as new sources of revenue."***

Greg Dipple, Head of Science and co-founder, Arca

Broad availability of mining feedstock enables significant removal of planet–warming CO_2 as well as multibillion–dollar additional revenue

10 billion tonnes

of carbon removal required annually by 2050 to meet climate targets according to the Intergovernmental Panel on Climate Change (IPCC)[2]. **Estimated at USD 100 per metric tonne, this represents a sector potentially the size of the entire mining industry.**

Current mining operations:

3 billion tonnes

mafic / ultramafic mine waste produced annually

→ **USD 100 billion**

annual revenue potential from ongoing operations (based on USD 100 per metric tonne of CO_2, long–term price estimate for removal credits and on 31% weight capture)

Legacy mining operations:

28 billion tonnes

mafic / ultramafic mine waste from legacy or inactive mines

→ **USD 870 billion**

one–off revenue opportunity from mafic / ultramafic mine waste at inactive mines (based on USD 100 per metric tonne of CO_2, long–term price estimate for removal credits and on 31% weight capture)

Download the full white paper and recommendations for action at arcaclimate.com/beyond-extraction-white-paper/

Contact Arca's senior team for a full briefing at info@arcaclimate.com.
Our sources can be found at arcaclimate.com.

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