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# New mineral frontiers and their ESG challenges

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## 1. Introduction

The recent focus on critical minerals is a response to the burgeoning demand for resources essential for modern technologies and green energy solutions in the wake of a climate crisis. The environmental, social and governance (ESG) considerations surrounding the extraction of critical minerals present a complex landscape. As the demand for these resources grows, so does the pressure to extract them in a manner that is environmentally sustainable, socially responsible and governed by ethical practices. The World Energy Council initially coined the term 'energy trilemma' to describe the three dimensions to energy supply: energy security, energy equity and environmental sustainability.<sup>1</sup> These factors continue to present serious challenges and prove difficult to reconcile. The world seems less secure now than it has in many years, with renewed geopolitical rivalries giving rise to tensions and conflict, notably in the Middle East and Ukraine. Climate change is no longer just a theory, but being felt in extreme weather events across the world, with resultant property damage, displacement and deaths. We are increasingly speaking in terms of a climate crisis or emergency. As supply shocks, particularly from Russia, have caused energy costs to spike, high inflation has eroded living standards and exacerbated poverty in many countries. That has created a fertile breeding ground for nationalist or isolationist policies aimed at securing supplies of energy and natural resources for domestic markets, often at the expense of other nations.

Against this background, the demand for critical minerals is expected to double by 2030 with prices having been increasingly volatile.<sup>2</sup> Data from Wood Mackenzie suggests that demand for copper – an essential component in electric vehicles – is expected to outstrip supply by 2026.<sup>3</sup> Whether by regulation or strategic investment, governments across the world appear to be responding,

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1 World Energy Council, *World Energy Trilemma 2024: Evolving with resilience and justice*, [www.worldenergy.org/publications/entry/world-energy-trilemma-report-2024](http://www.worldenergy.org/publications/entry/world-energy-trilemma-report-2024).

2 *Financial Times*, "Higher investment in critical minerals boosts chances of meeting climate targets", 10 July 2023, [www.ft.com/content/c51d4601-e2ec-40d2-93d7-fcd7d7ab1310](http://www.ft.com/content/c51d4601-e2ec-40d2-93d7-fcd7d7ab1310).

3 *Financial Times*, "Miner Rio Tinto to test 'new frontiers' as copper age dawns", 5 August 2023, [www.ft.com/content/91c1ae9e-8150-4201-9952-f02efbd60693](http://www.ft.com/content/91c1ae9e-8150-4201-9952-f02efbd60693).

albeit slowly. For example, the European Commission's Critical Raw Materials Act acknowledges that a secure and sustainable supply of critical raw materials is crucial to the energy transition. The US Inflation Reduction Act aims to promote national sources of critical minerals by making eligibility for tax credits on electric vehicles conditional upon a requirement that at least 40% of the value of critical minerals in the batteries was extracted or processed in the United States, or in countries with which the United States has a free trade agreement, or recycled in North America. That percentage will increase gradually to 80% by 2027. Meanwhile, as reported by the *Financial Times* in June 2023, Chinese companies, in 2022, nearly doubled their investments in securing resources essential to clean energy.<sup>4</sup>

This is further complicated by the concentration of critical minerals in certain regions, which have come to dominate certain mineral supply chains, despite the high risk of specific ESG failings. For example, production of cobalt is concentrated in the Democratic Republic of the Congo (DRC), which accounts for about 70% of global production.<sup>5</sup> Meanwhile, Indonesia holds the title of world's largest nickel producer with data from Benchmark Intelligence (as reported in the *Financial Times*) estimating that Indonesia's annual nickel output is expected to grow to 3.02 million tonnes by 2030 and account for 65% of global supply.<sup>6</sup> Lithium is found in Latin America, some parts of Africa, Western Europe, Australia and China. However, different locations contain different forms of lithium, which require different methods of extraction. The World Economic Forum estimates that Latin America holds 60% of the world's lithium reserves, earning Argentina, Bolivia and Chile the title of "the lithium triangle".<sup>7</sup>

Discovering new reserves of these critical minerals, to reduce over-reliance on specific regions and ensure security of supply, has become an economic priority. As the world's population continues to grow and the demand for renewable energy follows suit, supply challenges are likely to grow more acute. But with this global push for new supply will come its own host of ESG challenges, which must be considered and addressed, to ensure a just energy transition. Even with the imperative of meeting demand for renewable energy, it is paramount to ensure that new investments in exploration, development and production meet global ESG standards. As new mineral frontiers are sought, mining companies, investors and society more broadly should emphasise the importance of protecting natural ecosystems and developing less invasive and

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4 *Financial Times*, "Higher investment in critical minerals boosts chances of meeting climate targets", 10 July 2023, [www.ft.com/content/c51d4601-e2ec-40d2-93d7-fcd7d7ab1310](https://www.ft.com/content/c51d4601-e2ec-40d2-93d7-fcd7d7ab1310).

5 Cobalt Institute, "Responsible Sourcing", [www.cobaltinstitute.org/cobalt-sourcing-responsibility/](https://www.cobaltinstitute.org/cobalt-sourcing-responsibility/).

6 *Financial Times*, "Indonesia to accelerate nickel output despite low global prices", 29 March 2024, [www.ft.com/content/ba1e9856-66aa-4082-b6cd-261b798d050f](https://www.ft.com/content/ba1e9856-66aa-4082-b6cd-261b798d050f).

7 World Economic Forum, "Lithium: Here's why Latin America is key to the global energy transition", 10 January 2023, [www.weforum.org/agenda/2023/01/lithium-latin-america-energy-transition/](https://www.weforum.org/agenda/2023/01/lithium-latin-america-energy-transition/).

disruptive technologies. Equally, we should ensure that communities are protected, respected and able to participate in the economic benefits of mineral development.

This chapter will consider emerging and potential future sources of minerals, namely in the polar regions, the deep sea and even space, together with the associated challenges of responsible extraction in these new mining frontiers.

## 2. Polar mining

In considering potential new mineral ‘frontiers’, the polar regions – being the areas around the Earth’s north and south poles – present increasingly viable (albeit not easy) opportunities for mineral extraction. That said, the applicable regulation, geological potential and ESG challenges vary hugely between the Arctic and Antarctica.

### 2.1 Arctic

Beneath the tundra and ice of the Arctic lie untouched reserves of oil, natural gas and, importantly, minerals, thought to include gold, diamonds, copper, iron, zinc and uranium.<sup>8</sup> As global warming has reduced the reach of sea ice and permafrost, much of the region has opened up to mineral development, creating what has been dubbed the ‘scramble for the Arctic’. However, while resources may be abundant, the climate is still extreme and unforgiving, which often requires increased capital expenditure, higher operational costs and a reduced window for operations. Mine production and construction work may be seasonally restricted and require a higher degree of automation than in more temperate climes.

The Arctic region is generally considered to be the region north of the Arctic Circle, which includes the territory of Greenland (Denmark), Iceland, Norway, Sweden, Finland, Russia, the US state of Alaska and Canada.<sup>9</sup> Each of those countries has sovereign powers to regulate and benefit from mineral extraction and other economic activities on its territory and in, above and below its territorial waters.

The United Nations Convention of the Law of the Sea (UNCLOS) defines territorial waters as generally encompassing the areas within 12 nautical miles from its baselines (ie, normally its coastline at low tide). Beyond that limit, Article 56 of UNCLOS stipulates that a country has sovereign rights for exploring and exploiting, conserving and managing the natural resources of the waters within its exclusive economic zone (EEZ). Article 57 states that the EEZ shall not extend beyond 200 nautical miles from the baselines from which the

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8 Jeff Desjardins, “The energy and mineral riches of the Arctic”, *Visual Capitalist*, 8 April 2016, [www.visualcapitalist.com/energy-and-mineral-riches-of-the-arctic/](http://www.visualcapitalist.com/energy-and-mineral-riches-of-the-arctic/).

9 *National Geographic*, “Arctic”, <https://education.nationalgeographic.org/resource/arctic/>.

breadth of the territorial sea is measured.<sup>10</sup> That said, it is possible for companies to apply to extend this in accordance with Article 76, for up to 350 nautical miles from the coast.<sup>11</sup> However, the state must collect and analyse certain data to be submitted to the Secretary-General of the United Nations. The United States, Russia, Norway, Canada and Denmark have all made such applications.<sup>12</sup>

Beyond those limits are the High Seas, which cover a large proportion of the Arctic Ocean and are outside national jurisdiction.<sup>13</sup> At least that is what international law says, but international law may be strained by the rivalry of military superpowers. In 2007, four kilometres under the North Pole, Russia planted a titanium flag on the seabed, laying claim to over a million square kilometres of seabed, which it has since extended.<sup>14</sup> China, meanwhile, has also concluded that the resource-rich Arctic presents important opportunities and a 2018 Arctic Policy White Paper outlined plans for a “Polar Silk Road” to increase its influence and economic activities in the region.<sup>15</sup> Many original components of the Polar Silk Road strategy have been delayed or discarded, including the participation of Shenghe Resources in a uranium and rare earths mining site at Kuannersuit, Greenland, which has fallen foul of Greenland’s legislature reinstating a near-complete ban on uranium mining.<sup>16</sup> However, it shows that China is not going to let its geography rule it out of Arctic opportunities.

Norway is another example of the pro-mining lobby, and has been a first-mover in its approach to seabed mining, targeting manganese crusts and sulphides on the Norwegian Continental Shelf. In June 2019, the Seabed Mineral Act was adopted to govern commercial exploration and extraction of its deep-sea minerals in Norway. In January 2024, the Norwegian Parliament approved a proposal to allow exploration for seabed minerals on around 280,000 km<sup>2</sup> of its Arctic continental shelf between Jan Mayen Island and the Svalbard archipelago. This decision follows government-sponsored surveys that identified significant amounts of metals and minerals, such as iron, copper, zinc, cobalt and rare earth elements like lithium and scandium, in polymetallic sulphides.<sup>17</sup> Approval will be required from the Norwegian Ministry of

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10 United Nations Convention on the Law of the Sea, [www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf).

11 *Ibid.*

12 *Geographical*, “Arctic nations are squaring up to exploit the region’s rich natural resources”, 12 August 2022, <https://geographical.co.uk/geopolitics/the-world-is-gearing-up-to-mine-the-arctic>.

13 *Ibid.*

14 *Ibid.*

15 *Ibid.*

16 Kevin McGwin, “Greenland restores uranium ban – likely halting a controversial rare earths mine”, *Arctic Today*, 10 November 2021, [www.arctictoday.com/greenland-restores-uranium-ban-a-move-likely-to-halt-a-controversial-rare-earths-mine](http://www.arctictoday.com/greenland-restores-uranium-ban-a-move-likely-to-halt-a-controversial-rare-earths-mine); Marc Lanteigne, “The rise (and fall?) of the Polar Silk Road”, *The Diplomat*, 29 August 2022, <https://thediplomat.com/2022/08/the-rise-and-fall-of-the-polar-silk-road/>.

17 European Parliament, “Norway to mine part of the Arctic seabed”, [www.europarl.europa.eu/RegData/etudes/ATAG/2024/757616/EPRS\\_ATA\(2024\)757616\\_EN.pdf#:~:text=On%209%20January%202024%2C%20the%20Norwegian%20Parliament%20endorsed,the%20Parliament%2C%20following%20a%20possibly%20long%20exploration%20period%29](http://www.europarl.europa.eu/RegData/etudes/ATAG/2024/757616/EPRS_ATA(2024)757616_EN.pdf#:~:text=On%209%20January%202024%2C%20the%20Norwegian%20Parliament%20endorsed,the%20Parliament%2C%20following%20a%20possibly%20long%20exploration%20period%29).

Petroleum and Energy for any production plan, which must include a project-specific impact assessment. However, many environmentalists are worried that this has already opened the door to Arctic offshore mining. Because the technologies are untested and these pristine ecosystems are still relatively unknown, they are concerned that human interference on this scale will always present unacceptable environmental risks, and should be prohibited. Companies from Google to BMW signed a WWF call for a halt to deep-sea mining following the opening of deep-sea mining in Norway.<sup>18</sup>

In fact, there is considerable opposition to mining in the Arctic. For example, a group of Inuit hunters weathered freezing conditions to protest against the expansion of Baffinland Iron Mines' planned expansion to its Mary River site, 520km north of the Arctic Circle on Canada's Baffin Island. This ultimately led to a rejection of the expansion plans after years of uncertainty.<sup>19</sup>

ESG concerns centre on both the unknown environmental damage and arguments that it should be the Indigenous Peoples, including the Sami of Scandinavia, the Inuit of North America and Russian Arctic communities such as the Chukchi and Evenk, that should have first claim on these resources. One potential approach to that concern would be to introduce something similar to the various Aboriginal Native Title regimes found in Australia. Those regimes essentially require the consent of Indigenous Peoples prior to the grant of any mining permit over land on which they have a 'native title' claim. In cases where Indigenous Peoples are receptive to allowing mining activities on these lands, the regime facilitates equitable compensation for access to the land (usually in the form of a royalty or participation interest in the project itself). That may not be sufficient though where Indigenous concerns focus on the potential damage to the ecosystem, and the consequences it may have on their traditional ways of life, including hunting, trapping and fishing.

Other ESG risks concern the rights and working conditions of mine labour, which are thrown into focus by the remoteness and extreme conditions encountered at Arctic mine sites. Although hydrocarbon exploration has a successful track record in onshore areas of Canada, Russia and Alaska, mining presents different challenges, including health risks for the workforce, which may be exposed to extreme cold, risks of mechanical failure and blocking of transportation routes. And while climate change may eventually open up new areas of the Arctic to economic activity, the melting of permafrost can make building infrastructure difficult.

With that said, improvements in drilling and mining technologies suggest that previously inaccessible exploitation may now become accessible. By way of

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18 *Financial Times*, "Norway should push for a global moratorium on deep-sea mining", [www.ft.com/content/2f19e165-5580-4161-addf-bdaff878e787](https://www.ft.com/content/2f19e165-5580-4161-addf-bdaff878e787).

19 *The Guardian*, "Canada rejects Arctic mine expansion project after years of fierce protest", [www.theguardian.com/environment/2022/nov/17/canada-arctic-mine-expansion-rejected-protest](https://www.theguardian.com/environment/2022/nov/17/canada-arctic-mine-expansion-rejected-protest).

example, the University of Alaska is acquiring baseline geological, geophysical and geochemical data to evaluate regions for critical mineral resources. Arguably, machine learning and artificial intelligence could also be used to reduce exploration risk and accelerate mineral development in challenging regions like the Arctic.

Recently, the landmark High Seas Treaty, a significant environmental agreement, was established to safeguard the biodiversity of international waters, which cover nearly half of the planet's surface. The treaty is particularly important for the Arctic, as it aims to create a legal framework for establishing marine protected areas and requires environmental impact assessments for industrial activities including mining. The treaty's adoption is an important step towards preserving the fragile ecosystems of the Arctic, which are critical to global biodiversity, as well as the livelihoods of indigenous communities, while also addressing the challenges posed by the expansion of extractive industries in the region.<sup>20</sup>

Globally, views are very much split as to whether we should accelerate development of the Arctic for its untapped potential to supply critical minerals, including those required for the energy transition, or whether we should respect it as one of the last underdeveloped and underpopulated wildernesses, requiring fierce protection. The familiar tension between developing local economies and protecting habitats becomes more complicated considering the growing need for energy transition minerals in consumer markets many miles away.

This is an extract from the chapter 'New mineral frontiers and their ESG challenges' by Nabil Abrahams and Ted Rhodes in *ESG in Mining and Minerals*, published by Globe Law and Business.

<https://www.globelawandbusiness.com/books/esg-in-mining-and-minerals>

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20 WWF, "Landmark High Sea Treaty agreed – and what it means for the Arctic", 6 March 2023, [www.arcticwwf.org/newsroom/news/landmark-high-seas-treaty-agreed-and-what-that-means-for-the-arctic/](https://www.arcticwwf.org/newsroom/news/landmark-high-seas-treaty-agreed-and-what-that-means-for-the-arctic/).

21 Protocol on Environmental Protection to the Antarctic Treaty, [https://documents.ats.aq/keydocs/vol\\_1/vol1\\_4\\_AT\\_Protocol\\_on\\_EP\\_e.pdf](https://documents.ats.aq/keydocs/vol_1/vol1_4_AT_Protocol_on_EP_e.pdf).