# World view

By Saleem H. Ali

# There's no free lunch in clean energy

**The United States should get serious about mining critical materials.**

We are living in a time of a mineral impasse. Crucial green technologies, including solar panels, wind turbines and electric-vehicle batteries, require increasing amounts of metals, such as lithium, copper, nickel, cobalt, manganese and rare-earth elements.

Yet the current US administration is in a bind. The climate movement, a core part of President Joe Biden's base, wants clean energy and electric cars. But it doesn't want mining of the minerals required — certainly not close to home.

Emblematic of this impasse is a January decision by the US Department of the Interior to withdraw 91,000 hectares near the Boundary Waters in northeastern Minnesota from mining and geothermal leasing for the next 20 years. The area, known for its pristine lakes, also holds some of the nation's largest undeveloped copper and nickel deposits.

The country is in danger of forgetting one of the four laws of ecology that Barry Commoner — one of my early inspirations for a career in environmental teaching and research — established in his 1971 book *A Closing Circle*: "There is no such thing as a free lunch." All industrial activities have some ecological impact. As researchers, and as informed societies, we must consider the benefits and trade-offs in concert.

Other nations face the same problem. For example, Serbia stopped its Jadar lithium-mining project last January in response to environmental protests from across the political spectrum, even though it met the European Union's stringent environmental standards.

But the United States seems particularly stuck. Both President Biden and former president Donald Trump have called for mineral supply security. Yet, in 2022, domestic metal mine production was 6% lower than in 2021, and mineral imports reached a record high, according to the US Geological Survey. The nation remains 100% dependent on imports for 12 critical minerals, including manganese, niobium (used in steel alloys) and tantalum (for electronics). Opening new mines takes time, but no momentum has built up so far.

Instead, the United States has courted both allies, such as Australia and Canada, and countries with controversial domestic-labour policies and environmental standards, including Zambia and the Democratic Republic of the Congo. China has benefited from the uncompromising US opposition to domestic mining and has built up a formidable dominance in critical metal extraction and processing over the past 30 years. It wants to maintain that momentum. According to US cybersecurity company Mandiant, pro-China agents have even posed online as local US activists in attempts to spark protests over rare-earth mines.

> **"In the United States, the best first step out of the impasse would be to set up a new sustainable-minerals bureau."**

**Saleem H. Ali** is chair of the Department of Geography and Spatial Sciences at the University of Delaware in Newark and author of *Earthly Order: How Natural Laws Define Human Life*.
e-mail: saleem@udel.edu

Mining has a sordid history of exploitation and plunder, particularly with respect to Indigenous people. But contemporary mines with regulatory oversight can have workable impact–benefit agreements with communities. The Voisey's Bay nickel mine in Canada and Red Dog Mine in Alaska exemplify such agreements, preferentially employing Indigenous people, respecting traditional hunting seasons and including incremental royalties and partial resource ownership.

Deep-sea mining is an option with minimal social disruption, and less waste and lower carbon emissions than terrestrial mines (D. Paulikas *et al. J. Ind. Ecol.* **26**, 2154–2177; 2022). But activists also reject oceanic extraction on the basis of the precautionary principle, without a system-wide analysis of its relative impacts and benefits. Recycling more metals is crucial, including from existing tailings at older mines, but this simply would not meet the increasing demand for at least a decade.

Smarter planning can deliver resource efficiencies in urban areas: for example, bicycle lanes and public transport have almost halved car use in Paris since 1990. But there will be limits to such changes in lower-density areas, including much of the United States.

Moreover, with around 775 million people worldwide unable to access electricity, energy conservation alone will not suffice to meet basic sustainable-development targets.

In the United States, the best first step out of the impasse would be to set up a new sustainable-minerals bureau. The US Congress closed the Bureau of Mines in 1996, but the president has the power to create new agencies, as Trump did with the US Space Force. A 'Critical Materials Bureau' should have the authority to oversee and invest in mineral exploration. It should also champion conservation and circular-economy approaches based on industrial ecology tools such as life-cycle analysis.

To mitigate criticism of bureaucratic overload, the bureau should be given a specific mandate and an institutional reach similar to that of the General Services Administration. It should have some legislated powers of eminent domain — the ability to appropriate private property — as water and energy infrastructure agencies often have.

Other countries have realized that the private sector alone cannot efficiently source metals to meet domestic manufacturing needs. For example, the Japan Organization for Metals and Energy Security and its South Korean equivalent can streamline metal supplies from various sources.

The United States should also explore cooperative supply agreements with China through the World Trade Organization or the G20 group of the world's biggest economies.

As the world prepares for the 2023 COP28 climate conference — where even free conference lunches are not really free — the United States should revisit Commoner's wisdom: there is virtue in embracing tough trade-offs.

UNIV. DELAWARE, OFFICE OF COMMUNICATION