

US will boost domestic output of clean energy minerals

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President Joe Biden will use the 1950 Defense Production Act to boost domestic production of critical minerals

On March 31, President Joe Biden invoked the 1950 Defense Production Act (DPA) to prioritise domestic production of materials critical to a clean energy economy. The aim is to reduce dependence on imports from China and Russia. The executive branch can now channel up to USD750mn to firms developing domestic sources of lithium, nickel, graphite, cobalt and manganese sulphide to speed up feasibility studies and encourage production expansion.

What next

Biden's aim of greater US self-reliance in sourcing and processing of critical materials enjoys rare bipartisan support in Congress but is likely to run into environmental opposition as mineral producers seek to increase mining activity to meet the needs of the green economy, particularly battery components. Progressive Democrats may have trouble reconciling climate change benefits from mineral-intensive technologies with environmental concerns about how those minerals are obtained.

Subsidiary Impacts

- US electric vehicle producers will continue to push the White House for tax breaks, grants and incentives separate from the DPA.
- Even with the DPA impetus, Washington will look to allies such as Canada and Australia to increase critical mineral output.
- US companies have the potential to be leaders in lithium mining if new technologies can tap resources in California's Salton Sea.

Analysis

Last summer, the Biden administration released a report which highlighted supply chain vulnerabilities in a number of critical sectors. One was the electrical battery sector, which is central to transportation and mass storage for renewable energy, and also has defence applications. However, its domestic value chain has largely been left to market forces.

The global battery value chain

The battery value chain consists of several stages, including mining, refining and chemical processing, manufacturing of cathode, anode, electrolyte and separator, as well as cell fabrication and battery pack manufacture.

While the upstream sector is dominated by countries in the southern hemisphere, the bulk of refining and processing takes place in China. Further downstream, the manufacturing of battery components is centred in China, Europe, South Korea and Japan. These regions also dominate cell and battery fabrication, as well as the development of battery recycling.

China's value chain dominance

Chinese companies control nearly half of the cobalt production in the Democratic Republic of Congo and a large proportion of Indonesia's nickel output, and have established significant equity participation in Chilean and Australian lithium mining.

Midstream, China controls 80% of global lithium hydroxide production and 70% of cobalt sulphate processing. China also accounts for 75% of global battery cell production capacity. Chinese dominance in other critical materials, such as heavy rare earths, is even more extreme.

US geological endowment

Despite the importance of critical minerals for electric vehicle (EV) batteries ([see INTERNATIONAL: Automakers will rev up EV output - October 18, 2021](#)), the extent to which demand has been met from other sources has left the US mining sector slow to respond to decarbonisation and the energy transition.

3.7% - US share of global lithium reserves

The United States produces only 1% of its lithium needs and it is reliant on foreign sources to provide 100% of its Class 1 nickel, cobalt, graphite and manganese. Yet the country has 3.7% of global lithium reserves, much of which are situated on federal land. Many projects now in gestation could benefit significantly from Biden's invocation of the DPA.

The most prominent among them are:

- NioCorp's niobium, scandium and titanium Elk Creek project in Nebraska ([see INTERNATIONAL: EV advances highlight niobium's value - September 23, 2021](#));
- Graphite One's Graphite Creek project on Alaska's Seward Peninsula, targeting production of coated spherical graphite;
- Jervois Mining's Freeport cobalt and copper project in Idaho;

- Standard Lithium's direct extraction Lanxess project in Arkansas;
- Piedmont's lithium project in North Carolina, which is supported by Tesla;
- several lithium clay development projects in Nevada;
- Nevada Vanadium's Gibellini vanadium project; and
- Rare Elements Resources' Bear Lodge rare earth project in Wyoming.

Lack of domestic customers

The disconnected nature of the value chains means that many of these US developers are unable to secure terms with domestic customers and, as a result, concentrate on attracting South Korean or Japanese clients. As a result, US mined concentrate would currently be sent halfway around the globe to produce advanced chemicals and cathodes that would then be shipped back for use in US-made EVs.

Rare earths value chain

This inefficiency is well illustrated by the rare earths value chain. In 2018, US-based MP Materials restarted the Mountain Pass mine in San Bernardino, California and now produces 14% of the global mined rare earth supply. However, the company is exporting all this concentrate to Shenghe Resources in China for further processing.

The mine used to have its own separation plant but this was shut in 2014-15 following a restructuring of China's tariff system to favour the import of raw materials rather than separated products.

Nickel in Minnesota, copper in Arizona

Contrary to global trends, US nickel mining production fell by 33% between 2016 and 2020, while US cobalt production fell by 19%. The problems associated with sanctioning Russia's Norilsk Nickel following the invasion of Ukraine have again underlined the importance of supporting environmentally sound domestic nickel sulphide and copper production for battery production ([see INTERNATIONAL: Russia fears to fuel nickel volatility - March 21, 2022](#)).

Minnesota and Michigan, in particular, are well endowed with 'flood basalt' nickel sulphide.

Some promising mining projects have been stalled by local opposition

However, promising projects have stalled due to local opposition, with concern about water contamination on tribal lands in Minnesota and a proposed ban on mining in the state's Boundary Waters region. In Arizona, San Carlos Apache tribal leaders have successfully opposed development of Rio Tinto's Resolution copper mine, which could potentially meet one-quarter of US copper demand.

Policy options

The capital market has so far failed to provide a sustainable source of financing for exploration and mining in the clean energy materials sector. Global financing reached USD5bn in 2016 and 2017 but then fell back sharply in response to falling prices for lithium and cobalt in 2018. Entities supported by Beijing filled this gap and increased their footprint at various stages of the value chain, including offshore mining investments.

The Biden administration has some options for encouraging investment in the sector. One is simply to ensure that battery materials projects are prioritised and receive timely review during the federal permitting process. The DPA should help here.

It could also extend and expand renewable energy tax incentives to include projects that manufacture component materials required for EV and renewable grid batteries. These include the Investment Tax Credit and the Production Tax Credit. Clean energy tax incentives could be broadened to include producers of critical materials such as lithium hydroxide, lithium carbonate and cobalt sulphate.

Australian partnership

The White House, aware that in some cases environmental opposition from progressive Democrats in Congress as well at state and local level may counteract the impact of federal incentives, is also keen to secure supplies from reliable foreign sources.

At the end of March, a delegation of CEOs from Australia-based companies specialising in the development of critical materials visited Washington accompanied by Australian trade minister Dan Tehan. They held discussions on strengthening supply chains with Commerce Secretary Gina Raimondo and US commercial counterparts as part of the inaugural US-Australia Strategic Commercial Dialogue.

At the conclusion, Tehan said that Australia would continue to position itself as the partner of choice for the United States in critical mineral investment.