Zambia nickel-manganese-cobalt batteries nmc

Zambia nickel-manganese-cobalt batteries nmc

African countries are gearing up to play a pivotal role in the production of clean energy technologies for the global energy transition, and not just as suppliers of raw minerals. They seek to maximize their role in regional and global value chains by adding value to the resources extracted from their soil.

One key initiative is the partnership between the Democratic Republic of the Congo (DRC) and Zambia to produce nickel, manganese and cobalt (NMC) battery precursors. A precursor is an intermediate input to a complete battery, which the two countries aim to ultimately also produce. However, without a large regional market for the electric vehicles that use these batteries, production of complete batteries will be challenging. For now, the focus is on producing and exporting precursors that foreign battery manufacturers will use.

Congolese and Zambian civil society actors are concerned about the lack of information and limited stakeholder consultation. In November 2023 they established the Pamoja Critical Minerals Forum to monitor and engage the governments on these plans and ensure that the plans reflect community voices.

Based on available information, we see four issues around the precursor initiative that the two governments should consider in 2024:

Stakeholders suggest that this remains a point of disagreement between the DRC and Zambia. The governments initially agreed to construct the precursor plant in a cross-border special economic zone, but it seems that this shared site may be ultimately deemed unviable. The plant will therefore likely sit in one country or the other, and both countries aim to be the host. They have provisionally respectively earmarked the special economic zones of Kinsevere in DRC and Sub-Sahara Gemstone Exchange Industrial Park in Zambia.

Stakeholders suggest that the governments aim to source all the required nickel, manganese and cobalt only from the two countries. The capacity of the plant and specific precursor design (including the ratio of nickel, manganese and cobalt) that the governments target will partly determine the feasibility of this approach. These parameters will be clearer after completion of the prefeasibility study. The plant that was initially envisaged would be large by global standards, producing around 100,000 tonnes (t) of NMC (622) precursors (one of the most common types currently demanded) a year. This would require around 48,000 t of nickel, 15,000 t of manganese and 16,000 t of cobalt that has been refined into sulfate.

The DRC and Zambia will find it challenging to source a sufficient amount of ores of the three metals and refine them into sulfates without involving other countries in the region. Neither the DRC nor Zambia currently refines any cobalt production into sulfate, but prospects are promising. Plans for a cobalt sulfate plant are advancing in Zambia, and World Bank analysis suggests a plant could also be viable in the DRC.

Production of nickel and manganese sulfate is less certain, however. Zambia produced around 4,000 t of nickel in 2022. First Quantum"s large nickel mine, Enterprise, started production in Zambia this year, which will add a massive 30,000 t a year on average. Nevertheless, this volume may still be insufficient for Zambia to meet the precursor plant"s needs on its own even if refining facilities were constructed and all production was supplied to the plant. Nickel exploration in the DRC is underway. Given only 19 percent of the country has been properly explored, this exploration may yield discoveries. However, with nickel mines taking an average 17.5 years from discovery to production, supplying the precursor plant is a far-off prospect.

Time is also a factor for manganese. Manganese is mined in the DRC and Zambia, currently by artisanal and small-scale operators. Formalizing these operations, including to reassure potential buyers of the precursors that the supply chain meets high ESG standards, and going on to build refining capabilities will be challenging.

There is little information in the public domain on the specific support that the U.S. and EU intend to provide to the DRC and Zambia"s precursor ambitions. G7 support for the Lobito Corridor railway appears to have the most momentum currently. This project could increase investment prospects for value addition in DRC and Zambia by improving the route to market, but the railway could also be used to export unprocessed minerals. The implications for the precursor plant are therefore currently unclear.

It remains to be seen whether U.S. and EU will "put their money where their mouth is" in terms of specific support to the plant, and what the DRC and Zambia commit to in exchange. While the precursor plant could become a focal project of the U.S.-led Mineral Security Partnership or an EU strategic project under the bloc"s Critical Raw Materials Act, none of the parties have given such an indication.

Private investment and financing for the project will also depend on whether the U.S. enables buyers of mineral products processed in the DRC or Zambia to benefit from incentives offered by U.S. legislation. Only minerals processed in the U.S. or a country with which it has a free trade agreement qualify for the Inflation Reduction Act"s electric vehicle tax credits, for example. As the Carnegie Endowment"s Zainab Usman has highlighted, adjustments to the African Growth and Opportunity Act or other legislative instruments are needed for the DRC and Zambia (and other African countries) to qualify. Eligibility for U.S. incentives would increase the likely demand for DRC-Zambian precursors, and as a result, the attractiveness of the project to investors.