The delicate balancing act of developing 'vogue minerals' projects

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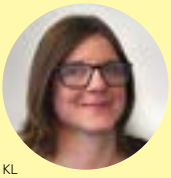
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The project potential for 'vogue minerals' such as lithium, graphite, cobalt and vanadium in the context of fast-developing battery technology has lit up the eyes of many investors. The opportunities, however, need to be approached with a strategic grasp of market uncertainties and a firm technical focus that will mitigate the potential risks.

Africa is an important current source and hunting ground for vogue mineral prospects. The continent holds potential for lithium in evaporite and pegmatite deposits, found in places like Southern and Western Africa's Proterozoic belts, and in the Rift Valley in Kenya and Tanzania. Pegmatite-hosted lithium deposits are found in the Democratic Republic of Congo, which are geologically similar to those found in Australia. All of this suggests excellent lithium exploration opportunities.

Extensive resources and reserves of cobalt are well-known within the Central African Copper Belt, mainly in the DRC, with some cobalt production also coming from South Africa as a by-product from nickel and platinum mines, as well as from Madagascar's nickel laterite deposits. One of the world's few primary cobalt deposits occurs in Morocco.

In terms of graphite – contained in metamorphic sedimentary rocks – over 50 deposits are recorded in Africa; the largest accumulation of resources are reported from Mozambique, Tanzania, Malawi, Madagascar, Ghana, Ethiopia and Namibia.

Africa's vanadium resources – potentially significant in new technologies to store renewable energy in large stationary batteries – occur mainly in magmatic layered intrusions such as the Bushveld Complex, Mozambique's Tete Complex, and high grade vanadate deposits in karst cavities in Damara age dolomite in countries such as Namibia, Angola and the Republic of Congo.

A powerful motivator driving interest in these minerals is first mover's advantage and an assumption that market conditions will remain favourable. Market demand for vogue minerals is, however, almost by definition less predictable than for the established suite of globally traded commodities – which places an extra burden of technical marketing risk upon the developer.

The impact of research and technological innovation to allow substitution of raw materials can be a significant source of uncertainty when forecasting demand and pricing for vogue minerals. For example, a new technique claims to lower cobalt content in battery cathodes from 20% to 4%, while another claims to boost nickel content as a substantial replacement for cobalt.

Where the potential source of these minerals is large – as for lithium – the supply-demand balance can be easily tipped by low-cost new entrants into the market, moving prices to potentially unsustainable levels. Price uncertainty has been recently demonstrated by expansion ramp-up delays at a leading Chilean lithium producer contributing to higher prices in the short term and significant possible declines in the medium term.

Inevitably, we see some step changes in demand arising from advances in technology; this impacts the approach taken to strategic planning, study management and technical design. It makes the exploration strategy, scoping and pre-feasibility stage particularly important to the project's future success, as scenario-based project responses to market changes can be modelled to allow an informed opinion on investment to be made.

In our advice to clients, we prioritise

being low on the cost-curve, requiring a focus on efficiency, sustainability and a meticulous attention to detailed and quality technical studies. With vogue minerals, the question of flexibility gains a special prominence; achieving optimal net present value for a project needs to be balanced to give operational flexibility to ride the rough seas of market vagaries.

Flexible methodologies at mine level may initially be more expensive but may underpin operational survival in a price trough. Surface mining methods may be preferable to underground operations, as they more readily allow for 'switching off the taps' during drastic price dips. On the process side, hydro-metallurgical processes may be more advantageous to flexibility than smelting technologies; and a modular plant with higher operating costs may provide more operational flexibility.

In terms of marketing, producers could look for downstream investment or joint venture agreements with end-users such as refinery builders and battery suppliers. This 'vertical integration' allows the design process and mine plan to be tailored to suit the end-user through early and appropriate technical marketing, rather than sourcing an end-user to match an approved mine plan.

Collaborating in research and development is valuable; for example, commercialisation of large-scale vanadium storage batteries for solar and wind power allows previously stranded assets to generate their own power. Win-win relationships could include trade agreements for raw materials supply to battery manufacturers and longer term off-take agreements lower the technical risk and enhance the sustainability of the project.

SRK believes that studies should assess a range of options for optimal project economics, an approach with special relevance for the opportunities and challenges of vogue minerals. •

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continent in August 2018, the first from a sitting PM since 2013. Despite ongoing Brexit issues, the country intends to be a top G7 investor, will host an Africa investment summit in 2019, and plans to invest £50 million in support of diplomatic missions and the reopening of several embassies across the continent, according to Chatham House. Canada, as a global mining leader and home to roughly half of the world's publicly listed mining and exploration companies, also remains important to Africa's mining industry. However, 2016 saw the overall value of the country's mining assets in Africa decline by 5.5%, suggesting a withdrawal of its presence.

African investors are also playing an increasing role in the development of their own countries, particularly as national governments strive to better provision for local content in mining legislation. Fears that this sort of thinking inevitably leads to resource nationalism are not unfounded, but they are perhaps exaggerated; the capital required for large-scale mining investments remains widely prohibitive for local investors, and international partners will continue to play an important role in extracting the continent's natural resources for years to come. The delicate dance between government and international investors thus remains a fundamental theme of this publication, and with that in mind, in the next section we present some of the key issues considered among the investment community in contemplating a mining investment in Africa.

Key Factors When Assessing Investment Potential

Asset Quality

Recovering prices suggest that now is the time to invest in commodities, but when compared to developed jurisdictions such as Canada and Australia, for some investors Africa is simply too high-risk for an already uncertain industry. However, the only thing an investor hates more than losing money is missing out. The geological prospects in Africa glisten too brightly to be ignored, and thus quality of the asset will always remain the critical component in evaluating an African mining investment prospect. "Tembo Capital's main investment criteria focus on quality. We will look at attributes of the project and investment that are likely to lead to low-cost mining: aspects such as the mine being near-surface and open pittable, high grade, and/or with good metallurgy. We thus focus on the resource itself and the quality of it," said Peter Ruxton, principal at Tembo Capital, a private equity mining fund with a focus on Africa.

In countries with longer legacies in mining such as South Africa or Zambia, mines are increasingly going underground, providing contrast to assets in nascent jurisdictions that still offer near-surface opportunities. "Mining in South Africa typically involves deep level mining – an environment perceived to be complex and dangerous and requiring very specific technologies and practices to avoid accidents," said Niel Pretorius, CEO of DRDGOLD, the oldest, continuously listed company on the JSE.

DRDGOLD completed an acquisition of the West Rand Tailings Retreatment project (WRTRP) assets from Sibanye-Stillwater in 2018, and is finding opportunity in the legacies left by aging projects: "By avoiding deep level mining, we avoid this issue because we mine where the sun shines, which, while not risk free, avoids the dilemmas associated with underground mining," he added.

The opportunities in the reprocessing and recovery of metals and minerals from historical mine wastes are increasingly being looked at in Africa, showing that even as mines age across the continent, ample opportunity exists for the creative investor. "When the mining economy is closing mines as is the situation in South Africa, moving into residual mining is a better opportunity. Surface re-mining is a growing part of our business," said Keith Scott, CEO of Fraser Alexander.

Particularly in Africa, the quality of an asset is intimately tied to the quality of the team behind it. High-risk jurisdictions require management with the know-how to navigate what are often complex oper-