BUSHVELD MINERALS

Readies itself to ride the vanadium demand wave

With growing demand from the steel sector and a steady increase in energy storage applications, vanadium has quickly become AIM-listed **Bushveld Minerals'** key project development focus and priority, CEO and founder **FORTUNE MOJAPELO** tells **CHANTELLE KOTZE**.

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Bushveld Minerals has set its sights on becoming one of the largest and lowest cost primary vanadium producers by establishing a significant vertically integrated vanadium mining and processing platform.

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Bushveld Minerals, one of only two vanadium producers in South Africa, is in a unique position – it has a large, high grade primary vanadium deposit portfolio with a combined 440 Mt resource (including 55 Mt combined reserve) with Tier-1 vanadium grades of ~2% V_2O_5 (vanadium pentoxide) in magnetite, which has helped position the company as an emerging large-scale primary vanadium producer.

Bushveld Minerals has its eyes firmly set on its vision of building the largest, lowest cost and most vertically integrated primary vanadium platform in the world (based on resource size and vanadium production).

This is an opportunity for Bushveld Minerals to carve its name as a pre-eminent vanadium primary vanadium producer at a time of constrained supply and limited new supply prospects – a situation that is expected to lead to a sustained structural market deficit, with significant price upside.

Located in South Africa's Bushveld Complex, host to some of the world's largest high grade primary vanadium resources, Bushveld Minerals has three key projects, including the newly acquired Vametco vanadium mine and its existing Brits and Mokopane vanadium projects.

> ***"With the acquisition of Bushveld Vametco, we now have a production platform and well versed operations team and will leverage this asset as a means to increase production at this asset,"*** Fortune Mojapelo

"Bushveld Minerals currently produces about 3.5% of total global vanadium," says Mojapelo. "Our ambition is to grow this number to more than 5% by 2019 in the near term and more significantly in the longer term through a combination of growth of the company's current vanadium platform both vertically and horizontally," he adds.

Mokopane project

Bushveld Minerals' primary resource base consists of the Mokopane vanadium project, a key part of the company's vanadium strategy. A scoping study was completed on the project in 2014 and a pre-feasibility study completed in early 2016. Bushveld Minerals has also submitted a mining right application for the project which is in the final stages of approval.

The Mokopane project, located on the Northern Limb of the Bushveld Complex,

CHINA'S VANADIUM DEMAND EXPECTED TO GROW AS NEW REBAR STANDARD IS RELEASED

On 6 February 2018, the government of China released a new high strength rebar standard intended to reduce the use of sub-standard steel to make buildings in China more earthquake resistant. The new rebar standard, GB/T 1499.2-2018, eliminates low strength Grade 2 (335 MPa) rebar and authorises 3 different high strength standards: Grade 3 (400 MPa), Grade 4 (500 MPa), and Grade 5 (600 MPa).

With about 90% of current demand for vanadium underwritten by the steel industry, as an additive to strengthen various grades of steel, Professor Yang Caifu, of the Chinese Central Iron & Steel Research Institute (CIRSI) who leads a Vanadium Technology Centre noted that for hot-rolled HS rebar, vanadium content will be at 0.03% vanadium in Grade 3, 0.06% vanadium in Grade 4, and more than 0.1% vanadium in Grade 5 rebar so the implementation of the new standard will significantly promote the application of vanadium in Chinese rebar products.

Moreover, the China Iron & Steel Research Institute (CSIRO) has estimated that the implementation of the new standard could lead to an increase in Chinese vanadium demand of over 30% or 10 000 tpa.

The implementation date for the new standard is 1 November 2018.

has a 298 Mt JORC-compliant resource with vanadium in-magnetite grades of 1.75% V_2O_5 – a good deposit in that it can be economically unlocked. Modelled on a base case operation of 1 Mtpa of run of mine (RoM) at a vanadium price of $33/KGV (current price of vanadium is around $60/KGV), the Mokopane project would produce 9 525 tpa (or 7% of total global vanadium production) of 99% purity V_2O_5 product at a capital expenditure of $298 million at a pre-tax NPV of $418 million and a pre-tax IRR of 24%.

Despite promising project economics at Mokopane, raising this kind of money would be difficult for a junior company, says Mojapelo, who decided to pursue the acquisition of processing infrastructure to support the development of its project and to provide a clear path to production for Bushveld Minerals.

Vametco acquisition

Bushveld Minerals acquired a controlling 59.1% interest in Bushveld Vametco in December 2017 which, according to Mojapelo, "has enabled Bushveld Minerals to more meaningfully leverage the vanadium platform it is in the process of developing."

Bushveld Vametco, located near Brits on the Western Limb of the Bushveld Complex, is an integrated operation and comprises a vanadium ore mine and a processing plant that produces Nitrovan, a trademark product sold in major steel markets across the world.

Bushveld Vametco was acquired at a time in which vanadium prices were depressed and trading at about US$15/KGV, which allowed Bushveld Minerals to acquire the asset/company at 10% of its replacement value, financed largely through debt and paid off soon thereafter.

"With the acquisition of Bushveld Vametco, we now have a production platform and a well versed operations team to drive an increase in production," says Mojapelo.

To realise this growth, Bushveld Vametco commenced a multi-phased expansion project in 2017 with the aim of increasing annual production to more than 5 000 metric tonnes of vanadium (mtV) over the next three years with the first 2 phases to be executed using a capex of ~US$3 million.

The first phase of the expansion was successfully completed on time and on budget in the September 2017 quarter, during which Vametco reached an annual production run rate of 3 035 mtV.

The next two phases of expansion will increase production to 3 750 mtV per year by June 2018 and to over 5 000 mtV per year by the end of 2019.

The completion of the expansion project will enhance Bushveld Vametco's existing competitive position in a structurally sparse market. In addition, the presence of an integrated platform will allow the development of downstream operations as well as achieving product diversification.

In parallel, Mojapelo notes that Bushveld will continue focusing on enhancing growth within its resource base by targeting Brownfield opportunities in South Africa.

Bushveld Vametco produces a final product called Nitrovan, a trademark nitrided vanadium used in the steel industry for strengthening steel

Vertical integration through VRFBs development

Meanwhile, vertical growth is being driven by the company's interest in developing a deeply integrated vanadium platform by not only producing Nitrovan and modified vanadium oxide products for the steel industry but also diversifying the product portfolio through the supply of electrolytes for VRFBs for the energy storage sector.

With China's recently released standards on rebar, estimates are that vanadium demand could increase by as much as 30%, while the increasing use of vanadium redox flow batteries (VRFBs) could, by 2030, account for up to 20% of vanadium consumption, creating solid demand.

Bushveld Minerals' vertically integrated business model is designed to maximise the share of the vanadium value chain in VRFBs. Owing to its unique characteristics, vanadium is well positioned for large-scale, long duration energy storage using VRFBs.

Through its Bushveld Energy platform, headed by CEO Mikhail Nikomarov, Bushveld Minerals aims to develop utility scale energy storage projects with the focus on supporting Africa's energy requirements

In doing so, the company is targeting about 1 000 MWh per year of energy storage solutions using VRFBs systems as well as targeting regionally-oriented assembly and manufacturing capacity for VRFBs within five years.

Read more about this technology in the April 2018 edition of ***Mining Review Africa***. MRA