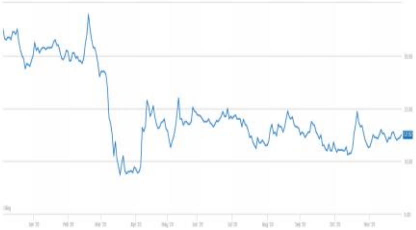
Company update

1 December 2020

BMN LN Mining & Metals



Source: LSE

Market data

Price (p)	12.5
Valuation (p)	28.0
12m High (p)	24.9
12m Low (p)	7.8
Shares (m)	1,153
Mkt Cap (£m)	144.1

Company summary

Bushveld Minerals is an AIM-quoted vanadium development and production company. The group's key assets are the Vametco and Vanchem primary vanadium producing operations in South Africa. Bushveld also participates in the development of the downstream, and fast-growing, vanadium-redox flow battery market through its majority-owned Bushveld Energy subsidiary.

Key forecasts*

	2019	2020e	2021e
Sales ($m)	116.5	92.0	144.0
EBITDA ($m)	32.6	(8.0)	44.1
EPS ($/sh)	0.05	(0.02)	0.00
FCF ($m)	(21.3)	(30.4)	4.2
EV/EBITDA (x)	6.1	na	4.5
EV/EBITDA adj* (x)	9.3	na	5.7
P/E (x)	3.0	na	47.7
FCF yield (%)	na	na	2.1
Net debt ($m)	28.5	39.1	37.8

*Equity-attributable adjusted EBITDA

Analyst contact

Nick Chalmers
Email: nchalmers@altrescap.com
Tel: +44 (0)20 7186 9003
Mob: +44 (0) 7559 910 874

Broking contacts

Alex Wood
Email: awood@altrescap.com
Tel: +44 (0)20 7186 9004

Bushveld Minerals*

Innovative financing reignites growth drive

We consider the US$65m production financing and convertible loan note offering a watershed moment in Bushveld's evolution, strengthening its balance sheet and thus de-risking its growth ambitions at a pivotal point in the vanadium market cycle. Vanadium's long-term fundamentals look strong, yet pricing is currently constrained by the dual effects of COVID-related industrial depression in the West and elevated seaborne iron-ore pricing (the latter indirectly increasing V co-supply in China). We believe both phenomena will be transient, and that now is therefore the time to be building out low-cost primary capacity in anticipation of much firmer pricing ahead. Bushveld owns some of the world's largest and highest-grade primary vanadium resources, and two of only four primary processing facilities globally. This innovative financing enhances its flexibility to progress a planned expansion of those assets, unlocking value whilst avoiding immediate dilution in what are challenging equity markets for junior miners at present. Moreover, it adds a leading mining-specialist investor well suited to support long-term growth. Completion should thus reignite interest in an equity story that offers substantial – and now greatly de-risked – growth in a highly-compelling commodity class.

- **Game-changing financing completed:** Bushveld has raised US$65m through a US$30m long-term production financing agreement (PFA) for Vametco with mining-specialist investment group Orion Mine Finance, and the forthcoming issue of US$35m in three-year convertible loan notes to the same group. Net proceeds from the PFA will be used primarily to fund expansion at Vametco, and those from the convertible loan note issue will be used to help fund the first phase of critical refurbishment and production uplift at Vanchem.
- **Balance sheet strengthened:** Bushveld also intends to use some of the proceeds to repay early some US$16m of existing bank debt. In addition, it has agreed to repay early US$5m of its existing US$23m of convertible notes due 2021, with a further US$6.5m being converted (leaving the balance at just US$11.5m). The financing thus significantly strengthens Bushveld's balance sheet, replacing covenant-heavy bank debt and short-dated notes with life-of-mine amortising debt and longer-dated convertible instruments.
- **Expansion plans back on track:** This firmer financial footing allows Bushveld to resume expansion initiatives it had hitherto placed under review as the COVID-19 pandemic weighed on vanadium prices (and thus group cash generation). For estimated expenditure of US$26m, Bushveld believes it can lift production at Vametco to an eventual rate of >4,200t pa (vs 3,000-3,400t pa current capacity). At Vanchem, cUS$14m of essential refurbishment is needed to sustain rates at c1,100t pa, while an additional cUS$31m of work could see a phased lift in rates to >4,200t pa over time. Final budgets and schedules for both Vametco and Vanchem will be refined by ongoing studies. However, a more than doubling of group production for an outlay of just over US$70m (excluding sunk acquisition costs) represents extremely low capital intensity, particularly versus the cost of developing equivalent capacity from scratch. Bushveld's buy-and-build strategy has seen it emerge as a significant player in the global vanadium market in just three years – this financing enables it to leverage that position further.
- **Valuation:** Bushveld's shares are trading at more than a 50% discount to our risk-adjusted sum-of-the-parts NAV estimate, and its EV (adjusted for the financing) is just 4.5x our 2021 EBITDA estimate. With considerable (and now significantly de-risked) production growth to come, and the prospect of firmer vanadium prices ahead, this offers a compelling entry opportunity, in our view.

US$65m Orion funding package significantly de-risks vanadium production growth plans

Bushveld has raised US$65m (gross) through a US$30m long-term production financing agreement (PFA) linked to Vametco and the forthcoming issue of US$35m in convertible loan notes. The PFA will be used primarily to fund further expansion at Vametco, but also for early repayment of pre-existing debt. Net proceeds from the convertible note issue will be directed towards the first phase of the refurbishment programme at Vanchem, as well as early debt repayment. The PFA is being provided by mining-specialist investment group Orion Mine Finance, who has also committed to subscribe to the entirety of the convertible note issue.

US$30m production financing agreement

PFA amortises over Vametco's life

The PFA has been structured as a US$30m debt instrument on Vametco which amortises over the asset's operational life. It will be serviced through two distinct quarterly royalty-like payments structured as follows.

- **Gross revenue rate payment:** Orion will receive quarterly payments equal to 1.175% of quarterly gross revenue from vanadium product sales at Vametco in 2020 and 2021, and 1.45% of quarterly gross revenues thereafter (unless the quarter-average realised vanadium price reaches or exceeds US$47/kg, in which case the applicable gross revenue rate will be reduced back to 1.175%).
- **Unit of production rate payment:** Orion will receive quarterly payments equal to US$0.443/kg of contained vanadium in all quarterly sales volumes at Vametco. The production unit rate will be adjusted for inflation annually.

Once Vametco reaches cumulative vanadium sales of approximately 132kt V during the term of the PFA, both the gross revenue rate and production unit rate applicable will be reduced by 75% (i.e. to 25% of the then applicable unit rate). Moreover, Bushveld has the option to repay up to 50% of both constituent parts of the PFA on each of the first three anniversaries of receipt. The gross revenue and unit rates will reduce accordingly if Bushveld exercises this option.

US$35m three-year convertible loan note issue

Orion has also committed to subscribe to US$35m in new convertible loan notes to be issued by Bushveld. Having satisfied all conditions precedent under the PFA, Bushveld served notice to Orion on 30th November to draw the full US$35m under the note offering.

Note conversion is fixed at 17p

The three-year notes will carry a fixed annual interest rate of 10%, to be accrued and capitalized on a quarterly basis in arrears and payable on maturity (to the extent not converted into shares prior to that date). At the option of Orion, the notes may be converted into Bushveld shares at a fixed conversion price of 17p, a near 40% premium to Bushveld's closing price on 6th November, the date the deal was ratified.

Conversion is limited to a maximum of one-third of the total amount outstanding (including accrued and capitalised interest) over the first six months from close, two-thirds over the next six-month period (less any amount converted over the first six months), and the balance at any time after twelve months until maturity. Bushveld has an option to convert all outstanding notes if its volume-weighted average share price is more than 200% of the conversion price over a continuous 15-day period.

Provides funding flexibility to optimise expansion schedule

The financing package significantly enhances Bushveld's funding firepower as it looks to progress an ambitious vanadium production expansion plan over the coming years, whilst also enabling it to repay early existing bank debt.

Bushveld's last stated cash position was US$25m at 30 June 2020. At that time both the group's R250m term and R125m revolving loan facilities were fully drawn, equating to gross bank debt of cUS$24m at current exchange rates. The group also had US$23m of unsecured convertible debt (plus US$0.7m of associated accrued interest) outstanding on the balance sheet, notes that were issued to Duferco as part consideration for the acquisition of Vanchem last year and which mature in November 2021.

Bushveld has agreed with its banker Nedbank to repay early the entirety of the R250m (cUS$16m) term facility on receipt of funds from the Orion convertible note issue. The R125m revolving credit facility will remain in place, albeit with the facility's interest rate margin over JIBAR increased by 0.25% to 3.85%. Nedbank has also agreed to amend certain covenants, including increasing the default level on the group net debt to EBITDA ratio to 2.5x.

Completion of the PFA and the new convertible loan note issue triggers an obligation to also redeem early US$11.5m (50%) of the US$23m Duferco convertible loan notes. However, Bushveld has reached an agreement with Duferco to convert US$6.5m of the US$11.5m into new Bushveld shares (at prevailing market price), with just the US$5m balance of the early redemption amount needing to be settled in cash (along with accrued interest of US$1.15m).

Balance sheet strengthened - covenant-heavy bank debt and short-dated convertible debt to be reduced

The PFA and convertible note issue thus significantly strengthen Bushveld's balance sheet, reducing covenant-heavy bank debt and leaving just US$11.5m of short-dated convertible debt (the balance of the Duferco notes) and US$35m of longer-dated convertible debt. (Though it will be lodged on the balance sheet, the US$30m PFA will be amortised over Vametco's life via the annual royalty-like payments to Orion, with no lump-sum repayment required unless Bushveld exercises its option to repay 50% of the principal during the first three years.)

This balance-sheet strengthening is timely as Bushveld looks to progress its ambitious expansion plans. As discussed in further detail on pp5-7, Bushveld has previously estimated capital expenditure of approximately R430m (US$26m) and R760m (US$45m) is required to expand annual output to at least 4,200t at each of Vametco and Vanchem respectively by 2025, while a further R370m (US$22m) may be spent on developing the greenfield Mokopane resource (p8).

Providing flexibility around capex plans for growth

Finalising the capex budget and schedule remains subject to a number of variables, not least of which is completion of all necessary technical and economic appraisals, while the group is also cognisant of the need for careful cash management given ongoing business and macro-economic uncertainty associated with the COVID-19 pandemic. Nonetheless, we believe this new injection of funds gives Bushveld optionality to accelerate its capital spending plans if deemed optimal, rather than being at the mercy of prevailing vanadium market conditions if it were relying on funding through internal cash-flow generation alone.

Operational performance and near-term outlook

Group vanadium production across the first nine months of 2020 totalled 2,667t (100% basis), some 37% higher than the corresponding period of 2019 owing to the inclusion of output from Vanchem following its acquisition in early November 2019. However, this is below year-opening expectations due to COVID-related operational interruptions, including several weeks' shuttered output in H1 as a nationwide industrial lockdown was imposed in South Africa (excluding Vanchem contributions, group production was very marginally lower than in the first nine months of 2019).

2020 vanadium production expected to be at least 25% above 2019 levels

Despite continuing COVID-related constraints on workforce availability and shift patterns, and a delay to commissioning of the kiln off-gas debottlenecking project at Vametco (now completed), management is confident full-year production will grow considerably on the 2,931t achieved in 2019, largely reflecting contributions from Vanchem but also due to the bedding-in of operational improvements at Vametco. Consolidated group production guidance is 3,660-3,950t (revised down from pre-COVID guidance of 3,960-4,300t), contingent on no further significant COVID-related disruptions. This would mark some 25-35% growth over 2019 production levels.

Vametco: rates set to increase in H2 following H1 COVID disruptions

Several operational improvement initiatives were implemented at Vametco in 2019 following the previous year's diagnostic review, resulting in record annual production of 2,833t being achieved. This was within annual guidance of 2,800-2,900t, and represented an 11% increase over 2018 output. Cash production costs beat guidance to come in 5% lower than 2018 at US$18.11/kg, reflecting the higher production volumes but also a weaker average Rand-US Dollar rate in 2019.

Management's guidance for Vametco in 2020 is 2,700-2,850t (revised down from pre-COVID guidance of 3,000-3,200t), at a cash production cost of R295-300/kg (the latter equating to U$17.50-17.90/kg at year-to-date average FX rates).

Vametco production rates anticipated to improve across H2

At 1,942t, production in the nine months to 30 September 2020 was behind the required run-rate to achieve the full-year target, but we note that the nation-wide industrial lockdown severely impacted output in March and April particularly, when 35 days of closure resulted in a c300t deficit to budget. Despite reduced workforce availability and the ongoing constraints of working under social distancing practices, Vametco has since returned to more normalised production rates – Q3 saw 725t achieved. Moreover, Bushveld used the enforced period of downtime to complete a ten-day annual maintenance programme that had originally been scheduled for later in 2020, and no further maintenance shutdowns are now expected this year. This, together with the commissioning of the kiln off-gas project (which was delayed from early to late Q3), should see production rates continue to increase across Q4, despite a reported power outage in early November caused by severe weather conditions.

Assuming no more unforeseen stoppages, we thus believe the low-end of production guidance for Vametco should be achievable. With the year-to-date average Rand-Dollar exchange rate weaker than 2019, we believe costs in Dollar terms should remain well below US$20.00/kg – at US$17.50/kg, production cash costs across the first nine months were 11% lower versus 2019 despite the operational interruptions. However, we caution that the Rand has been strengthening over recent weeks.

Capex for 2020 was budgeted at R50m (US$3m), most of which related to the kiln off-gas project (now completed). The latter was needed to meet regulatory requirements, but it will also allow increased kiln throughput which in turn should enable Vametco to *sustainably* operate at the targeted 'Phase 2' run rate of c3,000-3,400t pa that was facilitated by last year's operational improvement programme.

Vanchem: targeting around 1,000t in first full year of ownership

Vanchem enhances Bushveld's operational and product flexibility

Bushveld completed the US$54m acquisition of Vanchem in November 2019, the final consideration having been revised down from the initially proposed sum of US$68m. Vanchem is a primary vanadium processing facility capable of producing vanadium pentoxide, vanadium trioxide, ferrovanadium and vanadium chemicals. It utilises a similar salt-roast beneficiation process to that employed at Vametco, but has three kilns rather than one, offering potential for greater operational flexibility.

After some initial production contribution in the last few weeks of 2019, Vanchem's production guidance for 2020 was set at 960-1,100t V. Given the subsequent COVID-related disruption, management expects output to come in towards the lower end of its range, with cash production costs accordingly anticipated to come in at the upper end of the R310-320/kg (US$18.40-19.00/kg) guidance range.

On course to meet guidance despite COVID-related interruption

Q1 was solid, Vanchem producing 219t (31% of Bushveld's total group attributable vanadium production) despite enduring a ten-day period of power rationing as well as the beginning of the nationwide industrial lockdown towards the end of the quarter. COVID-related disruptions were more keenly felt in early Q2 (management estimates c80t of budgeted production 'losses'), contributing to a 3% drop in quarterly output to 212t (and taking H1 production at Vanchem to 431t of V in the form of various products). However, as at Vametco, production has now returned to more normalised rates following the relaxation of lockdown measures, with 294t achieve in Q3. We thus think the lower end of guidance remains well within sight.

The weighted average cash production cost across the first nine months of the year was just US$18.10/kg, despite a period of significant stock build-up in Q1 (Vanchem having been ramping-up production since December 2019). We therefore believe the operation appears on course to achieve full-year cost guidance, recent Rand-strengthening notwithstanding.

Critical refurbishment and regulatory capital expenditure for Vanchem in 2020 was budgeted at under R85m (cUS$5m), and is included in the group's total 'Phase 1' 2020-21 Vanchem refurbishment capex plan of R234m (cUS$14m) to ensure a sustainable production rate of c1,100t pa from the current one operating kiln set up. Some of that 2020 capex budget is now expected to fall over into 2021.

Plans to increase output to at least 8,400t pa reinvigorated

Continued bedding-in of the operational and productivity improvement initiatives at Vametco is expected to support the operation hitting >3,000t pa sustainable rates from the current single kiln set up. No additional capex is required to deliver this (the $2.3m capex for the kiln off-gas project has already been sunk), while only relatively modest 'critical' expenditure at Vanchem this year and next is required for that operation to consistently deliver at over 1,000t pa.

Low capital-intensity expansion projects could see annual production rates doubled by 2025

Over the longer term, Bushveld has ambitions to double its consolidated production total from the c4,200-4,400t pa run rate that we believe may be achievable by the start of next year. To this end it continues to evaluate a planned 'Phase 3' expansion of Vametco to a sustainable production rate of more than 4,200t pa, and has completed a desktop scoping study of the potential for a three-phase refurbishment programme at Vanchem to achieve a similar production run-rate there utilising all three of that operation's kilns.

We believe the Orion funding package significantly de-risks these expansion plans, which, subject to positive outcomes from the ongoing studies and prevailing market conditions, we think could commence next year.

Vametco: Phase 3 prefeasibility study eyes 4,200t pa potential

Bushveld has recently commenced a prefeasibility study (at a budgeted cost of R4m) of its Phase 3 expansion plan to increase steady-state production rates at Vametco to approximately 4,200t pa through a series of further de-bottlenecking and upgrading initiatives.

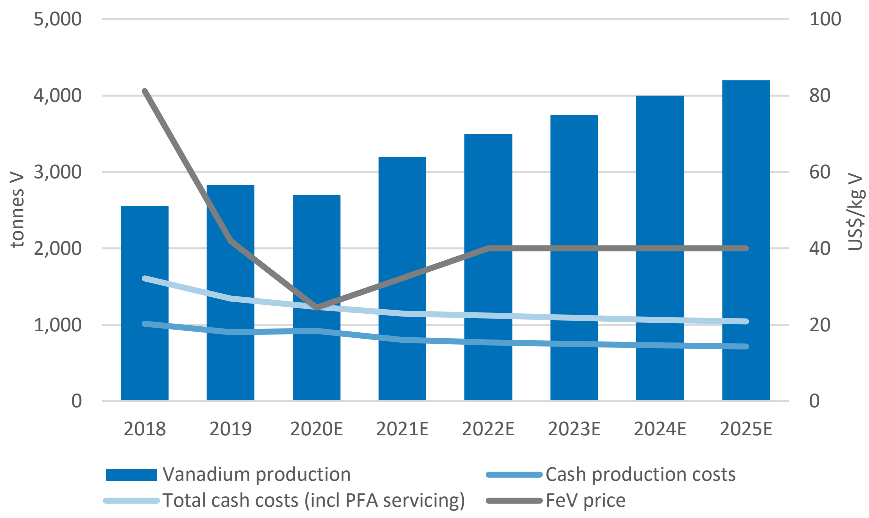
The PFS will test that the project still meets the group's internal hurdle rates given now lower prevailing vanadium prices, as well as firming-up capital and operating cost estimates. Based on previously completed internal reviews, management currently anticipates Phase 3 capital expenditure coming in at around R430m (US$26m). Most of this is expected to be Rand-denominated.

Orion PFA more than covers anticipated expansion capex at Vametco

Added to pre-existing cash reserves, and noting that Vametco remains cash-flow positive at an operational level even at current depressed vanadium prices, the US$30m PFA with Orion more than covers the anticipated capital cost of the Phase 3 expansion (some US$24m of the PFA funds have officially been earmarked for the work). We think this provides optionality to potentially accelerate the preliminary capex schedule, which previously targeted the expanded rate of over 4,200t pa being hit by 2025. However, we note that the pace of progression will be subject to ongoing review in the context of the COVID-19 pandemic, as well as prevailing vanadium market conditions and the results of the ongoing technical studies.

Our longer-term forecasts for Vametco are summarised below. These forecasts are based on Bushveld's broad guidance to date, but remain subject to change pending the outcome of the Phase 3 expansion PFS, as well as the other factors noted above.

Figure 1: Vametco – ARC production and operating cost six-year forecasts



Source: ARC estimates

Vanchem: three-stage refurbishment to expand output to 4,200t pa

Vanchem's facilities include: three core salt roasting kilns (of which currently just one is being operated); an electric smelting ferrovanadium converter; an alumino-thermic smelting facility; a vanadium chemical plant; and a rail siding linking the plant to South Africa's national rail network (and thus to Bushveld's primary vanadium deposits and potential other third-party vanadium supply sources).

Vanchem therefore not only adds scalable processing capacity to Bushveld, but on completion of the refurbishment programme its three-kiln configuration will add important flexibility to the group's vanadium product offering without compromising cost efficiencies. The vanadium chemicals and high-purity oxide producing capabilities are particularly strategic as Bushveld looks to grow its presence as a vanadium supplier to markets other than the traditional rebar steel sector.

Bushveld has completed a preliminary desktop scoping study of a three-phase refurbishment programme to achieve a production run-rate in excess of 4,200t pa at Vanchem by 2025. The project is centred on bringing back online, in a sequential manner, the two currently mothballed kilns. Capital expenditure for the full refurbishment programme is currently estimated by the company at approximately R750m (cUS$45m), which is expected to be mainly Rand-denominated.

Phase 1 focuses on critical refurbishment and regulatory capital expenditure to ensure that the current one kiln set-up can consistently operate at c1,100t pa. It is expected to require a total capital expenditure of under R234m (cUS$14m) over 2020-21 (inclusive of the <R85m earmarked for this year, as discussed earlier).

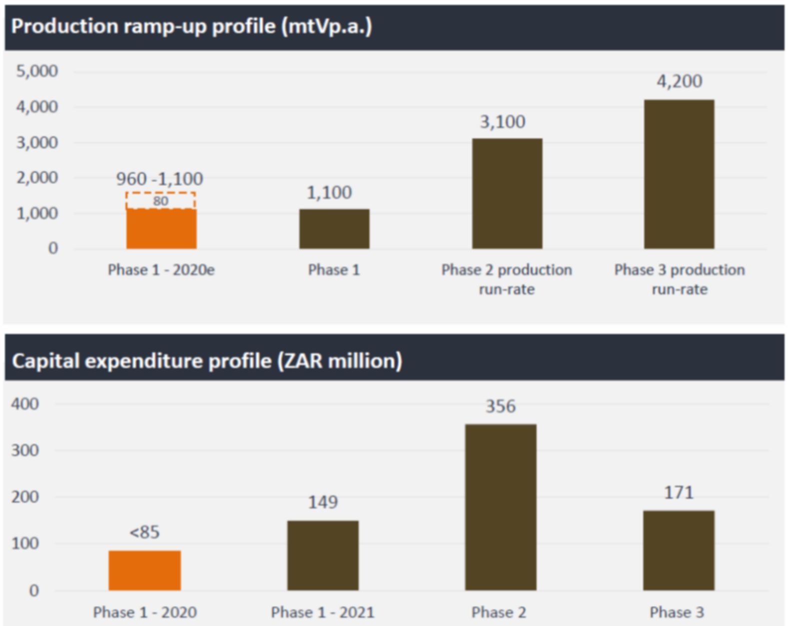
Phase 2 targets an increase in production rates to over 3,000t pa through the refurbishment of one of the additional kilns and the construction of a new ammonium metavanadate plant. Bushveld currently estimates this will require capital expenditure of approximately R356m (cUS$21m) over the period 2021-22.

Phase 3 will look to expand annual production rates to over 4,200t pa by 2025 through the refurbishment of the second additional kiln, the vanadium trioxide plant, the vanadium pentoxide plant and other associated infrastructure. Estimated capital expenditure for Phase 3 is R171m (cUS$10m) over 2023-24.

Convertible note offering significantly de-risks critical refurbishment and expansionary capex at Vanchem

The capital budget will be firmed up by feasibility study work, while timing will be somewhat influenced by external factors such as the continuing impact on the business of COVID-19 and wider market conditions. However, the US$35m convertible loan note financing substantially de-risks current work, and enhances Bushveld's flexibility to bring forward the next phases of refurbishment if deemed appropriate in the context of these external factors (some US$20m of the funds are earmarked for remaining Phase 1 work and starting Phase 2, leading to 2,600t pa).

Figure 2: Vanchem illustrative production expansion and capex schedule



Source: Bushveld Minerals

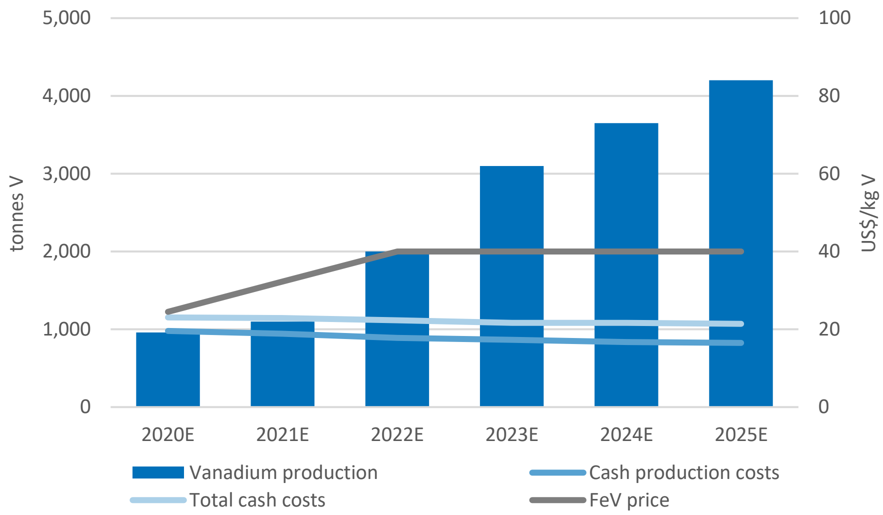
Mokopane offers a long-term, high-grade source of feed for Vanchem

Bushveld is currently feeding Vanchem with stockpiled ore from the nearby Mapochs mine. Amongst its long-term options for sourcing feed material is developing its own greenfield Mokopane vanadium project to the north. The company is assessing the potential for constructing an open-pit mine and basic ore concentrating operation, the capital cost of which it currently envisages being in the order of R370m (cUS$22m). Integrating Mokopane with Vanchem should, we believe, enable the former to be developed over a much shorter timeframe and at greatly lower cost than if developing it as a standalone integrated mining and full processing operation.

In the meantime, we note that Vanchem has enough stockpiled ore to support current production rates at Vanchem until H1 2021. Moreover, Bushveld has the option of supplying Vanchem with magnetite concentrates from Vametco given the latter's substantial resource base.

Our forecasts assume Mokopane comes on stream during 2023, with Vanchem fed by external ore sources (at similar cost to the current arrangement) in the intervening period. Note that our modelled production schedule summarised below is inferred from Bushveld's broad guidance to date on the schedule of the Vanchem refurbishment programme – final timing will be contingent on the pace and results of the company's ongoing technical-economic studies as well as the external factors noted above. Likewise, our longer-term operating cost forecasts are assumptions, largely benchmarked against Vametco's cost structure (adjusted for an assumed higher materials handling component of the costs given the additional haulage requirement of sourcing future ore feedstock from Mokopane). These are therefore also subject to change based on the outcome of ongoing study work.

Figure 3: Vanchem – ARC production and operating cost six-year forecasts



Source: ARC estimates

Bushveld Energy progressing on numerous fronts

While its focus remains on growing production rates at both Vametco and Vanchem, Bushveld continues, via its Bushveld Energy subsidiary, to develop and promote the role of vanadium in the growing global energy storage market through the application of Vanadium Redox Flow Batteries (VRFBs).

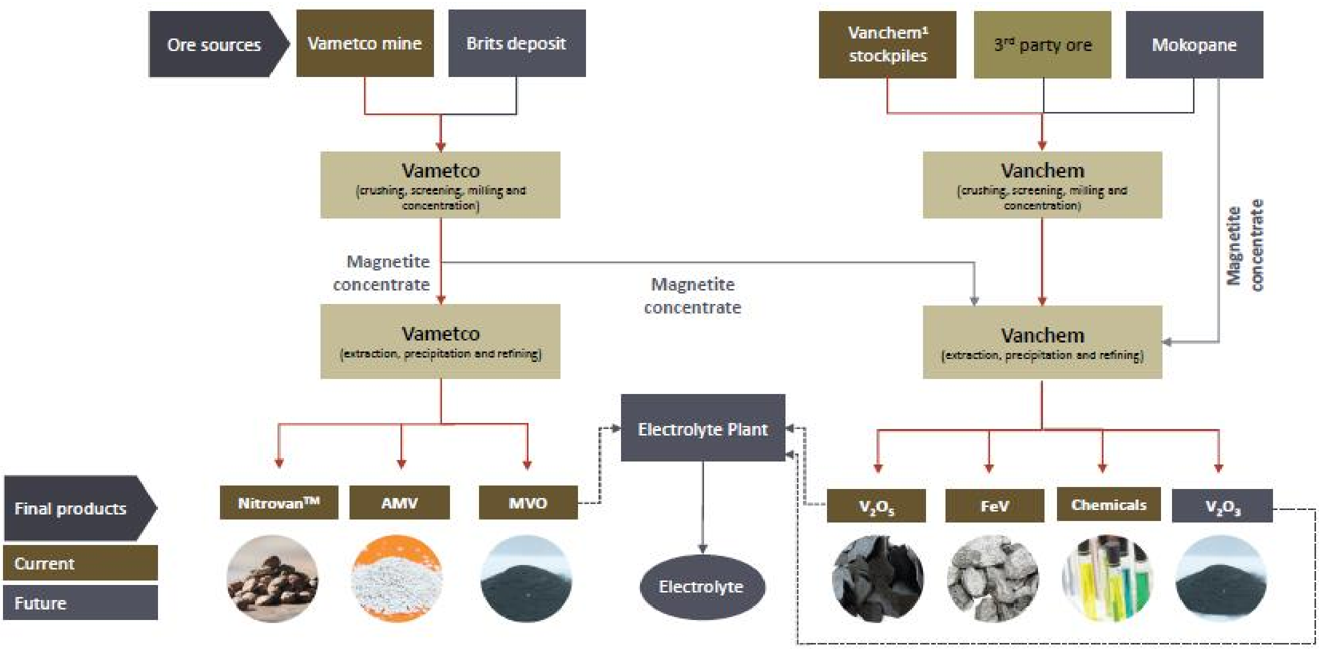
Bushveld Energy has ambitious plans in the VRFB space, leveraging its access to low-cost V production

Bushveld Energy's near-term strategy is to begin deploying VRFB systems as part of its longer-term vision of becoming a significant electricity-storage provider in Africa, leveraging its access to South African-mined and beneficiated vanadium. A key component of this strategy is driving the development of South Africa's first vanadium electrolyte production plant, in partnership with the Industrial Development Corporation (IDC). Approval for construction of the plant at a site in East London was granted earlier this year, and the project contractor has now commenced detailed engineering design work. Bushveld has committed to fund up to R68m (cUS$4m) of the capital investment requirement through to 2022.

Once completed, the electrolyte production facility will play a key role in Bushveld Energy's ambition of developing a vanadium electrolyte leasing market for VRFB users. The group recently established a special purpose company called Vanadium Electrolyte Rental Limited (VERL) in partnership with Invinity Energy Systems plc, the AIM-quoted VRFB manufacturing group in which Bushveld has an 8.5% shareholding. VERL intends to provide a vanadium electrolyte rental option to Invinity customers, and has already signed a rental contract with Pivot Power (part of EDF Renewables) under which VERL will hold, and rent to Pivot for a period of ten years, the electrolyte in Pivot's 5MWh flow battery (supplied by Invinity).

Bushveld Energy is also an indirect shareholder (via a specially formed consortium) in Enerox, one of the largest researchers, developers, manufacturers and distributors of VRFBs globally. Enerox's VRFB product is one of the most widely deployed over the past decade, and the group has a global customer base with over 130 field installations over the past ten years across five continents

Figure 4: Bushveld Energy and its planned electrolyte plant is an important part of Bushveld's vertically-integrated vision



Source: Bushveld Minerals

Vanadium market update: long-term fundamentals sound

Vanadium prices dropped by around 75% across 2019, albeit coming off multi-year highs of over US$120/kg (FeV basis) that were established in late 2018. In our view the general downwards trend across the period was driven by the following factors:

- a slowdown in Chinese buying in early 2019 following domestic stockpiling in late 2018 ahead of the introduction of more stringent steel rebar manufacturing laws (which prompted the spike in prices to an all-time high in late 2018);
- slower-than-anticipated implementation of the new steel rebar minimum-strength standards in China;
- some substitution of FeV with ferroniobium (FeNb) amongst rebar manufacturers given the sharp increase in FeV prices across 2018;
- an increase in slag co-production from titano-magnetite iron-steel operations in China due to elevated seaborne iron-ore prices (driven by haematite iron-ore production interruptions in Brazil) and higher Chinese crude steel production
- some opportunistic increases in primary supply from high-cost stone-coal (vanadium-bearing shales) operations

After hitting a trough of just over US$20/kg in Q4 2019, prices staged a partial recovery in late 2019/early 2020 as hitherto softer prices reduced the incentive for FeNb substitution amongst rebar manufacturers (substitution tends to occur when the FeV price is 2-3x higher than FeNb) and inhibited stone-coal vanadium production. Continuing demand growth in China meanwhile reportedly saw China move to becoming a net importer of vanadium.

However, the emergence of the COVID-19 pandemic in March stalled this nascent recovery in its tracks, as global steel production rates outside China collapsed. European FeV prices have since traded around US$23-25/kg, c30% below historic long-term (last ten years) average pricing levels. A significant gap temporarily opened between Chinese pricing and markets elsewhere (with the former trading around US27-$30/kg through Q3), perhaps reflective of a sharper industrial recovery – and thus rising steel production rates – in China, driving rising vanadium imports to the country. However, this gap has narrowed over recent weeks, with Chinese prices now trading closer to European and US prices.

Figure 5: Vanadium (European FeV basis) five-year pricing trend

Source: Bloomberg, vanadiumprice.com

While it is clearly challenging to predict very near-term commodity pricing trends given the ongoing uncertainty of the pandemic's impact on global industrial manufacturing and trade, we believe that the factors behind vanadium's slump last year should continue to reverse as global economic activity recovers.

On the demand side of the equation, there is now little incentive for FeNb substitution, and we note that the niobium market is even more concentrated than the vanadium market (with one mine accounting for c80% of supply), limiting its appeal as a long-term strengthening agent feedstock for non-specialist steels. Moreover, we believe Chinese rebar regulations will be increasingly enforced if builders are to meet safety expectations, driving up specific vanadium consumption rates in China closer to levels prevalent in developed economies and placing further strain on its domestic supply sources.

This is against a backdrop of general rising vanadium demand from China, supported most recently by a cUS$500bn infrastructure stimulus programme (which perhaps is driving the current vanadium pricing disparity between China and the rest of the world – Bushveld is seeking to capitalise on this by directing more of its sales to China, which now accounts for almost one-fifth of its volumes).

And VRFBs look set to increasingly grow market share in the stationary energy-storage space (itself rapidly growing in importance globally), the technology substantially more commercially viable at today's vanadium prices compared with the peaks of 2018.

On the supply side, the long-term outlook looks to be one of increasing market tightness, notwithstanding last year's increase in co-product supply. We believe there is very limited scope for co producers to further grow supply (even at higher steel or vanadium prices), with magnetite iron-ore steel operations at or near full capacity and increasingly stringent environmental restrictions in China inhibiting their ability to expand. The general trend in China's steel industry (historically the dominant co-product vanadium supplier) remains one of increasing reliance on imported high-grade haematite iron ore, which is non-vanadium bearing.

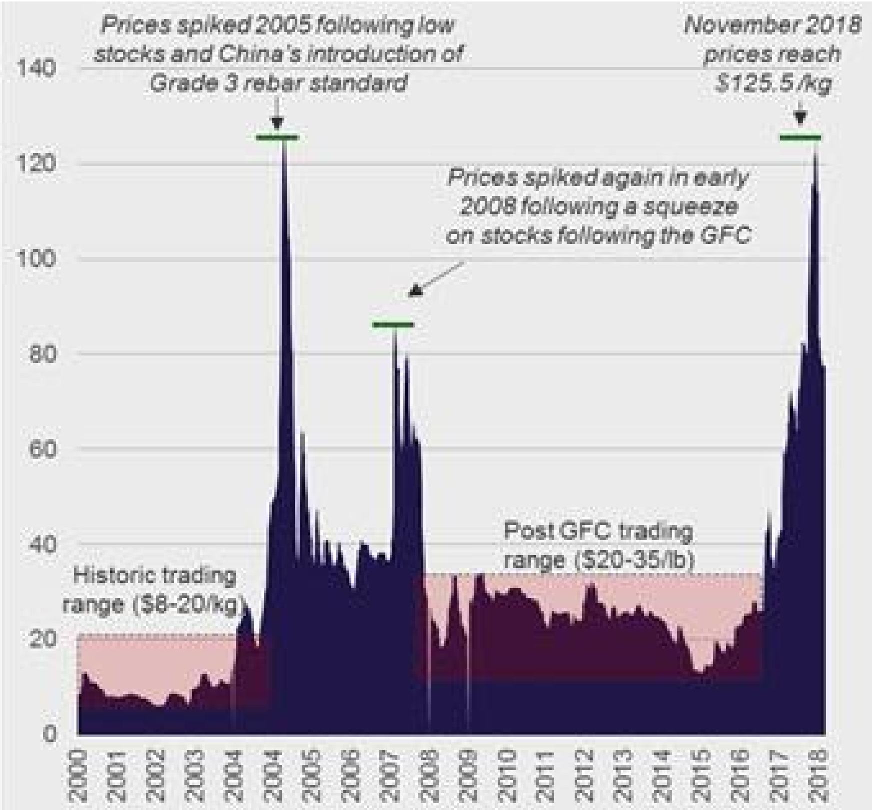
Figure 6: Has co-production maxed out? V prices have shown signs of nascent recovery despite still high Fe prices – the two are traditionally inversely corelated

Source: Bloomberg, vanadiumprice.com

High-cost stone-coal vanadium production (historically a swing source of global supply) requires considerably higher pricing levels to be viable, as do greenfield primary magnetite projects if they are to attract development finance. In our view that leaves Bushveld – holder of substantial primary vanadium resources and latent processing capacity – as one of the very few potential sources of new supply over the coming years.

We therefore remain optimistic that prices will recover from current levels to longer-term 'normalised' prices that will exceed historic averages owing to this marked structural change in the market that we believe has only been temporarily interrupted. Historically, periods of price weakness after preceding peaks have tended to make way for more settled periods of pricing at levels higher than the previous 'normalised' period (Figure 7).

Figure 7: Historically, vanadium price spikes have been followed by periods of lower volatility but at a higher than pre-spike mean pricing level



Source: CRU

We use a long-term pricing assumption of US$40/kg (from 2022) for equity valuation purposes. This compares with the ten-year average market price of just under US$35/kg (which we note current market prices still lag).

We consider this a relatively conservative assumption and see potential for further periods of much higher pricing, particularly if co-production capacity is curbed.

Valuation

Our valuation incorporates risk-adjusted NPV estimates for Vametco and Vanchem assuming a 10% discount rate and a long-term FeV price of US$40/kg from 2022. Our cash flow model of Vametco incorporates the quarterly payment obligations to Orion under the newly announced PFA.

As discussed on pp6-8, our cash flow models for each operation incorporate operating and cost assumptions inferred from Bushveld's broad guidance of the planned expansion programmes, both of which are subject to change based on the results of ongoing technical-economic studies being carried out by the company. We apply haircuts to each of our resulting NPV estimates to reflect these risks and uncertainties – 25% in the case of Vametco (reflecting our view that its expansion plan is relatively advanced, and that it has a well-established operating cost structure) and 50% in the case of Vanchem (reflecting our view that its expansion/refurbishment plan is at an earlier stage – and that we incorporate the development of the greenfield Mokopane resource – and that Vanchem has a less well established *recent* operating history and cost structure). We consider funding risk for both projects has been lowered with the PFA and convertible note financing.

After also including nominal valuations for the undeveloped Brits property and Bushveld Energy, the group's investments at market value, and balance sheet items at 2020 year-end estimates (assuming the Orion financings are completed in-line with expectations), we arrive at a risk-adjusted sum-of-the-parts valuation of 28p per share. We see potentially significant upside to this valuation as the Vametco and Vanchem expansions are successively de-risked, and as greater clarity emerges on the commercial potential of Bushveld Energy's initiatives.

*Figure 8: Base-case sum-of-the-parts valuation**

		Unrisked US$m	Unrisked GBp/sh	Risk multiple	Risked GBp/sh
Vametco (incl PFA)	$NPV_{10\%}$	322	20.3	0.75x	15.2
Vanchem	$NPV_{10\%}$	412	25.9	0.50x	13.0
Brits property	nominal	10	0.6		0.6
Bushveld Energy	nominal	25	1.6		1.6
Investments	market	16	1.0		1.0
Corporate-level costs	$NPV_{10\%}$	(45)	(2.8)		(2.8)
EV		**740**	**46.6**		**28.6**
Cash	end-2020 est	45	2.8		2.8
Bank debt	end-2020 est	(8)	(0.5)		(0.5)
Convertible debt	end-2020 est	(47)	(2.9)		(2.9)
NAV		**730**	**46.0**		**28.0**

**Assumes long-term (from 2022) US$40/kg V price and R16.25:US$1 FX rate* *Source: ARC estimates*

Figure 9: Unrisked $NAV_{10\%}$ (GBp) sensitivity to vanadium price and FX rate

USD/ZAR rate	Ferrovanadium price (US$/kg V): 25	30	35	40*	45	50	55
14.25	2	15	26	38	50	62	74
15.25	7	19	31	42	54	66	78
16.25*	11	22	34	**46**	58	70	82
17.25	14	26	37	49	61	73	85
18.25	17	29	40	52	64	76	88

**Valuation base-case assumptions* *Source: ARC estimates*

Summary operating and financial forecasts

Figures 10-14 summarise our base-case forecasts for the next few years, incorporating Bushveld's 2020 guidance and our own assumptions on the schedule and cost implications of the planned production expansion thereafter. We will refine our longer-term forecasts as and when more precise guidance on the latter emerges. We believe the PFA and convertible note financing potentially allows our assumed production schedule to be brought forward, subject to the results of ongoing studies.

The biggest risk to our *near-term* forecasts are achieved V price and sales volumes. We assume sales volumes are slightly higher than production this year given the level of stock build-up in 2019. However, we note that, owing mainly to COVID-related logistical constraints, longer sales lead times adversely impacted volumes in Q2 and Q3, a trend that could well continue through the remainder of the year.

Figure 10: Summary operational forecasts and macro assumptions

		2019	2020E	2021E	2022E	2023E	2024E	2025E
Vanadium production	t V	2,931	3,660	4,300	5,500	6,850	7,650	8,400
V_2O_5 equivalent	t	5,232	6,534	7,676	9,818	12,228	13,656	14,996
Sales volumes	t V	2,490	3,753	4,466	5,624	6,943	7,750	8,445
Vanadium price (FeV basis)	US$/kg V	47.77	24.50	32.25	40.00	40.00	40.00	40.00
C1 cash production costs	US$/kg V	18.11	18.73	16.78	16.28	16.02	15.60	15.42
Total cash costs (incl royalties & G&A*)	US$/kg V	26.84	23.72	21.71	21.05	20.59	20.33	20.08
South African Rand	ZAR:USD	14.40	16.25	16.25	16.25	16.25	16.25	16.25

**Operating-level G&A (estimate) only, does not include corporate-level overheads* *Source: ARC estimates*

Figure 11: Summary Bushveld Minerals consolidated income statement

Year-end 31 Dec		**2019**	**2020E**	**2021E**	**2022E**	**2023E**	**2024E**	**2025E**
Revenue	US$m	116.5	92.0	144.0	225.0	277.7	310.0	337.8
Cost of sales	US$m	(56.2)	(87.3)	(93.4)	(117.9)	(141.9)	(151.6)	(161.1)
Selling and distribution costs	US$m	(7.6)	(5.0)	(6.5)	(8.7)	(10.5)	(11.6)	(12.7)
Administrative and other costs	US$m	(31.4)	(26.0)	(18.6)	(16.9)	(16.4)	(15.7)	(15.2)
Operating profit/(loss)	**US$m**	**22.3**	**(25.5)**	**25.6**	**81.5**	**109.0**	**131.1**	**148.8**
Net finance costs	US$m	1.9	(1.9)	(5.9)	(6.5)	(5.6)	(2.8)	(2.1)
Exceptional non-cash items	US$m	59.1	0.0	0.0	0.0	0.0	0.0	0.0
Profit/(loss) before tax	**US$m**	**83.3**	**(27.4)**	**19.6**	**75.0**	**103.3**	**128.3**	**146.7**
Tax	US$m	(14.0)	(0.0)	(9.8)	(20.6)	(38.8)	(48.4)	(69.3)
Net profit/(loss)	**US$m**	**69.2**	**(27.4)**	**9.8**	**54.4**	**64.5**	**80.0**	**77.4**

Source: ARC estimates

Figure 12: Summary Bushveld Minerals consolidated cash flow statement

		2019	2020E	2021E	2022E	2023E	2024E	2025E
Operational CF before WC changes	US$m	23.9	(8.1)	34.3	82.6	92.4	103.0	97.5
Working capital changes	US$m	4.6	(12.9)	(3.1)	(14.4)	(13.4)	(7.1)	(5.5)
Cash flow from operations	**US$m**	**28.5**	**(21.0)**	**31.2**	**68.2**	**79.0**	**95.9**	**91.9**
Capex	US$m	(13.3)	(8.3)	(24.6)	(41.6)	(23.0)	(8.1)	(3.2)
Other	US$m	(36.4)	(1.1)	(2.4)	(1.2)	0.5	0.5	1.4
Cash flow from investing activities	**US$m**	**(49.7)**	**(9.4)**	**(27.0)**	**(42.8)**	**(22.4)**	**(7.6)**	**(1.8)**
Net borrowings	US$m	18.6	44.2	(12.5)	(1.0)	(43.7)	(1.0)	(1.0)
Dividends to minorities	US$m	(4.5)	0.0	0.0	0.0	0.0	(0.6)	(33.0)
Other	US$m	(0.8)	(2.8)	(2.9)	(3.4)	(13.5)	(3.3)	(3.5)
Cash flow from financing activities	**US$m**	**13.3**	**41.4**	**(15.4)**	**(4.4)**	**(57.2)**	**(4.9)**	**(37.5)**
Increase/(decrease) in cash	US$m	(8.0)	11.0	(11.2)	21.0	(0.7)	83.4	52.6

Source: ARC estimates

Alternative Resource Capital

Figure 13: Summary Bushveld Minerals consolidated balance sheet

		2019	2020E	2021E	2022E	2023E	2024E	2025E
Cash	US$m	34.0	45.0	33.8	54.9	54.2	137.6	190.3
P,P&E	US$m	185.3	176.2	182.2	202.2	202.9	190.8	175.9
Intangible assets	US$m	59.4	59.9	59.9	59.9	59.9	59.9	59.9
Other assets	US$m	56.1	65.1	71.5	90.5	104.4	111.3	117.5
Total assets	**US$m**	**334.8**	**346.1**	**347.4**	**407.4**	**421.4**	**499.6**	**543.6**
Payables	US$m	15.7	10.4	12.4	15.8	16.9	49.1	57.4
Debt	US$m	62.5	84.1	71.6	70.6	26.9	25.9	24.9
Other liabilities	US$m	36.2	28.3	28.3	28.3	28.3	28.3	28.3
Total liabilities	**US$m**	**114.4**	**122.8**	**112.3**	**114.6**	**72.1**	**103.3**	**110.6**
Shareholders' equity	US$m	207.6	189.5	195.7	242.1	286.5	320.1	378.2
Non-controlling interests	US$m	33.5	33.8	39.5	50.7	62.8	76.2	54.8
Total equity	US$m	241.1	223.3	235.1	292.8	349.4	396.3	433.0
Total liabilities & equity	**US$m**	**355.5**	**346.1**	**347.4**	**407.4**	**421.4**	**499.6**	**543.6**

Source: ARC estimates

Figure 14: Key financial measurements and ratios

		2019	2020E	2021E	2022E	2023E	2024E	2025E
EBITDA	US$m	32.6	(8.0)	44.1	103.2	131.2	151.4	166.8
EBITDA margin	%	28%	na	31%	46%	47%	49%	49%
EPS	US$/sh	0.05	(0.02)	0.00	0.04	0.04	0.06	0.06
Net profit margin	%	53%	na	3%	19%	19%	21%	19%
Free cash flow	US$m	(21.3)	(30.4)	4.2	25.4	56.5	88.4	90.1
Net debt/(cash)	US$m	28.5	39.1	37.8	15.7	(27.3)	(111.7)	(165.4)
EV/EBITDA (fully consolidated)	x	6.1	na	4.5	1.9	1.5	1.3	1.2
EV/EBITDA (equity attributable)	x	9.3	na	5.7	2.3	1.8	1.5	1.4
P/E	x	3.0	na	47.7	4.6	3.8	3.0	3.0
FCF yield	%	na	na	2.1%	12.8%	28.5%	44.5%	45.5%

Source: ARC estimates

Disclaimer

This document has been prepared and issued by Alternative Resource Capital, a trading name of Shard Capital Partners LLP ("Alternative Resource Capital"), which is authorised and regulated by the Financial Conduct Authority (FRN: 538762).

Bushveld Minerals is a corporate client of Alternative Resource Capital, and Alternative Resource Capital is contractually engaged and paid by Bushveld Minerals to produce marketing communications on an ongoing basis. In addition, Alternative Resource Capital may from time to time receive additional compensation from Bushveld Minerals for provision of other advisory services, including fundraising services. This document constitutes a minor non-monetary benefit.

This document is a marketing communication and not independent research. As such, it has not been prepared in accordance with legal requirements designed to promote the independence of investment research.

This document is published solely for information purposes and is not to be construed as a solicitation or an offer to buy or sell any securities, or related financial instruments. It does not constitute a personal recommendation as defined by the Financial Conduct Authority, nor does it take account of the particular investment objectives, financial situations or needs of individual investors. The information contained herein is obtained from public information and sources considered reliable. However, the accuracy thereof cannot be guaranteed.

The information contained in this document is solely for use by those persons to whom it is addressed and may not be reproduced, further distributed to any other person or published, in whole or in part, for any purpose, at any time, without the prior written consent of Alternative Resource Capital. This document is not intended for retail customers and may not be distributed to any persons (or groups of persons) to whom such distribution would contravene the UK Financial Services and Markets Act 2000. Moreover, this document is not directed at persons in any jurisdictions in which Alternative Resource Capital is prohibited or restricted by any legislation or regulation in those jurisdictions from making it available. Persons into whose possession this document comes should inform themselves about, and observe, any such restrictions.

Alternative Resource Capital or its employees may have a position in the securities and derivatives of the companies researched and this may impair the objectivity of this report. Alternative Resource Capital may act as principal in transactions in any relevant securities, or provide advisory or other service to any issuer of relevant securities or any company connected therewith.

Neither Alternative Resource Capital nor any of its directors, officers, employees or agents accept any responsibility or liability whatsoever for any loss however arising from any use of this document or its contents or otherwise arising in connection therewith. The value of the securities and the income from them may fluctuate. It should be remembered that past performance is not a guarantee of future performance. Investments may go down in value as well as up and you may not get back the full amount invested. The listing requirements for securities listed on AIM or ISDX are less demanding and trading in them may be less liquid than main markets. If you are unsure of the suitability of share dealing specifically for you then you should contact an Independent Financial Adviser, authorised by the Financial Conduct Authority.

By accepting this document, the recipient agrees to the foregoing disclaimer and to be bound by its limitations and restrictions.

Shard Capital Partners LLP
23rd Floor,
20 Fenchurch St,
London, EC3M 3BY

T +44 (0)207 186 9900
F +44 (0)207 186 9979
E info@shardcapital.com
W shardcapital.com