12 May 2020

METALS & MINING

VSA capital

Initiation of Coverage

Marketing Communication (Connected Research)

Ferro-Alloy Resources Group#

BBG Ticker: FAR LN *Price: £0.10* *Mkt Cap: £31.5m* **BUY**

Vanadium; Just not as you know it!

Leading Low Capex, Low Opex Development

Ferro-Alloy Resources Group (FAR LN)# owns the Balasausqandiq vanadium project in Kazakhstan which unlike nearly all of its peers is a vanadium bearing black shale ore rather than a titano-vanadiferous magnetite (TVM). This ore, unlike TVM ores, does not require expensive concentrating and pre-roasting, reducing capital and operating costs significantly. Initial capex of US$101m, and annual output of 5.6ktpa V2O5 rising to 23.5ktpa, cash costs of US$2.30/lb excluding by-products and negative US$-1.2/lb on an inclusive basis results in an NPV11 of US$1.4bn.

Strengthening the Existing Operation

Further differentiating itself from the vanadium pre construction peer group, FAR has the significant advantage of existing production, having adapted and expanded its pilot plant to treat third party material. FAR recently confirmed a tripling in capacity to 480tpa with a planned further increase to 1,500tpa during 2020. Despite a profitable 2018, this aspect of the business suffered in 2019 due to falling vanadium prices and constrained capacity, however, with an achievable plan to increase near term output, we expect an earnings recovery through 2020F leading to positive EBITDA in 2021F of US$4m, providing modest cashflow to support the group during the main project development.

Vanadium Exposure

With global supply side disruption from lockdown impacting vanadium supply and China's industrial economy restarting in later Q1 2020, the vanadium price is up 25% YTD to US$6.65/lb in Europe and 3% in China to US$6.3/lb. Having fallen 68% through 2019 we now believe that the price has stabilised at close to the last pricing trough, offering an attractive entry point for investors. However, we see upside potential from both China's post-coronavirus stimulus, which is expected to incorporate steel intensive infrastructure projects, and the growth of the vanadium redox flow battery market over the medium to longer term.

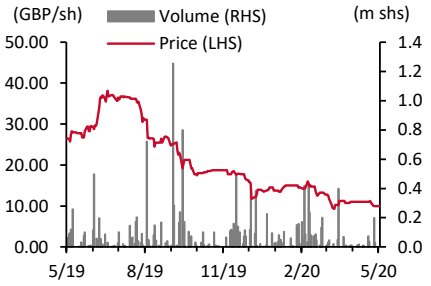
Recommendation and Target Price

Our risked DCF valuation, based on conservative pricing, indicates significant upside potential. With a clear plan to finance the main project we believe there are multiple catalysts for a rerating in the short to medium term, underpinned by an improving earnings outlook for the existing secondary processing business. **We are initiating coverage with a BUY recommendation and target price of £1.71/sh.**

Company Description

Ferro Alloy Resources Group is focussed on the processing of vanadium ores and development of the Balasausqandiq vanadium shale project in Kazakhstan.

One Year Price Performance



Price % chg	1mn	3mn	12mn
	-9%	-29.3%	67.8%
12mn high/low			38.2/9.3p

***SOURCE**: Eikon, as of 11 May 2020 close.*

Market:	LSE
Shares in issue	302.5m
Target Price (p/sh.	1.71
Free float:	57%
Net cash (Dec 2019F):	£0.7m
Enterprise value:	£30.8m
Major shareholders	
A Kuznetsov	22.4%
N Bridgen	20.7%
Citadel Advisors LLC	13.4%

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Investment Case

Ferro Alloy Resources (FAR LN) has the potential to become the lowest cost vanadium producer globally through the development of its major black shale deposit, Balasausqandiq. With a market cap of US$38.9m (£31.5m) currently, we believe that the combination of an attractive valuation and an improving near term cashflow outlook make FAR stand out against the broader vanadium universe, particularly given a realistic and achievable financing programme.

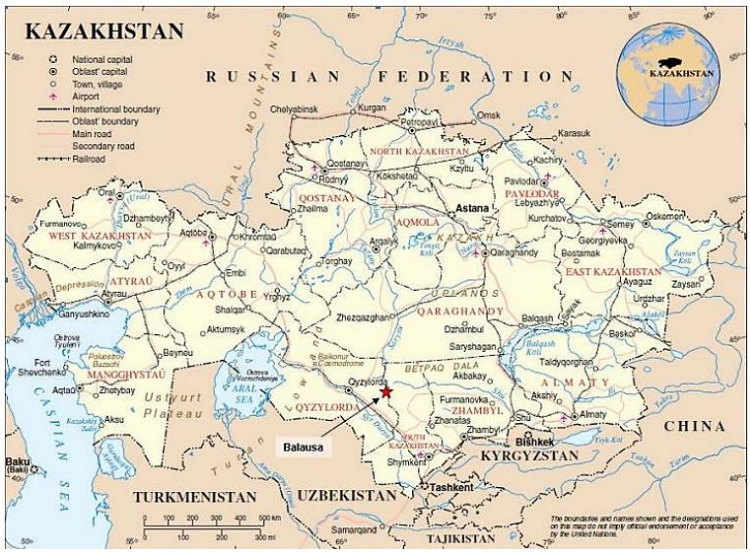
Project Highlights, FAR and Peer Group

	M'Cap (US$m)	Capex US$m	Capital Intensity $/t V2O5	Post-tax NPV US$mn (Discount rate)	NPV/Capex	Annual V2O5 ktpa	Assumed V205 Price US$/lb
FAR Phase 1 VSA Estimate	39	101	**18,035**	700 (10.6)	**6.93**	5.6	6.75
FAR Combined VSA Estimate		326	**14,573**	1,433 (10.6)	**4.41**	22.3	6.75
Far Combined CPR 2018		326	**14,573**	2,000 (10)	**6.15**	22.3	7.5
BMN Mokopane	189	298	**31,286**	259 (9)	**0.80**	9.5	7.5
TMT AU	9	374	**29,422**	286 (8)	**0.77**	12.7	8.78
TNG AU	44	1184	**52,486**	1,729 (8)	**1.46**	24.3	10

SOURCE: *Company Data, FAR CPR 2018, VSA Capital Research. *Figures based on published CPRs, N.B. TMT capex is adjusted to reflect capex deferred to Year 3 (A$64m) and mining pre-production spending (A$16m) and does not include planned BOOT contracts for gas pipeline and supply and power generation. TNG also makes significant use of BOOT contracts to defer capital of US$533m.*

Our analysis which highlights significant upside potential indicates an NPV of US$1.4bn for FAR's main project and is based on a Feasibility Study which is currently being upgraded to Western Bankable standards. There are a number of FAR's peers which also trade at deep discounts to their projected NPV's, however, we believe there are a number of factors which differentiate FAR from its peers and it is the combination of these factors, not any single factor, which makes FAR a uniquely attractive opportunity. In our view, the low upfront capital and sector leading operating margins which are not reliant on by-product revenues, make this project far more likely to be built and therefore to realise its projected NPV. FAR's black shale orebody is amenable to conventional minerals processing technology which does not require the expensive concentration and roasting steps in the metallurgical process that are required for standard TVM orebodies (see later). This reduces both capex and opex of the processing plant, while all the main infrastructure items already exist and a shallow and easily mined ore body reduces the mining costs. FAR is already in production at a small scale but sufficient to give its management essential operating experience and to provide useful cash flow. Currently FAR's deep discount to NAV indicates that the market values it similarly to peers but this overlooks these crucial factors.

Balasausqandiq Project and Processing Operations in Kazakhstan



SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

Unlike its peers, FAR's deposit is not a titano-vanadiferous (TVM) ore body but a black shale. TVM is a low-grade iron ore and must be concentrated and pre roasted before leaching, which adds to the cost base significantly. Beyond this the processing flowsheets and costs of extraction are highly comparable. We do not see the differences in FAR's investment case as a black-box style bet on metallurgical processing. Instead, lower processing costs combine with strong existing infrastructure along with a large, shallow and uniform ore body to make FAR a low cost project. FAR's significant by-products which include uranium and molybdenum can more than pay for the whole cost of processing on their own, further emphasising this cost advantage.

Although full development of the existing plant isn't essential, with an additional US$5m, FAR will be able to scale up its adapted pilot plant from capacity of 480tpa to 1.5ktpa V2O5 within a few months, which we anticipate would result in a sevenfold increase in revenue by 2021 and positive EBITDA of US$4m providing cashflow to be used for the remaining pre-development costs on Balasausqandiq. Based on the currently available studies, we believe that with a completed BFS confirming the current assumptions, it would be relatively straightforward to secure cUS$100m in project financing for Phase 1 of 5.6ktpa (V2O5), capable of generating free cash flow sufficient to develop Phase 2 which would take FAR to a 23.9ktpa producer generating steady state free cash flow of US$350mpa based on our conservative V2O5 price forecast of US$6.75/lb.

Although the shares are now down 82% since March 2019, this has largely been driven by the vanadium price correction following the 380% spike from 2017-19 driven by a change in Chinese rebar standards and the company is valued at just US$38.9m (£31.5m). Furthermore, the shares are down 27% YTD while in 2020 the vanadium price is up 25% YTD in Europe to US$6.65/lb and 3% in China to US$6.3/lb despite the volatility surrounding coronavirus. Although this highlights a near term opportunity in the shares, the key point is that FAR's main project is projected to have lowest quartile unit costs of US$1.50/lb over the LoM indicating strong operating margins at the current price. Our investment case is therefore not hinged on the vanadium price. We believe that the start of the development programme and successful financing will see the shares rerate significantly. Furthermore, whilst the take-off of the Vanadium Redox Flow Battery industry could be the catalyst for the next period of high pricing, FAR's low incentive price does not rely on this market.

Highlights Table Balasausqandiq Project

	VSA Estimates @US$6.75/lb V2O5
Project NPV (10.6% WACC)	1,444
Project NPV (10.6% WACC) ex-byproducts	703
LoM	27 years +
Average Revenue, US$m	451
Average EBITDA, US$m	334
Average FCF, US$m	239
Upfront Capex, Phase 1	101
Internally funded Phase 2 Capex	225
Unit costs, ex-byproduct LoM, US$/lb	2.30
Unit Costs, co-product LoM, US$/lb	1.50
Unit costs, by-product LoM, US$'lb	-1.16

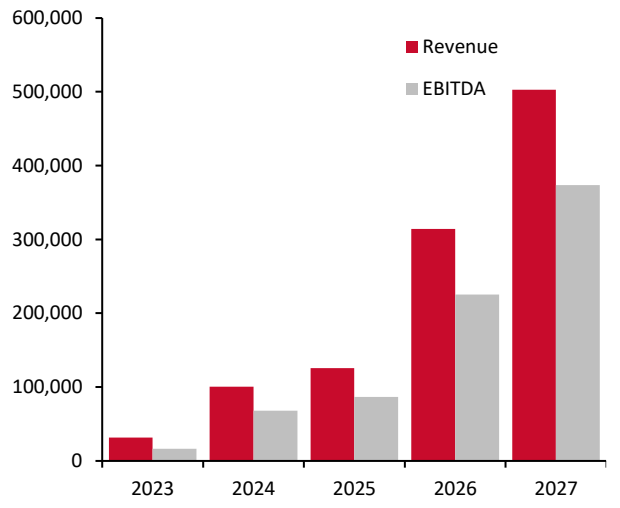
SOURCE: *Company data, FAR CPR 2018, VSA Capital Research*

Strong Project Economics; Balasausqandiq

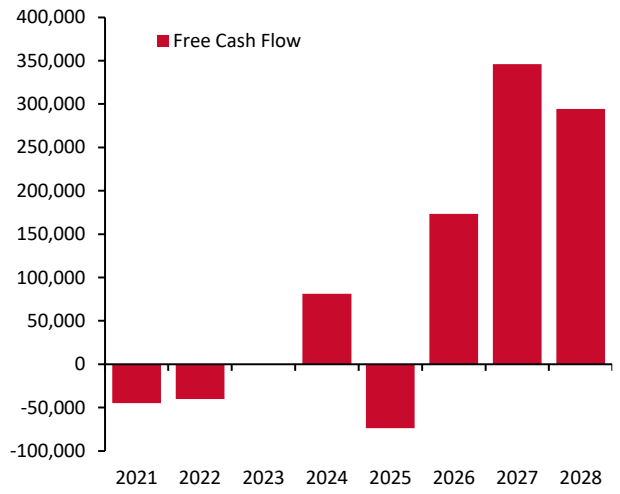
The stand out aspect of the FAR investment case is the economic projection for Balasausqandiq project which is characterised by low operating costs and low upfront capital, resulting in strong operating margins and significant free cash flow generation. The result is an NPV11 of US$1,433m and a payback period of just 1.5 years. FAR anticipates three phases of production; a near term ramp up to 1,500tpa at the secondary processing facility, Phase 1 Balasausqandiq production of 5.6ktpa and Phase 2 production of 22.4kpta with steady state group production of 23.9ktpa. There is also the potential for significant additional value arising from by-product uranium, molybdenum, carbon, potassium, alumina,

carbon silica flux and rare earth concentrates. Although these significantly strengthen FAR's outlook we stress that FAR remains cost competitive in absolute terms regardless of by-product values achieved. Indeed, although they are potentially high value they are not essential to the economics; the standalone NPV excluding by-products is US$665m.

Revenue Forecasts, US$'000



Balasausqandiq Net Cashflow Outlook, US$'000



SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

Extremely high NPVs in the published DFS are not uncommon in the vanadium subsector of the mining industry, however, what makes FAR stand out is the ratio of NPV to upfront capital of 6.2x using the CPR price deck for comparison and combined Phase 1 and 2 capex. Undeveloped peer projects range from 0.8-1.5x (using higher base case prices and lower discount rates in most cases). Moreover, the NPV of its peers tends to be extremely sensitive to vanadium price assumptions, with most turning negative at prices not far below today's. FAR's low cost base makes its valuation far less dependent on sustained high vanadium prices. This highlights that FAR does not have a project scaled to suit the required capex but a project scaled to suit the marketplace and an exceptional business model which is capable of delivering supernormal profits.

The recent decline in vanadium pricing has weakened FAR's recent earnings performance and working capital position, preventing the completion of the secondary processing plant expansion from internally generated funds. The need for external financing in a declining price environment has been challenging, however, now with a valuation of US$38.9m and a requirement which we estimate at around US$5m to complete the BFS and secondary processing upgrade (and less if the BFS is prioritised alone) we believe that FAR presents a highly attractive opportunity to investors.

Highlights for FAR Earnings Potential Per Annum, US$'000

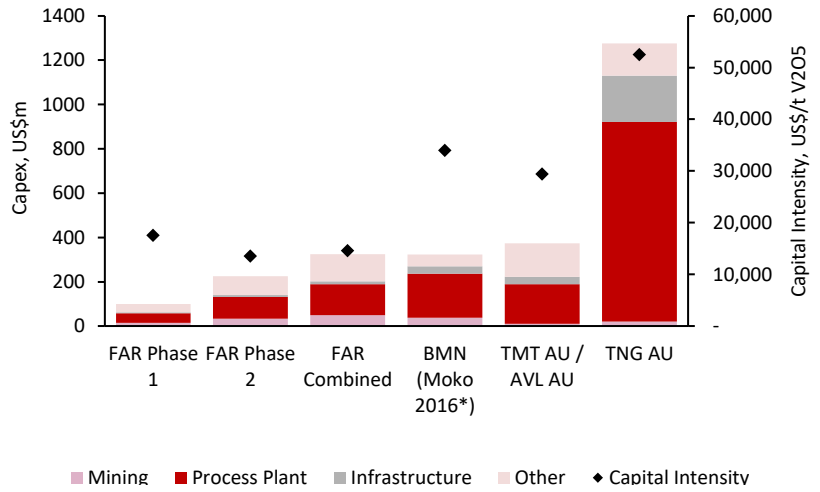
V2O5 Price, US$/lb	Metric	Processing Operations (1.5ktpa)	Phase 1 (5.6ktpa)	Phase 2 (22.4ktpa)	FAR Group (23.9ktpa)	FAR Group No -By Products
6.75 (Base Case)	Revenue	22,322	125,642	502,570	524,891	356,035
	EBITDA	9,238	93,339	373,357	382,595	219,649
	Free Cash Flow	6,598	71,467	319,424	354,303	204,863
	Unit Cost, US$/lb	5.12	2.26	2.26	(0.85)*	2.29
7.5 (CPR Price)	Revenue	24,802	134,912	539,649	564,451	395,594
	EBITDA	10,558	102,062	408,249	418,806	259,527
	Free Cash Flow	7,653	80,388	355,711	387,680	223,779
18.9 (2018 Actual)	Revenue	59,525	275,875	1,103,501	1,118,283	997,425
	EBITDA	29,030	234,708	938,833	925,761	815,029
	Free Cash Flow	22,431	215,292	906,782	854,965	807,609

SOURCE: *Company data, FAR CPR 2018, VSA Capital Research . *Inclusive of By-product credits*

FAR has already completed a feasibility study on a local Kazakhstan basis and the company's strategy is now to return the existing operation to profitability and upgrade the study to Western bankable standards; both of which can be achieved by around year end 2020F. Finance for Phase 1 of Balasausqandiq is expected to come from project finance, supplemented as necessary by royalty sales and streaming, potentially removing the need to raise funding via equity. Once phase 1 is in operation FAR then plans to fund Phase 2 from internal cash flow. Indeed, at US$70mpa in Phase 1, free cash flow generation is sufficiently strong that phase 2 of US$225m, which takes group production from 6.9ktpa to 23.9ktpa, could be funded internally despite our 10% more conservative price deck for vanadium compared to the company's CPR. Phase 2 is not, however critical to delivering shareholder value given the current valuation and will be progressed assuming supportive market conditions. It is our base case that Phase 2 will be progressed in line with the company's plans although our analysis suggests that Phase 1 alone has an NPV of US$700m. We highlight that significant value can be unlocked at each stage of development with individual valuations of the secondary processing, Phase 1 and Phase 2 of Balasausqandiq at US$48m, US$700m and US$1,433m respectively.

Periodic sharp price rallies as recently experienced in the vanadium price are a feature of the vanadium market but their timing is hard to predict. Given FAR's low cost base, the potential for extraordinary returns during the periodic upturns is significant. Based on the 2018 average price we would anticipate the FAR group at Phase 2 capacity to generate EBITDA of US$939m in such a scenario, with FCF of US$907m. However, to highlight that the returns are not contingent on Phase 2 being delivered, we would anticipate that Phase 1 as a standalone project would generate US$235m under the same scenario.

Vanadium Peer Group Pre-production Capital and Capital Intensity, US$m



SOURCE: *Company data, FAR CPR 2018, VSA Capital Research . *2016 study Inflation adj. FAR Phase 2 is a pro-rata assumption*

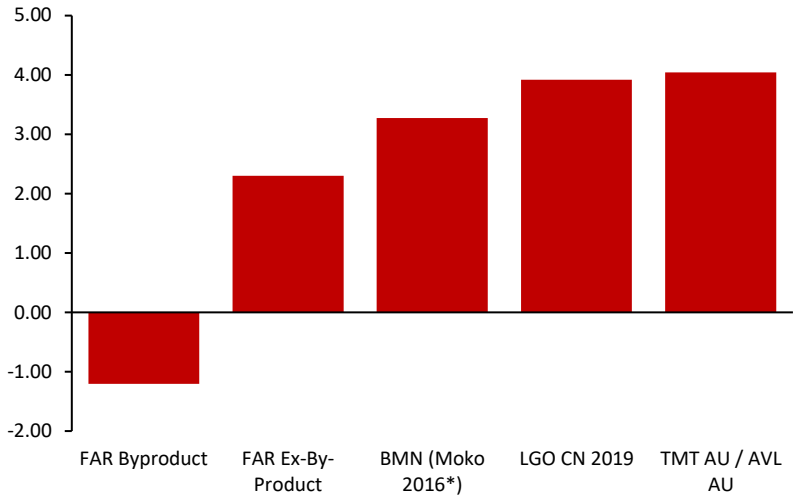
One of the strongest aspects of FAR's investment case is the low upfront capital of US$100m and in combination with the high operating margins this means that the capex for the combined project is paid back in just 1.54 years, while under a Phase 1 only scenario that lower capital is repaid in 1.15 years. Although these metrics are impressive in their own right, FAR also stands out against its peer group with Phase 1 capital intensity under US$17,000 per annual tonne of V2O5 production, unlike the peer group which are up to 2.9x higher while both TNG and TMT opting to undertake BOOT (Build Own Operate Transfer) financing for certain portions of pre-production capital which although currently captured as opex could arguably be considered upfront capital, further highlighting the attractive nature of FAR's project. We do advise caution in directly comparing vanadium projects due to the differing end products which include ferrovanadium, vanadium pentoxide, ammonium metavanadate etc, however, the peer projects above all are designed to produce V2O5. The major difference is that Balasausqandiq is not a titano-vanadiferous (TVM) deposit, like all the above peers, where the concentrating equipment and high temperature kilns add to capex and opex.

FAR Unit Costs of Production, LoM Average, V2O5 US$/lb

	Process Plant	Phase 1	Phase 2	FAR Group
Excluding By-product	3.83	2.39	2.30	2.70
Co - product	3.83	1.59	1.50	1.92
By-Product	3.83	(1.0)	(1.2)	(0.75)

SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

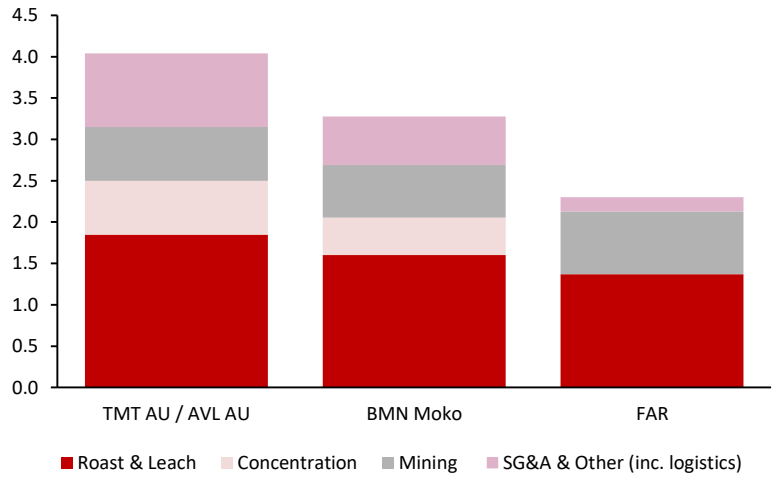
Selected Vanadium Production Costs; Current and Forecast, US$/lb V2O5



SOURCE: *Company data, VSA Capital Research.*

By-products produced by TVM processors are generally iron-ore concentrate and titanium. FAR's by-products are completely different and are recovered from the same process plant at almost no extra cost. Moreover, they are high value products with provable value. However, an extremely conservative approach of excluding all by-products highlights that FAR will still be the lowest cost producer, and on our current price deck there remains an operating margin of 66% for the full Balasausqandiq project. The cash cost of production of vanadium can be calculated in several ways where by-products are produced. If costs are apportioned pro rata over all the products, the cost attributable to vanadium amount to US$1.50/lb, less than half of the costs forecast for Bushveld's Mokopane or for Largo's Maracas operation. If by-product revenues are deducted from costs then the cost remaining to be attributed to vanadium is negative. If by-product revenues are ignored, the forecast figure for FAR is US$2.3/lb which is still 30% lower than **Bushveld Minerals (BMN LN)**'s PFS result for Mokopane. We also note that **Largo Resources (LGO CN)** in 2019 achieved cash operating costs excluding royalties of US$3.92/lb in 2019 which was down 13% YoY and is guided to US$3.45-3.65/lb in 2020. Furthermore, peers treating TVM ores can have high capital sustaining costs; LGO's guidance for 2020 adds a further US$0.83/lb while FAR sustaining capital is expected to be US$0.36/lb at phase 1 and US$0.27/lb at phase 2.

Unit Costs Breakdown Based on Peer Engineering Reports, US$/lb



SOURCE: *Company data, VSA Capital Research..*

The previous chart highlights where FAR makes its cost savings. The need to preconcentrate and roast provides the major differentiating factor in terms of operating costs, as leaching costs are broadly comparable. Unfortunately, peers are reluctant to break these costs down any further consistently. Either including by-products or attributing costs pro-rata to vanadium and other by-products would accentuate this cost advantage.

Geology is Key

The fundamental difference between FAR's main project, Balasausqanqiq and its peer group is the geology. This directly informs the low upfront capital, lower cost processing cost and overall robust economic model and is the primary factor which leads to a world class vanadium resource and project, in our view. Although there are other Black Shale deposits in the world, they have few other similarities with Balasausqandiq and do not have the necessary characteristics in terms of grade, scale and ease of processing to support commercial mining.

FAR, JORC 2012 Resources

Orebody	Category	Tonnes, mnt	V2O5, %	V2O5, tonnes
OB1	Indicated Primary	21.4	0.67	143,380
OB1	Inferred Oxide	1.3	0.89	11,570
OB1	Inferred Primary	1.6	0.67	10,720
Total		**24.3**	**0.68**	**165,670**
Exploration Target, Ore Body 2-5		85.5	0.68	581,400

SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

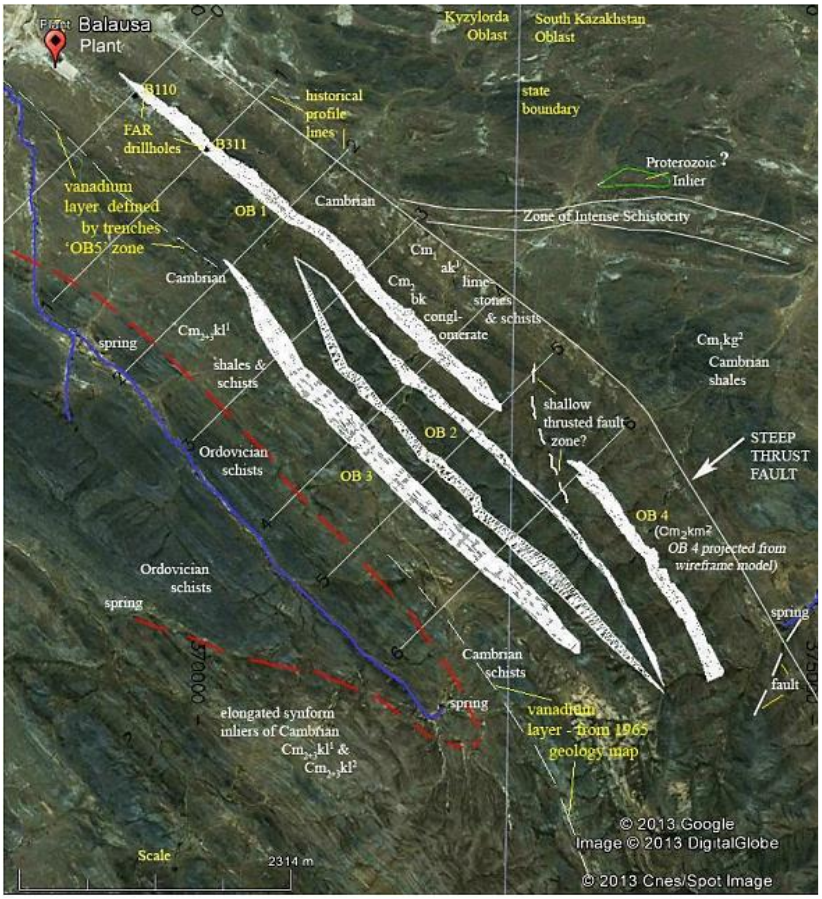
The primary resource combined with exploration target is huge with upside potential well beyond the scope of the current project parameters. The JORC 2012 Indicated and Inferred resource covers only a portion of the first of five ore bodies whose surface expression extends over 40km. Carbonaceous shales and shists are the primary host rock for vanadium mineralisation and extend from surface with a typical thickness of 4-14m. The JORC resource over Ore Body 1 is 24mnt while the combined exploration target across Ore Bodies 2-5 ranges from a further 77-104mnt. By way of confirmation, the resource determined to Kazakh, GKZ standards, indicates a total resource of 71mnt, notwithstanding that this was not to full depth.

At the current time exploration of the further ore bodies is a low priority as the first ore-body, including normal mining dilution already contains sufficient for 27 years of mining at the Phase 1 rate of 1mntpa. It does indicate that further phases of production capacity could be added should FAR be in a position to capitalise on vanadium market growth or by using its low cost position to leverage market share. Although most of the work has focused on the first ore body

where 1,945m have been drilled, mostly in 2010/11 under the current ownership, notable work has also been undertaken across Ore Bodies two and three where 932m and 387m have been respectively drilled. With this existing drill data exhibiting similar results to those of OB1 we are confident that the exploration target could be achieved although exploration upside is not a major part of our investment case.

Titano-Vanadiferous-Magnetite (TVM) deposits host 90% of vanadium reserves and the overwhelming majority of primary production (some 70% comes as a co-product from steelmaking and a little is recovered from oil refining). A small but varying amount is produced from other shale-type deposits but these are generally high cost and become significant only when prices are high. TVM deposits are found in each of the key areas around the world where current production and development opportunities are located; in South Africa (Bushveld Complex), China (Panzhihua), Russia (Kachkanar), Australia (multiple) and Canada (Quebec). Grades range between 0.2-1.5% V2O5 although for TVM deposits it is important to compare resulting concentrate grades and overall metallurgical recovery, typically only around 75% for TVM ores, which play a large part in determining costs. Grades in black shales are generally lower in situ and FAR's is 0.67% V2O5 (or nearly 1% including by-products at vanadium equivalent) but metallurgical recovery is higher at over 90% and as we have seen, costs are far lower, so it is misleading to compare FAR with other TVM deposits on the basis of grade.

Map of Ore Bodies

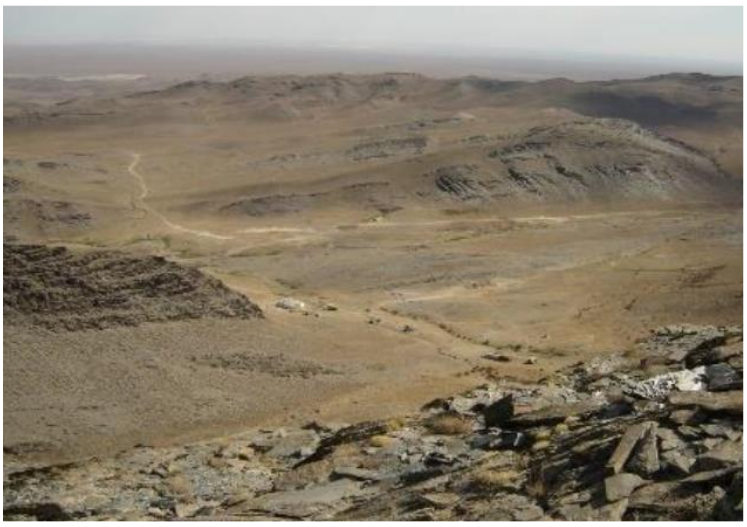


SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

There are a number of other shale deposits globally in the US, China, Scandinavia and Australia but it is important to understand that the components of shale deposits can be very different and there is little commonality in processing methods, costs and recoveries. There is some ostensible similarity of Chinese "stone coal" deposits but these generally have high acid costs due to the acid consuming components of the ore and operate as swing producers, only operating when prices are high. FAR is the first to derisk and demonstrate a successful commercial process on a large scale deposit; benefitting from an ore which has few acid consuming components. The result is low acid consumption and furthermore, Kazakhstan hash very low acid costs as a result of surplus sulphur generated from the desulphurisation of oil, as well as

significant smelter production. The resource has a grade of 0.67% V2O5 and the forecast head grade after mining dilution is 0.62% V2O5. The results from drilling demonstrate stable grades across the ore body apparently arising from stable conditions during formation. Such a consistent ore body significantly aids mine and process planning. Furthermore, the uniformity of grade is a major differentiator against other shale deposits globally which have been discovered but not advanced commercially; those in Utah and Colorado are not confined to single bedding planes or lenses and vanadium content is not consistent, so highly selective mining across small and more expensive pits would be necessary, raising the cost of mining despite pockets of extremely high vanadium content. We also note that drilling results demonstrate that grades of molybdenum are similarly consistent at Balasausqandiq.

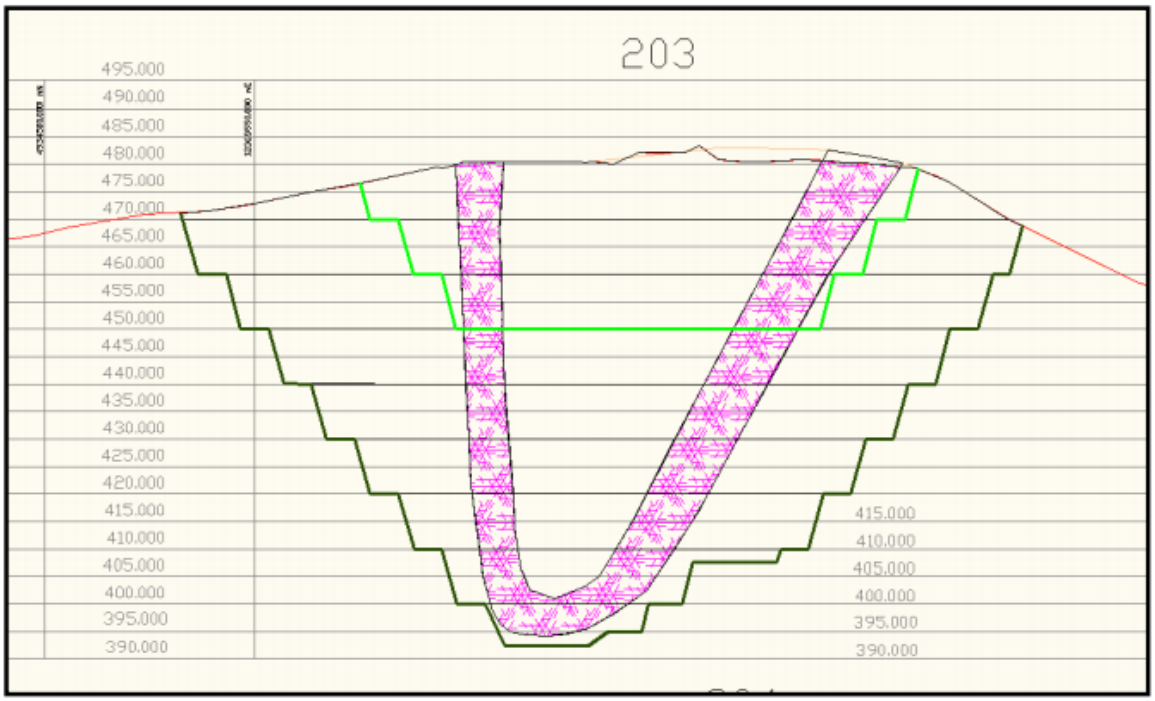
CPR Photo Highlights No Other Land Use and Topography



SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

The ore body is a bedding plane which has been folded over millions of years forming a syncline fold feature. This fold feature manifests as a series of ridges trending SE-NW interspersed with cross cutting valleys, varying in elevation of 400-700m. This formation lends itself to open pit mining throughout the life of mine using conventional drilling, blasting and excavation with an expected strip ratio of 4.2:1 which is low, in our view, on a global scale. Although mining cost represents only a modest portion of the overall operating costs, this is one of a number of factors which reduces the cost of overall production and combines to make FAR such a compelling opportunity, in our view.

Cross Section Highlights Pit Design and Folded Ore Body



SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

Strong Existing Infrastructure Reduces Capital Significantly

Infrastructure represents just US$4m of the capital cost of building the Balasausqandiq mine, which whilst perhaps surprising for a project in a remote location is a major positive for project economics and the low upfront capital cost. Sealed roads, high voltage electrical lines and railway in close proximity to or through the property requiring only modest extensions to suit the project's requirements. It is noteworthy that a large part of the cost of the currently ongoing expansion of the existing operation is for infrastructure that is necessary for the main project, including the connection to the adjacent high-voltage power-line, railway sidings and significant warehousing and accommodation.

Railway sidings will be constructed at a cost of US$0.5m in Shieli, the closest urban centre, around 70km away along sealed roads resurfaced by KazAtomprom in 2013. Reagents, raw materials and construction materials will be trucked to site from the sidings and product can be loaded at these sidings which is on the main East-West twinned rail and road link providing access to European, Russian and Chinese markets.

FAR has constructed a 22km power line to site connecting to the local supply lines which have capacity of 35kV although typically deliver well below this. This has been a constraint on production to date. FAR intends to connect to a separate 110kV power line which runs through the property in the coming months. This will be capable of supporting the secondary processing and main project albeit with some further upgrading such as transformers etc at the 1,500tpa level.

These costs for infrastructure compare to between US$30-120m for peer development projects in Australia. We stress yet again that FAR's capital costs are not simply lower due to an alternative processing technique but a combination of inherent characteristics which differentiate FAR against not only incumbent TVM and slag producers but other shale hosted vanadium deposits as well.

Derisked & Proven Processing

The existing operations are a scaled-up and adapted version of the original pilot plant used to test semi-commercial quantities of ore from Ore Body 1 which yielded overall recoveries of 93.3% and the production from which was sold commercially to a customer in China. Operation of this pilot plant enabled CAR to optimise the flowsheet and gain

considerable experience which will be crucial when the project is scaled up. The process uses conventional techniques although FAR has 13 patents for their use in processing black shales and FAR has developed an effective metallurgical flowsheet for low cost production of vanadium. With a pilot plant and current production, we believe that this should give investors significant comfort that scaling up should be achievable without significant risk.

There are three major differences between FAR's process and those of higher cost TVM producers. FAR uses a whole-ore autoclave acid-leach circuit where temperatures and pressure are modest compared with autoclave processes used in treating gold sulphides or nickel ores. The main advantage of using the autoclave leach is the reduction in the already low consumption of sulphuric acid. However, the major difference which impacts both capital and operating costs is the lack of pre concentration and roasting. FAR's treatment route is not available to TVM processers because their ore contains high levels of acid-consuming components. Typical treatment processes used for TVM ores involve pre-concentration where the mass is reduced by around 50%, followed by salt-roasting, typically at around 1,100 degrees, to put the vanadium in a soluble form. In the roasting process some re-agglomeration occurs and another grind is required. As a result of these multiple processing steps capital and operating costs are higher and only around 75% of the vanadium content is recovered. FAR's process saves on the need for pre-concentration, roasting and regrind and achieves over 90% recovery.

As mentioned, the lack of pre concentration after crushing and milling is the first notable difference. For example, with Bushveld's Mokopane project the estimated cost is $35m for their concentrator. In operating costs, we estimate that it might represent around $0.05/lb V2O5.

Much more significant for TVM producers is roasting in both capital and operating cost terms. The salt roasting plant in Bushveld Minerals (BMN LN) reworked Mokopane project has a capital cost of US$147.8m; greater than the entire capital cost of FAR's Balasausqandiq project. It also represents a significant portion of the projected unit costs from the original pre-production engineering studies equivalent to US$1.75/lb; while FAR has an overall unit cost of US$2.30/lb. This salt roasting phase requires temperatures in excess of 1,150˚C and it is important to note that the cost of raising temperature does not rise proportionately, hence the marked difference in costs. In other peer projects the infrastructure cost of bring such power to site is also high.

Run of mine ore will be crushed and milled from 350mm to 20mm using standard crushing techniques with output directed to a spiral classifier and sent to a thickener which does not use flocculants. Once settled the dense slurry is transferred to the decarbonising process which is carried out in three acid wash reactors. At the end of this phase acid consuming minerals within the slurry are reacted with sulphuric acid to prevent them consuming acid during the autoclave process. After decarbonisation the pulp is further thickened and filtered before proceeding to the autoclave leaching circuit.

The filtered cake is repulped before being pumped into the autoclave along with an acid mixture. Pressure in the autoclave is 0.8Mpa with a temperature of 125˚C and 150˚C. Although we have highlighted that we believe the process is relatively low risk, investors may be concerned by the mention of pressure oxidation. This combination of temperature and pressure is, however, significantly lower than that for refractory gold (230˚ and 35Mpa) and much lower still than in the treatment of laterite nickel ores. Due to the higher consumption of sulphuric acid under atmospheric conditions it was felt during the design phase that autoclave leaching would be more effective. After the autoclave the pulp is cooled and filtered; the solutions containing vanadium etc proceed to the next phase while the residue is the by-product carbon silica flux. This perhaps raises the cost marginally on like for like leaching terms.

Three adsorption circuits form the next stage of the process. Solution from the autoclave first passes through the uranium-molybdenum circuit with the exit solution entering the vanadium circuit and the exit solution from that entering the rare earth circuit. Each phase of adsorption is followed by separate process streams for desorption. In the vanadium phases hydrogen peroxide is added to change the vanadium oxidation state. Loaded resin with uranium and molybdenum is washed with ammonium nitrate and sulphuric acid and subsequently precipitated to form the vanadium equivalent of 'yellow cake'. The loaded vanadium resin is treated with ammonia nitrate to produce ammonium meta-vanadate which is then screened to fully separate the AMV from the resin. The AMV crystal slurry which is produced is then recrystallised to form V2O5 which is then recirculated until all the MVA is recovered before entering the thermal breakdown circuit (heating at 550˚ to drive off the ammonia) to produce the final vanadium oxide powder.

Process Flowsheet

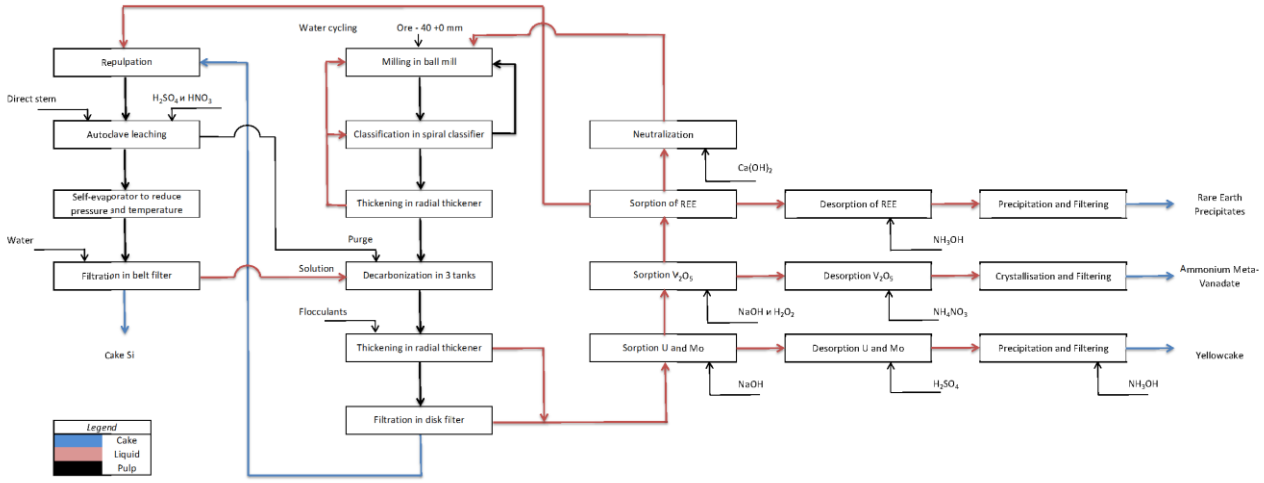


Figure 7-1: Process Block Diagram

SOURCE: *Company data, FAR CPR 2018, VSA Capital Research .*

Already in Production; Near Term Earnings Outlook Strengthening

Unlike its vanadium peers who have yet to build their flagship projects, FAR already has production through the expanded and adapted version of its pilot plant which as well as its improving financial performance also maintains and enhances the skillset of the operational team. To date the earnings performance has, however, been mixed owing to capacity constraints and unfavourable vanadium pricing movements.

FAR Earnings Highlights

	2018A	2019F	2020F	2021F	2022F	2023F
V205 Production	125	153	410	1,400	1,500	2,902
Unit Cost	5.96	12.38	5.14	4.89	3.87	4.32
Revenue	4,220	2,576	5,051	20,834	22,322	43,179
EBITDA	1,307	(3,146)	(610)	4,686	8,400	8,654
Net Income	2,963	(3,686)	(1,575)	3,721	7,366	8,685
P/E, x	10.6x	neg	neg	8.4x	4.3x	3.6x
EV/EBITDA, x	24.0x	neg	neg	6.7x	3.7x	3.6x
EPS	0.009	(0.012)	(0.005)	0.012	0.024	0.028
Capex	(886)	(2,500)	(5,000)	(46,000)	(41,000)	(11,000)
FCF	423	(4,836)	(6,074)	(38,852)	(31,795)	6,383

SOURCE: *Company Data, VSA Capital Research.*

Having generated a modest profit in 2018 we anticipate that 2019 performance will be significantly weaker. FAR purchases vanadium-containing raw materials from third parties based on the vanadium content and the price of vanadium on the day of purchase, and makes its margin by recovering and selling that vanadium content. There are two components to this price risk. First, since it can take several months to deliver and process these materials there is significant cost price exposure. In a rapidly weakening market the fall in the selling price compared with the price used to calculate the cost of the raw-materials can quickly erode or even eliminate the margin. Secondly FAR typically receives an upfront payment of 80% of the value of product shipped, but the final balancing payment is calculated following delivery and assays at the price prevailing close to the time of delivery which can be several months after shipment. This means that in a falling market the Company's margins are doubly squeezed, with product sales being made at prices that prevailed more than half a year after the raw-materials were purchased. Vanadium prices fell from a high at the end

November 2018 of nearly US$29/lb to a low at the end of 2019 of around US$5/lb, so that FAR will have bought its raw-materials at far higher prices than it sold at. Of course, in a rising price-market these effects are reversed, so in the long run they can be expected to even out. In 2020 we expect there to be a more stable pricing environment although there may still be some squeeze on margins on the raw materials bought earlier in 2019. We anticipate that at our long run price of US$6.75/lb this operation will generate US6.49mpa in cashflow.

Having proven the concept and optimised the flowsheet in the original pilot plant, FAR decided to alter and expand the plant to enable it to treat a wider variety of third party vanadium bearing products to produce ammonium metavanadate AMV. AMV trades at roughly a 15% discount to the prevailing vanadium pentoxide price. The major difference to the pilot plant was the addition of a pre roaster (800-900˚C) to enable a wider variety of third party materials to be treated. The capacity has recently been expanded to 480tpa while 2019 production was 153t, 22% higher than 2018.

In April 2018 FAR added a new pre roaster and additional equipment associated with a larger leaching and precipitation circuit to adapt the pilot plant to a commercial process. Vanadium bearing concentrates are a waste by-product from oil refining require roasting and since this a major potential source of third-party material, FAR opted to add the pyrometallurgical line. For treating low grade concentrates a hydromet leaching line is used closely aligned to the original pilot plant although certain residues are concentrated and reprocessed via the roasting line to improve overall recoveries.

Although this higher capacity now exists, it can only be fully utilised when the connection to the new power-line has been completed. Furthermore, Coivd-19 has caused some disruption, with some technical staff proficient in the acid line unable to reach site, forcing FAR to operate only one of its two process routes - the new pyro circuit.

2019 financial results have been affected by the effects on margins described above but these can be expected to improve in a more stable price environment, even if prices do not rise from today's level. We believe that the 2019 plant output of 153 tpa is insufficient to achieve a positive cash flow at current prices but even if a part of the new capacity of 480 tpa is brought into production we believe a surplus is achievable. To achieve the full expansion to 1,500 tonnes per year of V2O5 envisaged at the time of FAR's listing, we estimate that FAR would need an additional capital spend of around US$4.3m, much of it on items needed for the main Balasausquandiq project in any case. Included in this figure is the connection to the high voltage power line which runs through the license area and requires just 2km of connecting line and transformers etc to link it up. This has been in large part delayed by gaining licensing approval to connect and currently by the coronavirus restrictions on FAR's suppliers. The other main spending is on an electric arc furnace and associated ovens which will enable very low cost production of ferro-vanadium, and on railway sidings which will reduce the cost of renting and provide more flexibility. We note that not all these items are required to reach cash flow break even and expect that there are lower investment levels that can achieve profitability and allow for completion of the BFS. With commodity price headwinds in 2019, the weakened working capital position means that FAR is looking to finance the remaining cost externally and with this resolved we would expect rapid progress. Although the secondary processing operation is not as low cost as the main project, we do expect that at current pricing and steady state operation that it will be profitable without significant additional expenditure.

Once at 1.5ktpa and even at the 480tpa current capacity we expect FAR to secure more advantageous terms on its contracts due to a broader potential range of suppliers and consumers as well as the usual discounts for purchasing in bulk and at more regular intervals. Furthermore, the company is currently producing AMV which trades at a c15% discount to the vanadium price and once fully commissioned, FAR intends to produce V2O5 and consequently fully capture the value. Over the long run we expect the secondary processing plant to generate EBITDA margins of 40% with free cash flow of US$6-7mpa.

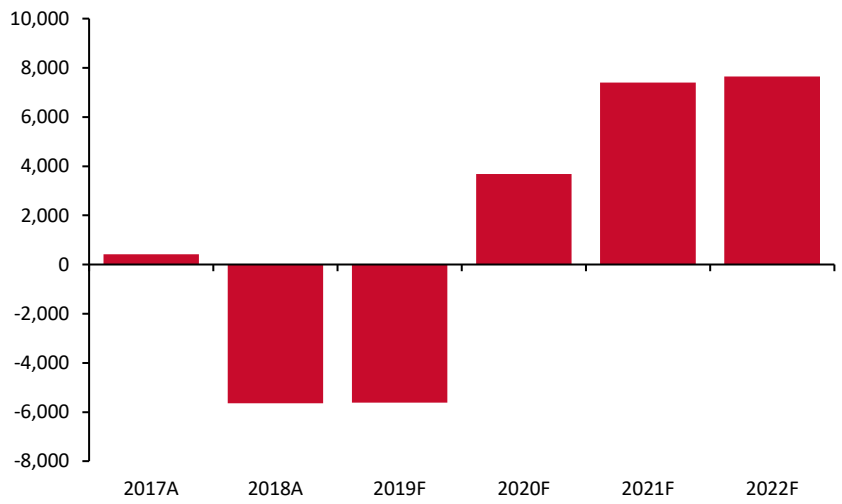
The quantitative benefits in terms of near term cashflow arising from the secondary processing plant are clear and at the expanded rate FAR will have a more robust business model. However, there are a number of other key advantages which will benefit the main project aside from reducing the initial financing needs. Leveraging up an existing business will likely reduce cost of lending for the main financing package given the substantially lower risk profile of an already producing asset. Furthermore, and this is possibly the most important point, the years of experience gained by the 150 strong team in terms of plant optimisation will be invaluable in the ramp process. In addition, FAR strengthened its team with hires from **Evraz (EVR LN)** who have direct production experience from their operation in Russia as well as Highveld

in South Africa. Many of FAR's peers do not have this experience which makes their ramp up phases relatively more risky.

A track record of production and an established network of customers achieved through secondary processing will likely also improve offtake terms for the main project due to product acceptance etc having already been largely achieved during the construction phase through secondary processing. The importance of product acceptance in niche metal markets is often underestimated by investors and is a significant derisking factor in the development of such projects and realising the benchmark assumptions modelled.

In terms of valuation, we value the secondary processing side of the business separately to the main project and our DCF generates a value of US$48m using a 10.6% WACC. This indicates that FAR is undervalued in relation to this side of the business alone. With the potential for near term cashflow FAR's business model is strongly and favourably differentiated against the peer group and indeed in the junior mining space.

Existing Operations, FCF Outlook, US$'000



SOURCE: *Company data, VSA Capital Research.*

Breaking the Financing Circle

Although we believe that the value proposition in FAR is clear, the headwinds from a sharply falling vanadium price in 2019, its impact on the earnings outlook and consequent erosion of working capital has delayed the expansion process. However, we believe that despite the volatility in early 2020, the importance of China's industrial demand to the vanadium market has meant that it has been one of the first industrially geared mining subsectors to show signs of recovery and normalisation. Indeed, the V2O5 benchmark price is up as much as 25% from February lows to US$6.65/lb, strengthening the near-term earnings outlook for FAR. We expect successfully closing the financing for the secondary processing operations will lead to a rerating.

Although there are many short term development scenarios that can be envisaged at many different investment levels. Our base case envisages an injection of US$5m in the coming months to enable the fast track scenario whereby the expanded secondary processing commissioning unlocks cashflow and sets in motion the remainder of FAR's development strategy. Finalising the Bankable Feasibility Study is expected to cost US$1.3m enabling the company to undertake final discussions relating to a construction finance package for Phase 1. We note that the current processing plant amounts to a very small proportion of the FAR's NPV so other scenarios involving much smaller cash injection can be envisages so long as the main purpose – completion of the BFS for Balasausqandiq is achieved.

We highlighted above the NPV to upfront capital ratio for FAR, however, another interesting viewpoint is to compare current market cap to up front financing requirements. Many of FAR's TVM peers have large project NPV's. This is often the case because the capital and operating costs of developing TVM deposits are high, requiring the maximum economies

of scale to reach hurdle rates of NPV. TVM deposits cannot be developed at small scale so they typically have very high capital costs and high NPVs, with 10,000 tpa being a usual first phase output, but they are then highly sensitive to vanadium price assumptions or project overruns and delays which can push the NPV into negative territory. Balasausqandiq is different, with low capital cost intensity and low production costs, it does not need to be built overly large in the first phase. Phase 1 is anticipated to cost just US$100m, with construction taking around 18 months to first production with a capacity of 5,600 tpa. In our view, this a highly achievable funding package for an independent junior mining company. We believe that given the strong operating margins, at conservative pricing levels, the company could support a relatively high level of gearing; our base case is 70%. Further expansions can be added incrementally, easily financed from operating earnings. FAR's Phase 2 envisages a step up to 23,900 tpa overall but after full exploration of ore-bodies 2 -5 we would expect there to be further phases.

We assume commercial lending rates in our model, however, we note that FAR has highlighted that it is eligible for Export Credit which potentially offers more favourable interest terms than bank finance. We note that London listed CIS peers currently pay between 4-13%pa interest for development capex. **Central Asia Metals (CAML LN)** recently struck a deal to reduce annual interest from LIBOR plus 4.75% to plus 4% following its strong track record of repayment. **Altyn (ALTN LN)** in late 2019 secured a funding package at 6%pa while **Chaarat Gold (CGH LN)** has a range of instruments which charge between 8-13% depending on the maturity. The latter operates in more challenging jurisdictions than Kazakhtan including the Kyrgyz Republic and Albania which likely attracts a risk premium.

The company is considering a variety of options for the remaining portion including royalty and streaming deals. There is precedent in the sector at **Largo Resources (LGO CN)** Maracas mine which secured a US$25m royalty agreement with **Anglo Pacific Group (APG LN)** in 2014 for a 2% NSR on all products. More recently, in October 2019, **Horizonte Minerals (HZM LN)** secured a US$25m royalty agreement for a 2% NSR on nickel products. This provides a fairly clear template of the possible structure of such a deal. This leaves a small portion of cUS$10m which could either be filled by equity markets or alternatively higher gearing, however, given the improving outlook for the secondary processing operations this may prove unnecessary. Our model reflects a 2% NSR associated with vanadium.

Phase 2 (US$225m) based on our estimates could be entirely funded out of internally generated cashflow, however, should pricing performance be weaker than our estimates, Phase 2, could either be delayed or funded via additional debt. Indeed, we have also run our model based on Phase 1 alone being completed which results in an NPV of US$700m highlighting that unlocking upside is not contingent on realising the second phase of the project. Other vanadium projects globally are typically designed at vast scale because they need the economies of scale to make returns to investors which highlights their financial risk and by demonstrating the value potential of Phase 1 alone we seek to highlight that this is not the case for FAR.

Valuation

Our NAV-based valuation approach is based on DCF analysis using a discount rate of 10.6%, P/NAV multiple of 1.0x for the processing operations and 0.5x for the development asset. We believe that breaking the financing circle is the major catalyst for unlocking the development roadmap and therefore the significant upside potential.

Our analysis suggests that US$5m is required to complete the plant and BFS according to the base case development programme outlined. There are of course other scenarios for spending to enable near term development progress indeed, we do not believe that FAR needs to complete the full extent of the originally planned expansion in order to benefit. FAR recently updated the market indicating that it is in discussions with multilateral institutions and other potential capital providers. Given the uncertainty as to how this financing might be achieved we have assumed the most conservative scenario, recognising FAR's recent updates which refer to less dilutive sources of near term financing, and our target price reflects an additional 45mn ordinary shares are issued in 2020.

Our target price for FAR is £1.71/sh.

FAR NAV Valuation

Division	Division NAV US$m	P/NAV	Fair Equity Value (US$m)	Fair Equity Value, £m
Balasausqandiq	1,433,580	0.5x	716,790	573,432
Existing Operations	48,012	1.0x	48,012	38,409
Total NAV	**1,481,592**		**764,802**	**611,841**
Consolidated Net Debt				706
Total Equity Value				**612,547**
No. of shares (m)				359m
Current Price (£/sh.)				**0.10**
Target price £/sh.				**1.71**

SOURCE: *Company data, VSA Capital Research. USDGBP 0.8x*

Peer Group Comparison

Despite the emergence in recent years of **Largo Resources (LGO CN)** and **Bushveld Resources (BMN LN)** as listed vanadium producers, there remain few options to gain genuine exposure to the vanadium price. The remainder of the peer group is made up of developers with valuations each around the US$50m mark each trading at a significant discount to the headline NPV of their projects. The major differentiating factor for how companies can unlock that NPV then becomes project financing and with amongst the lowest financing requirement and far stronger financial ratios we believe that FAR has a higher chance of success in realising the projected NPV. This belief is also underpinned by the quality and experienced management team and near term potential for cashflow generation.

Outside of the developers are the micro cap explorers, which include all FAR's direct geological peers looking to develop black shale deposits. However, the unique combination of a large, accessible ore body suitable for commercial mining along with a proven processing route has meant that FAR has been able to advance much more rapidly than other similar deposits.

Our valuation of the existing operations demonstrates that the main project is valued purely as an option highlighting the opportunity arising from the initial financing which we believe unlocks the main development programme. Given that an initial US$5m results in a rapid transformation of the earnings outlook and completion of the BFS we expect that to rapidly change, derisking the entire development programme. With an improving near term earnings outlook we see significant value potential in FAR from its existing operations and through the development of its main Balasausqandiq project. With a robust business model capable of withstanding periods of weak market pricing FAR will then be positioned to make extraordinary levels of profit during the next vanadium price spike.

Risks

- **Commodity Prices**. The company is primarily exposed to the vanadium market although unexpected changes to the vanadium prices and those of the other by-products are likely to affect our valuation.
- **Financing Risk.** Given the delays the company has faced in securing funding to date, this continues to be a risk going forward.
- **Construction Risk.** The potential for delays and operating issues are an inherent industry risk and there is the potential for delays during the construction of the project.
- **Execution Risk.** There are inherent risks in scaling up pilot plants and successfully replicating achieved metallurgical performance at commercial scale.

Listed vanadium exposure comparison, ex-China

Company	Refinitiv Ticker	Market Cap, US$m	Asset location	Deposit Type	Development Stage	Production/ Cash costs	Grade, %, M&I	In-Situ V2O5 M&I, kt	Grade, %, Inf'd	In-Situ V2O5 Inf'd, kt
Largo Resources	LGO.TO	418.0	Brazil	TVM	P	12ktpa at US$3.9/lb	1.20%	236.7	1.20%	19.8
Bushveld Minerals	BMNB.L	188.8	South Africa	TVM	P		0.36%	1,214	0.78%	361
Atlantic Vanadium Pty	Private	n/a	Australia	TVM	D (DFS)	7.75ktpa @ undisclosed	0.50%	236	0.47%	230
Vanadiumcorp Resources	VRB.V	8.3	Canada	TVM	E	n/a	.	.	.	.
Flinders Mines	FMS.AX	59.7	Australia	TVM	E	n/a	-	-	0.64%	506
TNG ltd	TNG.AX	43.8	Australia	TVM	D (DFS)	17.56ktpa at US$2.5/lb	0.29%	397	0.22%	62
Neometals	NMT.AX	60.1	Australia	TVM	D (DFS)	DFS due	0.46%	861	0.40%	372
King River Resources	KRR.AX	40.5	Australia	TVM	D (SS)	n/a	0.33%	325	0.29%	9,672
Technology Metals	TMT.AX	9.1	Australia	TVM	D (DFS)	12.7ktpa @ US$4.04/lb	0.92%	277	0.85%	864
Australian Vanadium	AVL.AX	18.3	Australia	TVM	D (DFS)	n/a	"	"	"	"
Vanadium Resources	VR8.AX	3.6	South Africa	TVM	E	n/a	0.78%	1,802	0.78%	2,964
Protean Energy	POW.AX	1.2	South Korea	Black Shale	E	n/a	n/a	11	n/a	213
Aura Energy	AEE.AX	5.5	Sweden	Black Shale	E	n/a	.	.	0.15%	3,570
Scandivanadium	SVD.AX	1.8	Sweden	Black Shale	E	n/a	.	.	.	.
Ferro Alloy Resources	**FARF.L**	**38.9**	**Kazkakhstan**	**Black Shale**	**P/D (BFS 2020)**	**23.9kt @ US$-0.8/lb**	**0.67%**	**143**	**0.78%**	**22**

SOURCE: *Company data, VSA Capital Research, Bloomberg.*

Financial Model Summary

VSA Commodity Price Forecasts

	FY 2018A	FY 2019A	FY 2020F	FY 2021F	FY 2022F	LT
V_2O_5, (US$/lb)	18.91	10.70	6.57	6.75	6.75	6.75
Molybdenum, (US$/t)	11.75	11.95	9.7	9.7	9.7	9.7
Uranium, (US$/t)	25	26	30	30	30	30
Carbon-silica, (US$/t)	n/a	n/a	35	35	35	35
AL2CO3, (US$/t)	n/a	n/a	408	408	408	408
Potassium (US$/t)	n/a	n/a	165	165	165	165

SOURCE: *Bloomberg, VSA Capital Research.*

Having fallen c75% from 2018 highs, the vanadium price is now trading at around US$6.3-6.65/lb and despite the added headwind of COVID-19 related volatility the price is up YTD. Long periods of stability interjected by significant and sharp spikes characterise the vanadium price offering significant upside potential to investors, however, they are in themselves difficult to forecast typically arising from shocks to market demand or supply.

It is important to note that our vanadium price deck is more conservative than that used in the company's base case CPR assumption which uses US$7.50/lb which is already lower than the long run price used by most of FAR's peers. V_2O_5 prices averaged US$6.2/lb during the trough between the GFC and 2017 when the rebar standards in China were adjusted to increase vanadium intensity. We conservatively base our long run price on the last trough although recognise that each period of stability is typically modestly higher than the last.

Given the niche nature of the relevant by-product markets we have forecast flat pricing as much of the realised price is likely to be related to offtake agreements as much as market dynamics. Indeed, market pricing data is not available for some of FAR's proposed products although that is not to say there is not a ready market for them.

Uranium production will be in the form of concentrate (yellow cake), containing molybdenum. Due to Kazakhstan's significant uranium and nuclear industry we expect the concentrate to be purchased by **Kazatomprom**. The company is the vertically integrated state nuclear power company and has first right of refusal on the purchase of all uranium products produced in Kazakhstan, it also has the suitable facilities to process and refine uranium concentrate.

The uranium spot price is up 35% in 2020 to US$34/t, and most uranium development projects use a price deck of US$40-50/t, highlighting that the market trades well below the current incentive price. We conservatively use US$30/t as a flat price deck for FAR which is closer to the spot price than US$42/t as used in the CPR. Molybdenum prices have, however staged a significant recovery from 2015 lows, although having risen c180%% to over US$12/lb where the price traded between 2017-2019 fell by around a third in late 2019. With the oil and gas industry a significant drivers for demand, as molybdenum is used in refineries to remove sulphur, a recovery in the steel market which accounts for 70% of demand is not in itself sufficient to drive a recovery rally towards recent highs, in our view.

The tailings from the vanadium plant contain a mixture carbon silica. The carbon in Balasausqandiq is chemically and physically the same as carbon black, which is a high value form of carbon mostly used as a filler for making rubber, especially for tyres. FAR can concentrate this material and a high-grade concentrate has been certified under the Kazkhstan GossStandarts as a carbon black product and high quality rubber has been made using this material. However, FAR has been seeking bulk markets for this material that are more easily and quickly developed and has proven that the mixed carbon-silica tailings can be briquetted and used as a feed in the making of ferro-silicon. The silica is of high purity, having had the impurities removed in the vanadium extraction process so the resulting ferro-silicon is of high quality, attracting premium prices. FAR has based its valuation of the carbon on this use, having commissioned a market study that calculated the value of the carbon and silica that it would replace, less transport costs and a further allowance to allow for market penetration to a range of regional smelters. FAR envisages selling all its carbon-silica in this way while it develops a market for the carbon black product. It is not tradeable on any exchange but the rubber market is worth US$12bnpa and there is therefore a ready market which justifies recognising the value of this product. FAR intends to produce a relatively low grade product in the range of 18-30% carbon which is reflected in the modest assumption of US$35/t over the LoM although we highlight that higher grade product sells for thousands of dollars per tonne.

This carbon valuation is potentially underpinned in future by the intriguing possibility of building an on-site ferro-silicon smelter which can be supplied with very low-cost gas either from the main pipeline just 30 km distant, or from a nearby gas-field. FAR has not included this in its base case as the study has so far only been carried out conceptually using analogous costs, but the very low cost of the main components, power, carbon and silica, indicate that FAR could become an extremely low cost producer.

Although rare earths present a potentially high value by-product, no value is currently ascribed to them in our model, in line with the CPR. This is the most opaque market given rare earth production quotas within China and the lack of processing capacity ex-China. It is therefore difficult to fairly demonstrate a reliable route to market and a fair market price.

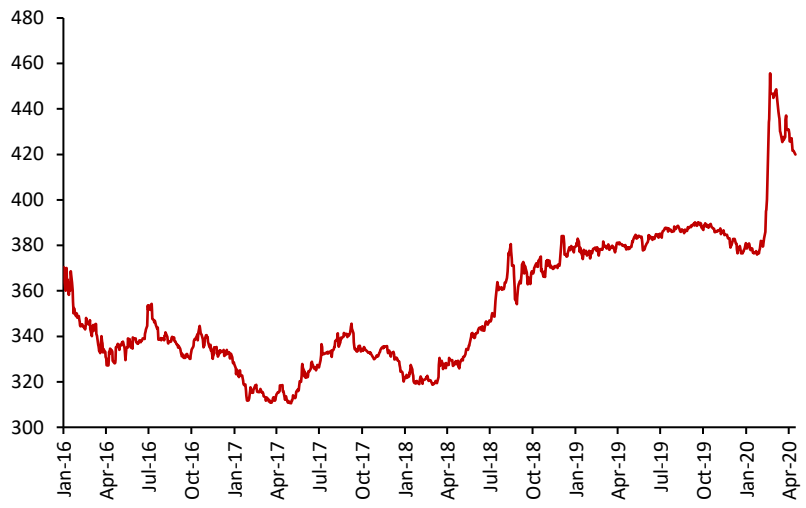
Key macro assumptions

	2018A	2019A	2020F	2021F	2022F	2023F	LT
USDKZT	345	383	435	400	380	380	380
CPI	6.03%	5.24%	8%	6%	5%	5%	5%

SOURCE: *IMF, VSA Capital Research.*

The collapse in oil pricing in Q1 2020 has had a significant impact on the USDKZT rate causing it to depreciate sharply now trading at 420 having been stable in a narrow approximate trading range of 375-380 in the early part of 2020. Oil and gas accounts for 35% of Kazakhstan's GDP and 75% of export revenue hence the significant correlation of the exchange rate with the oil price. Given the rapidly rising crude oil stocks and challenges that are associated with reducing supply in the oil market we expect the recovery in oil prices to be slow with a knock-on impact for our USDKZT outlook. This is likely to have an impact on local inflation which, using annual averages, has ranged between 5-15%; with the spike to the high end of the range caused by the currency devaluation and oil price shock. The currency was allowed to freely float for the first time in 2015 prompting this devaluation and knock on inflationary impact; given this significant event we believe that the inflationary impact following the latest devaluation is unlikely to be as significant as in 2015/16.

USDKZT Significant Depreciation



SOURCE: *Eikon, VSA Capital Research.*

Capital Costs

One of the strengths of the FAR investment case is the low capital cost of the Balasausqandiq project. Given the strong existing infrastructure in terms of access and power the spending is largely focused on development of the plant and equipment. We also note that some aspects are likely to change against the CPR estimate given that with secondary processing operations up and running the corporate overheads at a minimum should be covered internally.

Capital Cost Breakdown Phase 1

	US$m
Engineering Design Work	9.7
Additional Exploration	1.5
Buildings and Facilities	6.5
Mining Equipment	7.1
Additional Transport Equipment	2.6
Treatment Plant Equipment	37.3
Auxiliary Treatment Plant Equipment	5.9
Geological Exploration Equipment	1.0
Tailings impoundment and mining capital works	2.4
Other Infrastructure	3.9
Corporate Overheads	3.1
First Fill	2.4
Initial Spare Parts Inventory	1.6
Commissioning Support	1.4
Contingency and Allowance for Over run (18%)	13.7
Total	**100.1**

SOURCE: *Company data, CPR 2018, VSA Capital Research .*

The secondary processing plant was estimated pre-production to cost around US$10.3m and having raised US$6.9m at IPO, this was not sufficient to complete the expansion and there remains a portion of around US$4.3m in outstanding capital requirements. The other near-term spending will be US$1.5m on completion of the BFS. Phase 2 capital of US$225m has been calculated using standard industry scale up formulas.

Cost of Capital

Our calculation below results in a 10.6% WACC for FAR which we have applied to all operations. Kazakhstan is improving as a jurisdiction, however, warrants an equity risk premium, in our view. The debt equity ratio is applied in line with the company's proposed financing strategy and the 6% cost of interest is based on market rates achieved by peers operating in Kazakhstan as detailed earlier in the report.

FAR WACC Calculation

Target Debt to Asset Ratio	30%
Target Equity to Asset Ratio	70%
Risk Free Rate	2.0%
Base Premium for EM	8%
Beta	1.00
Country Specific Premium	2%
Liquidity Risk	1%
Corporate Governance	0%
Total Cost of Equity	13.0%
Cost of Debt	6%
Net Income Tax Rate	20%
Cost of Debt (Net of Tax)	4.9%
WACC	10.6%

SOURCE: *Company data, CPR 2018, VSA Capital Research .*

Production Overview

Productions schedules and ramp up are based on the CPR and company guidance although we highlight that it is our conservative base case which reflects a six-month delay to the company's own assumptions. Our time line assumes a full financing package is secured in early 2020 following completion of the BFS. The company then assumes 18 months build time to commissioning. Given the current global disruption we feel it is prudent to build in an additional cushion to reflect the risk that there could be additional disruption to this timetable although we are not specific as to when this delay may occur.

Production and Financial Highlights Balasausqandiq

	2021	2022	2023	2024	2025	2026	2027	2028	2026 Ph. 1 Only
Mined Ore, t			250,000	800,000	1,000,000	2,500,000	4,000,000	4,000,000	*1,000,000*
V2O5, grade, %			0.62%	0.62%	0.62%	0.62%	0.62%	0.62%	*0.62%*
Uranium grade, %			0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	*0.01%*
Molybdenum grade, %			0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	*0.03%*
V2O5, recovery, %			91.10%	91.10%	91.10%	91.10%	91.10%	91.10%	*91.10%*
Uranium recovery, %			95.60%	95.60%	95.60%	95.60%	95.60%	95.60%	*95.60%*
Molybdenum recovery, %			76.10%	76.10%	76.10%	76.10%	76.10%	76.10%	*76.10%*
V205, t			1,402	4,485	5,606	14,016	22,425	22,425	*5,606*
Molybdenum, t			20	65	81	202	323	323	*81*
Uranium, t			49	157	196	491	786	786	*196*
Carbon, t			184,500	590,400	738,000	1,845,000	2,952,000	2,952,000	*738,000*
Potass Alum, t			53	168	210	525	841	841	*210*
Revenue			20,857	100,514	125,642	314,106	502,570	502,570	*125,642*
EBITDA			5,745	67,884	86,755	225,278	373,357	373,357	*90,111*
FCF	(30,000)	(35,000)	(21,874)	78,609	(74,404)	167,007	345,978	294,329	*85,277*
Capex	(30,000)	(35,000)	(30,000)	(7,500)	(167,100)	(102,000)	(5,950)	(5,950)	*(5,950)*

SOURCE: *Company data, CPR 2018, VSA Capital Research .*

Tax and Royalties

Kazakhstan applies corporation tax of 20% on profits. FAR will benefit from a six year tax holiday commencing 2020.

Kazakhstan levies royalty style payments in the form of a Mineral Extraction Tax which was reformed in 2018. FAR intends to extract "non common minerals" which are taxed based on the physical volume of recovered minerals taking into account potential loss deductions; the value is based on the average market price during the tax year. These volumes are based on the "subsoil use" operation and chemical treatment after production such as FAR intends to carry out is excluded. This substantially reduces the MET against for example a copper or gold project which is charged at 5.7% of the copper value or 5% for gold produced regardless of the end product.

Given FAR's intention and preference for non dilutive financing we assume a 2% NSR on the LoM vanadium production.

There are no requirements for a government free carry or local ownership; that said Andrey Kuznetsov holds 22.4% of the shares and is a Kazakh citizen.

Licensing

The Balasausqandiq project was originally granted a license in 1998 although this has been revised on various occasions to reflect changes in the underlying legal framework in Kazakhstan and the company's development. The Mining license currently covers an area of 1.2km^2 although the site boundary where extraction of vanadium ores will be allowed covers 54km^2. It is valid until 2043 and can be extended further should it be required. It was updated in 2018 to allow a 1mpta

mining rate. We do not expect any issues at such a point where FAR looks to increase the scope of the license to 4mntpa or over a wider mining area.

FAR has already completed a locally required Environmental Impact Assessment known as an "OVOS" which largely mirrors what is required for this part of the BFS and EU standards. This will be reviewed as part of the BFS but the Company does not expect any significant differences.

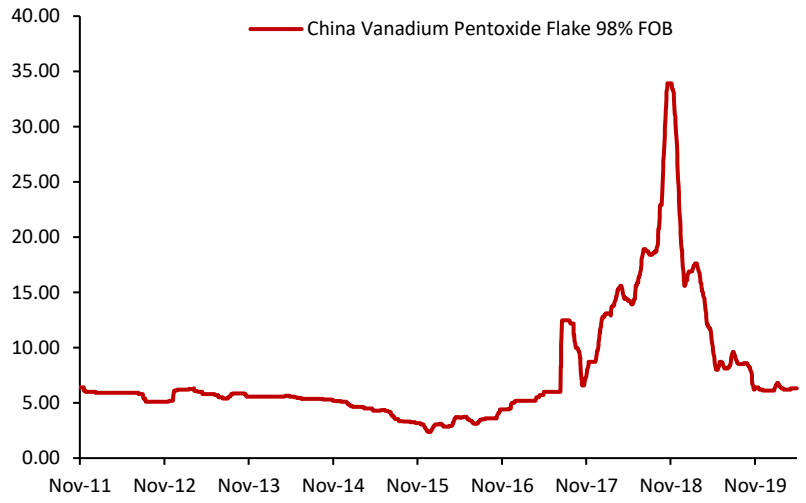
Vanadium Market

Vanadium's major use is as a steel additive, accounting for around 91% of current demand. Steel alloys containing just c0.1% vanadium can be up to two times stronger than non-alloyed steel and retain their strength at high temperatures making these alloys particularly suitable for drill bits, engine turbines etc. Although demand is therefore driven primarily by the steel industry, vanadium is typically produced as a by-product and supply does not respond elastically to changes in price. The result is that price performance is largely stable although punctuated by short periods of extreme volatility. The most recent spike, a five fold increase in pricing to above US$33/lb for V2O5 in China, commenced in early 2017 peaking in late 2018 and was driven by a step change in Chinese steel regulations requiring higher vanadium content to improve strength. This was more pronounced than the previous price two spikes 2005 and 2008. The former was again caused by a new rebar standard in China while the latter was caused by supply issues in South Africa due to power outages and issues with Eskom the state electricity provider. Having been above US$15/lb in 2008 prices fell sharply during the GFC and stabilised around US$6/lb with the exception of the broad commodity downturn in the middle of the last decade.

Although there are a number of vanadium-based products, the most important in terms of pricing benchmarks are ferrovanadium and vanadium pentoxide. The former is the product used to strengthen steel while the latter is a more refined chemical for use in high purity applications although ferrovanadium is produced from V2O5. Given the dominance of steel demand to the market these two benchmarks are highly correlated despite the differing end uses. Given FAR's intention to produce V2O5, this is our focus for this report.

Clearly the market has been disrupted by the coronavirus outbreak, however, given both supply and demand is so entwined with China the impact was in fact a higher price as rest of world demand held up in the earlier part of the outbreak when both Chinese supply and demand were on hold. China's factories and mills began to normalise in March with steel output down 3.4% YoY in the first two months of the year, while subsequently lock downs in the rest of the world have impacted vanadium production, allowing inventory drawdown, causing prices to rally into Q2 2020 which are now up 25% YTD in Europe and 3% in China. Given the potential for further disruption and ongoing uncertainty our price forecast in 2020 is broadly in line with the spot level.

Vanadium Price Performance



SOURCE: *Eikon, VSA Capital Research.*

Whilst rising steel intensity is likely to be the main driver for vanadium consumption over the short to medium term, the potential for major market disruption comes from the advent of vanadium redox flow batteries (VRFBs). Although currently accounting for 1% of demand there is significant potential for continued strong growth driven by the battery market given the global energy transition which is currently commencing. Vanadium redox batteries (VRB) are an alternative to the lithium-based battery technologies which have to date been preferred by major technology and EV

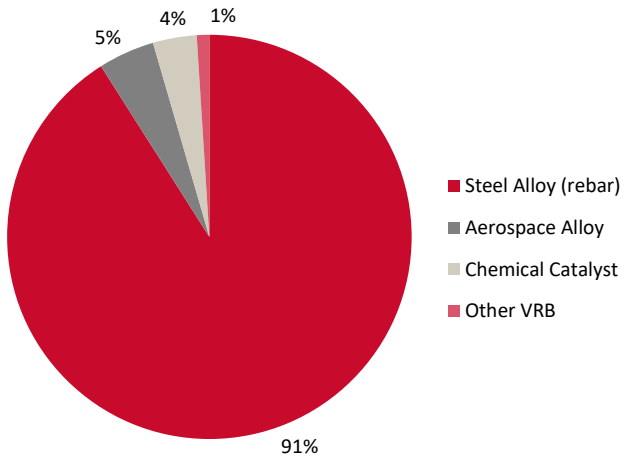
firms, and while we believe that VRB technology is unlikely to compete against devices and EVs there is significant potential for VRB technology in commercial storage, indeed, in combination with lithium ion batteries.

Demand Outlook

Vanadium demand in 2019 reached 102kt, up 2.7% YoY, driven primarily by growth in demand from the steel and chemical industries. China's steel production in 2019 was up 8% YoY to 996mnt and as vanadium prices continued to fall, mills reverted to using vanadium rather than substitutes such as ferroniobium which were cheaper during the price spike. Given the disruption in Q1 2020 to Chinese steel production the outlook for output is clearly weaker than 2019, however, the extent is unclear although consensus appear to be around a 5% reduction YoY all thing unchanged. That said, China's economic stimulus programme for reducing unemployment and restarting the economy is expected to include a higher than previously anticipated element of infrastructure spending.

China's economy has changed hugely over the last decade and this infrastructure programme is not simply going to be building new housing, roads and railways, the focus will be on upgrading infrastructure required higher quality raw materials. Indeed, the State Grid of China plans to spend CNY18bn (US$2.6bn) on new Ultra High Voltage Networks across the country while China Mobile is rolling out the development of 200,000 5G base stations this year. We expect the Chinese government to focus on fast tracking these types of project which would have a proportionally higher requirement for niche steel products, including those requiring a higher vanadium content. Therefore, the coronavirus response may be a catalyst for higher than current consensus steel related demand growth which ranges from 2.3% CAGR until 2030. However, what we do note is one avenue of demand growth that had been expected to be increasingly important in addition to steel is aviation. With the airline industry in turmoil and unlikely to be replacing or expanding fleets at anywhere the previously expected rate this higher infrastructure growth from China could simply offset this weaker aspect of the demand outlook.

Vanadium Demand by End Uses



SOURCE: Largo Resources, VSA Capital Research.

The second major structural driver is the growth of the battery market given the gathering momentum behind the energy transition. Currently batteries occupy 1-2% of annual demand, however, given that VRFBs have particular advantages for commercial and grid scale storage in that they don't degrade with repeated charge cycles unlike lithium-ion we do see the potential for significant market growth. Indeed, by 2030 batteries could occupy some 20% of annual demand, indeed, the UK is commencing the **Energy Superhub Oxford** a combined lithium-ion / VRFB smart energy system utilising 2.5MW of VRFB storage; successful execution could likely see a wider roll out given the project is being developed by a subsidiary of **EDF Renewables**. This highlights to us that this demand is real and not simply a blue sky aspect of the market outlook.

Given that periods between major price spikes tend to be stable our price deck is flat and we do not try to guess when the next major rally may occur, however, we note that each phase of stability tends to hold at a higher level than the last. This is why our US$6.75/lb is above the last period of stability which averaged around US$6/lb; as the market grows higher cost supply is increasingly relied upon to support a larger market.

Change to Chinese Rebar Standards

Two of the recent major vanadium price spikes have been driven by changes to Chinese steel manufacturing regulations. These step changes in regulation which require higher vanadium content in steel prompt a step change in demand growth and begin with mills in China building up their inventories of vanadium to ensure that they are producing in line with the new rules when they come into force.

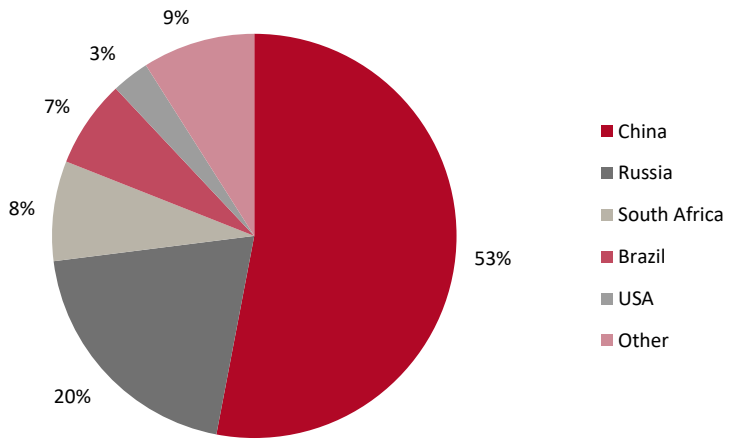
China is adapting its economy to focus on the manufacture of higher quality products through the "Made In China 2025". This has two aspects, capturing the value add of higher quality steel products but also the safety aspect associated with using higher strength steel in construction. The government has recognised that low strength steels present a major risk in an earthquake prone region, and we note the 2008 Sichuan earthquake, which killed c.68,000 people.

Despite the latest change which eliminated low strength Grade 2 rebar and sets out specifications for three different high strength standards of steel, Grade 3 (400MPa), Grade 4 (500MPa), and Grade 5 (600MPa), China lags behind Western economies standards of steel manufacturing, indicating the potential for further increases in the future. These standards will require differing levels of vanadium at 0.03%, 0.06%, and more than 0.1% respectively. In 2018 China's vanadium consumption was 0.048KgV/t of steel, 11% below the global average and with peak steel consumption now likely to be close, as the economy matures future demand drivers beyond base level GDP growth are likely to be in terms of rising vanadium usage intensity as quality becomes an ever greater focus.

Supply Outlook

The major reason for vanadium's historic price performance is that the vast majority of production comes as a by-product and supply is therefore highly inelastic to the price and primarily driven by market performance of the steel market. Indeed, this also explains the stability in price despite the cyclical nature of the steel market as weak steel market performance tends to lead to a reduction in the output of vanadium rich slags from the steel making process providing an automatic brake on supply.

Vanadium Supply is Concentrated



SOURCE: *Company data, VSA Capital estimates.*

In 2019, vanadium supply increased 5.5% YoY to 104kt marginally outstripping demand as China increased output given the rising availability of vanadium rich slags from the strong increase in steel output. Around 70% of supply is sourced

as co-product slag, the remainder is sourced from primary ore (18%) which is currently all TVM style production and secondary processed products (12%). Primary production has increased over the past five years as **Largo Resources (LGO CN)** and **Bushveld Minerals (BMN LN)** have ramped up output.

Although we have highlighted that Chinese steel output has been impacted by the coronavirus lockdown and therefore demand for vanadium, there has also been an impact on supply. 57% of production comes from China and is highly concentrated amongst two producers **Pagang** and **Chengde** which make up for over half of China's output. Operations were clearly shutdown here in the initial lockdown although RoW production continued allowing inventories to build. However, with China now reopening its economy and the RoW in lockdown, notably South Africa which accounts for just under 20% of production meaning that China has been able to immediately begin to normalise inventories; flattening the impact of coronavirus on the 2019 demand supply balance from an annual perspective.

The current cost curve is broken up into three major parts. Primary production at around or less than US$4/lb, steel slags which occupy the US$6-8/lb range and a high cost tail above US$12/lb accounting for the remaining 5-10%. During price spikes such as recently experienced, high cost supply from China's stone coal mines, which costs in excess of US$14/lb to produce is all of a sudden viable during these bursts of high pricing. However, this is a short term solution only available when prices rally sharply and clearly this is no longer viable given that prices are now between US$6-7/lb. Given the steady market growth anticipated from the steel market and the potential for more rapid growth associated with the battery market new sources of supply will be required. Furthermore, VRFBs are somewhat sensitive to vanadium prices so significantly and sustained higher pricing could in fact slow the growth of the battery side of the market.

Vanadium Redox Flow Batteries

Vanadium Redox Flow Batteries VRFBs were first demonstrated in the 1980's, at the time when lithium-ion was first gaining traction, however, they lacked the key property for portable electronics and EV applications - high capacity per kilo of weight. The technology was over-looked, and investment poured into lithium-ion development.

However, the investment climate is changing. The current centralised electricity generation system is aging and inefficient with energy lost in transmission from power stations to point of use. There is an urgent need to reduce fossil fuels for power generation to combat climate change. The move from conventional, continuous, centralised generation to more intermittent, distributed renewable energy, is a key challenge for electricity networks which were originally conceived decades ago but is gathering critical momentum.

There is a growing requirement to locate electricity generation closer to point of consumption, so called "Distributed Energy". With a rising proportion of electricity now being generated from intermittent renewable sources, such as solar and wind power, electricity markets are becoming more volatile. Energy storage technology is key to smoothing out the intermittency of renewables and provide investors with an opportunity to generate value from increased wholesale price volatility.

Whilst huge volumes of lithium-ion batteries have already been installed, the technology faces a number of challenges not faced by VRFBs:

Short lifetime / Degrades with each cycle; Lithium-ion batteries degrade with each charge/discharge cycle – this diminishes capacity, as we know from our smartphones. Lithium-ion battery use therefore needs to be controlled and the number of cycles limited to elongate their life and ensure they don't require frequent replacement. VRFB technology doesn't suffer from this issue

Unable to use 100% depth of discharge; For reasons outlined in the point above, if you use 100% - 0% on lithium-ion, it will degrade the battery quickly, requiring replacement. This therefore means that you cannot utilise the whole of the battery (I.e. 1MWh rated capacity doesn't necessarily mean you get 1MWh in/out) and can result in having to oversize the battery. Again, VRFB does not suffer from the same issues.

Expensive for long duration storage; Lithium-ion batteries can typically manage to around 4 hours of storage delivery at rated capacity. This limits their applicability in applications requiring >4 hours of storage including solar mini grids and off-grid (source: the company).

Safety; One of the most serious problems that can occur with a lithium-ion cell is thermal runaway. This happens when the battery is damaged in collision, from internal shorts or overcharging causing heat from a failing cell to propagate to a neighbouring one and potentially causing fire.

Energy and Power can be separated in a VRFB - this provides highly scalable storage

Within conventional batteries, the conversion and storage take place in closed cells. In a VRFB, however, the conversion and storage of energy are separated. Systems can be sized to specific power and energy needs, adding or subtracting stacks to change the power or changing the amount of electrolyte to modify the amount of energy storage. This makes the VRFB adaptable. The energy storage medium has comparatively low costs and so the energy output can be scaled by adding larger external tanks to increase the energy/power ratio, which results in effective economies of scale.

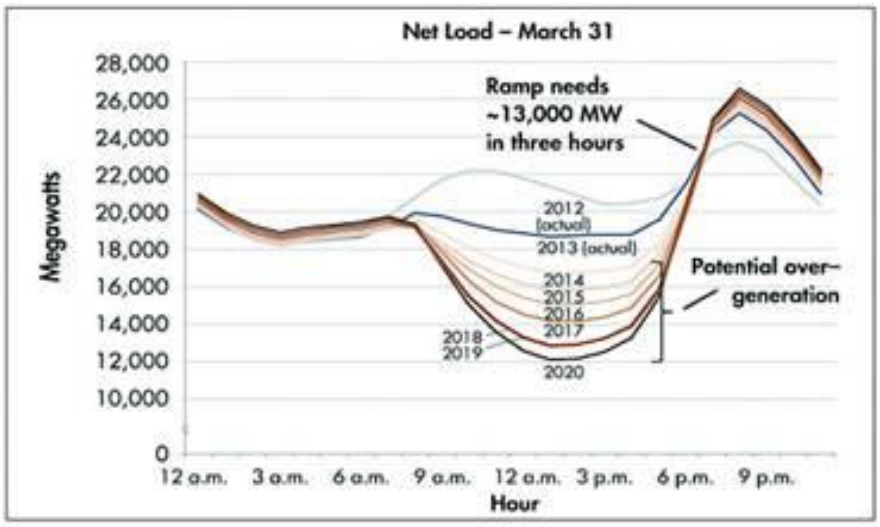
In a VRFB, the energy storage material is conveyed by the fluid in the tanks attached to the cell. This is like a fuel cell. The battery charging and discharging processes can take place in the same cell.

- VRFB 's has the distinguishing feature that energy and power can be scaled separately.
- The power determines the cell size or the number of cells.
- The energy is determined by the amount of the energy storage medium.

Shorter period storage generation from lithium-ion; Longer period storage generation for VRFB

In 2018, California had 744 operating solar plants with an installed capacity of 11,900MW (source: California Energy Commission). California's 24hr electricity generating cycle, when plotted graphically, produces the so-called "Duck Curve" graph (see diagram below) - it appears to be duck shaped. The x-axis represents one day. The y-axis is the net load which is equal to the normal load minus wind and solar generation.

The duck curves



SOURCE: *CAISO (California ISO), VSA Capital Research.*

The belly of the duck grows as wind and solar installed capacity increases. This means that during the day there is a risk of over generation given low net load on the system. In the evening, when people return home from work, solar is beginning to cease to generate and a ramp in capacity from other sources is required to meet demand. As overall solar capacity, in particular increases, the ramp in capacity required from other sources, such as battery storage, becomes steeper.

Typically, to allow for the duck curve ramp, utilities tend to specify battery storage contracts for delivery at rated power over a four-hour period. Lithium-ion batteries are the dominant technology in that they can provide shorter-term power.

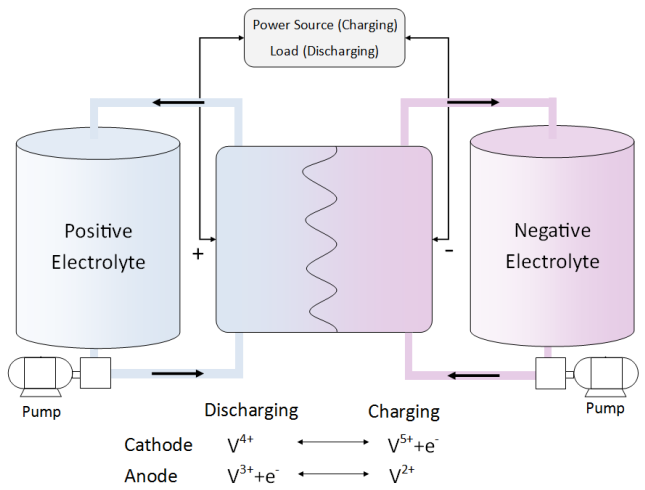
Longer period storage of up to eight hours is required for stability through the evening periods and this is currently mainly met by Pumped Hydro Storage.

This longer-period of up to eight hours of utility-scale storage is ideally suited to the generating characteristics of VRFBs and is seen as a specific market opportunity for the combined entity alongside four hour duration where lithium-ion sits – this given VRFBs ability, unlike lithium-ion, to cycle during the day over longer periods without causing wear of the battery.

How VFRBs Work

Vanadium can exist in four states oxidation (V2+ V3+ V4+ V5+), each of which holds a different electrical charge, and it is this property which has made VRB technology possible. The battery has two cells, the electrolyte in the negative half contains V3+ and V2+ ions, and the electrolyte in the positive half contains VO2+ and VO2+ ions. Vanadium electrolyte contains 145g of high-purity V2O5 per litre and it is estimated that 1MWh of VRB storage requires 5.5mtV. The cells are separated by an ion exchange membrane and a reversible reaction allows the electrical energy to be stored and returned. A redox reaction occurs changing the composition of the electrolyte and creating a surplus of electrons at the negative terminal relative to the positive terminal and when the battery is in use the electrons flow from the negative terminal to the positive terminal generating an electric current.

Vanadium Redox Battery



SOURCE: *Invinity Energy Systems, VSA Capital Research.*

Appendix 1: Board of Directors

Chief Executive Officer - Mr Nicholas Bridgen

Mr Bridgen is a Chartered Accountant who lives in Kazakhstan and speaks Russian. He spent 14 years with Rio Tinto group in various roles and has 26 years' board level experience with companies operating in the FSU including as CEO of Hambledon Mining.

Director of Operations - Mr Andrey Kuznetsov

Mr Kusnetsov is an engineer with a PhD in mathematical logic and a native Russian as well as fluent English speaker. Previously he lead the Scientific Department in Central Committee of Youth, Kontakt Research and Development and TOO Firma Balausa. He is the author of more than 10 vanadium treatment technology patents.

Non-Executive Director - Mr Christopher Thomas

Chairman of I&S BBDO, Japan and previously CEO for BBDO in the Americas as well as for Asia, Middle East and Africa.

Non-Executive Director – Mr James Turian

Mr Turian has a background in accounting and trust management and is a Chartered Fellow of the Securities Institute IAQ and a Fellow of the Institute of Directors. He is also Director of Accounts at For You Ltd.

Technical Director – Alexander Fofanov

Mr Fofanov is a chemical engineer with a PhD in vanadium extraction. He completed a tenure at the Central Research Metallurgical Institute, Moscow and has been MD at Tula Vanadium and Technical Director for Vanadium at the Evraz Group.

Operations Director – Oleg Shulepov

Mr Fofanov is a mechanical Engineer who has spent the majority of his career at Tula Vanadium and the Evraz group, most recently as Chief Manager of the Project Management Department.

Appendix 2: Financial Statements

Profit & Loss

	2017A	2018A	2019F	2020F	2021F
Revenue	1,132	4,220	2,576	5,051	20,834
Cost of sales	(1,084)	(1,688)	(4,627)	(5,616)	(16,071)
Gross Profit	**48**	**2,532**	**(2,051)**	**(565)**	**4,762**
Corporate and administration expenses	(908)	(1,271)	(1,545)	(1,010)	(1,042)
Impairment loss/reversal on exploration	(124)	1,775	-	-	-
Other income	52	10	-	-	-
Distribution expenses	(64)	(11)	-	-	-
Other expenses	-	(35)	-	-	-
EBIT	**(996)**	**3,000**	**(3,597)**	**(1,575)**	**3,721**
Finance costs	(84)	(36)	(89)	-	-
Net finance costs	(84)	(36)	(89)	-	-
Profit before taxation	(1,080)	2,964	(3,686)	(1,575)	3,721
Mining and income tax	-	(1)	-	-	-
Profit for the year	**(1,080)**	**2,963**	**(3,686)**	**(1,575)**	**3,721**

SOURCE: *Company Data, VSA Capital Research*

Balance Sheet

	2017A	2018A	2019F	2020F	2021F
Non-current assets					
Property, plant and equipment	79	2,203	4,253	8,287	53,321
Exploration and evaluation expenditure	-	59	59	59	59
Intangible Assets	2	25	25	25	25
Long-term VAT receivable	91	237	237	237	237
Prepayments	52	249	249	249	249
Total non-current assets	**224**	**2,773**	**4,312**	**8,346**	**53,380**
Current assets					
Inventories	596	929	1,059	969	3,995
Trade and other receivables	47	38	423	415	1,712
Prepayments	15	91	91	91	91
Cash and bank balances	267	892	883	737	56,961
Total current assets	**925**	**1,950**	**2,456**	**2,212**	**62,760**
Total assets	**1,149**	**4,723**	**6,767**	**10,558**	**116,141**
Equity and liabilities	-	-	-	-	-
Issued Capital	15	27,330	33,866	38,866	68,866
Share Premium	26,904	-	-	-	-
Additional paid-in capital	380	380	380	380	380
Exchange Reserve	(2,672)	(2,965)	(3,212)	(3,212)	(3,212)
Accumulated losses/Retained earnings	(24,238)	(21,275)	(24,961)	(26,536)	(22,815)
Total equity	**389**	**3,470**	**6,073**	**9,498**	**43,219**
Non-current liabilities					
Loans and borrowings	-	-	-	-	70,000
Provisions	152	60	60	60	60
Total non-current liabilities	**152**	**60**	**60**	**60**	**70,060**
Current liabilities					
Contract Liability	-	264	264	264	264
Trade and other payables	608	929	634	1,000	2,862
Total current liabilities	**608**	**1,193**	**634**	**1,000**	**2,862**
Total liabilities	**760**	**1,253**	**694**	**1,060**	**72,922**
Total equity and liabilities	**1,149**	**4,723**	**6,767**	**10,558**	**116,141**

SOURCE: *Company Data, VSA Capital Research*

Cash Flow Statement

	2017A	2018A	2019F	2020F	2021F
Cash Flows From Operating Activities					
Net income	(1,080)	2,963	(3,686)	(1,575)	3,721
Adjustments for:					
Depreciation	27	46	450	966	966
Impairment/(reversal of impairment) of PPE	119	(1,613)	-	-	-
Impairment/(reversal of impairment) of exploration assets	5	(162)	-	-	-
Impairment of VAT receivables	4	-	-	-	-
Write down of inventories to NRV and obsolescence	39	11	-	-	-
Expenses on credit loss provisions and impairment of prepayments	45	21	-	-	-
Change in working capital	(278)	(459)	(810)	464	(2,462)
Other	-	264	-	-	-
Interest received	-	-	-	-	-
Interest paid	84	36	-	-	-
Taxes paid	-	1	-	-	-
Net cash generated by operating activities	**(1,035)**	**1,108**	**(4,045)**	**(145)**	**2,224**
Cash flows from investing activities					
Payment for property, plant and equipment	(182)	(886)	(2,500)	(5,000)	(46,000)
Acquisition of intangible assets	(1)	(2)	-	-	-
Other	-	-	-	-	-
Net cash (used in)/generated by investing activities	**(183)**	**(888)**	**(2,500)**	**(5,000)**	**(46,000)**
Cash flows from financing activities					
Proceeds from borrowings	20	-	-	-	70,000
Repayment of borrowings	(368)	-	-	-	-
Proceeds from issue of share capital	1,889	417	6,880	5,000	30,000
Share issue costs	(142)	(6)	(344)	-	-
Dividends paid	-	-	-	-	-
Net cash used in financing activities	**1,399**	**411**	**6,536**	**5,000**	**100,000**
Net increase in cash and cash equivalents	**181**	**631**	**(9)**	**(145)**	**56,224**
Effects of exchange rate changes on the balance of cash held in foreign currencies	-	-	-	-	-
Cash and cash equivalents at the beginning of the year	72	267	892	883	737
Cash and cash equivalents at the end of the year	**267**	**892**	**883**	**737**	**56,961**

SOURCE: *Company Data, VSA Capital Research*

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Risks to that valuation

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