

01 April 2021

VR8 TO ACQUIRE INTEGRATED ESG PROCESSING TECHNOLOGY BY WAY OF AN EARN-IN JV, AND CAPITAL RAISING

HIGHLIGHTS

- ◆ Company to acquire up to a 74% interest in an ESG integrated extraction, processing, refining, and manufacturing technology developed by TCM Research Ltd (TCM), that innovatively utilises existing processing methodologies to produce battery grade Vanadium Pentoxide and high-end Vanadium products, including other products arising from the Steelpoortdrift Ore such as Iron, Titanium, Silicon and Aluminium, which are not currently extracted using conventional processing methods
- ◆ Technology IP will be transferred into a new joint venture company (of which VR8 can earn up to a 74% controlling interest), and the JV Co will licence the technology to VR8 who will hold exclusive rights as well as have the ability to licence the technology globally
- ◆ The processing technology diversity enables:
 - Diverse processing options to be considered, thereby possibly replacing existing processing methods and/or allowing concurrent processing and/or enabling further refinement of products produced by conventional methods
 - elevated levels of automation, recycling and commercial scalability
 - energy and waste water independence
 - production of green metals and hydrogen
- ◆ The processing technology is carbon-efficient and has hydrogen- and power-generating proficiencies that envisages:
 - zero CO₂ emissions by converting CO₂ into saleable mineral carbonate products
 - “in-process” re-utilisation of energy by harvesting excess energy during multiple exothermic stages
 - the provision of power generation through the production of hydrogen, which could also become a saleable product
 - methodologies aimed at reduction of overall emissions, including reductantless iron extraction, and moderate reductant processing of Vanadium, Titanium, Aluminium and Silicon products
 - a significant reduction in the emissions footprint for VR8’s existing salt roast process
 - zero waste water or effluent discharge
- ◆ Studies conducted will include investigation to treat waste from the Salt Roast process and remediate waste from other vanadium tailings storage facilities globally
- ◆ Existing studies for the PFS and DFS for the Steelpoortdrift Vanadium Project utilising the conventional salt roast method will continue unaffected
- ◆ Firm commitments received to raise A\$2,000,000, with funds to be utilised to pursue integrated ESG processing technology studies, immediate commencement of the Steelpoortdrift Vanadium Project DFS (at completion of PFS) and to provide working capital

Jurie Wessels, Chairman of VR8 commented that: *“This joint venture is the result of an 8 month investigation into the potential synergies that may follow from a joint venture with TCM. The placement provides working capital and enables the Company to pursue the joint venture, gaining access to the experienced team at TCM Research and the opportunity to acquire equity ownership in intellectual property and know-how, that utilises proven processing techniques. Through the earn-in, VR8 will have the opportunity to investigate the production of Vanadium products for the burgeoning renewable energy era and the possibilities of extracting additional returns from other resource credits resident in the Steelpoortdrift ore, which are usually rendered uneconomic and discarded by existing processing methodologies. An added benefit is that the processing technology utilises the inherent qualities of the ore at the Steelpoortdrift Vanadium Project that could make a plant energy and water independent, enhancing VR8’s ESG credentials. The current PFS and DFS studies for the conventional salt roast processing will continue unaffected by the studies undertaken over the TCM processing technology, due to the diversity of the technology process.”*

Eugene Nel, CEO of VR8 commented that: *“Considering the size of the Resource contained in the Steelpoortdrift deposit, the TCM technology will afford VR8 significant flexibility in its overall long-term mining and processing strategy. The technology can seamlessly be integrated into the existing execution strategy either as a standalone operation or as a supplementary process to the base case Salt Roast process to further enhance the robustness and profitability of the project.”*

Vanadium Resources Limited (ASX:VR8) (VR8 or the Company) is pleased to announce that it has received firm commitments to raise A\$2,000,000 and has entered into an agreement with TCM Research Ltd (“TCM”) to acquire up to a 74% interest via an earn-in, which could potentially result in the development of high-value downstream vanadium products and alloys and significantly reduce carbon emissions and other waste from VR8’s operations.

The placement will enable the Company to pursue the ESG integrated processing technology and provide working capital.

The Company’s current PFS, which commenced on 22 January 2021, towards the production of highpurity V₂O₅ utilising conventional salt roast technology from concentrate produced at the Steelpoortdrift Vanadium Project in South Africa, is on track to be completed in Q2 of 2021 and will continue unaffected. The joint venture agreement with TCM follows 8 months of negotiations and mutual due diligence and provides VR8 with the flexibility to potentially develop concurrent and supplementary processing avenues that could enhance VR8’s energy efficiencies and ESG footprint, as well as enable further refinement of products produced by the salt roast method. In addition, the joint venture is aimed at earning-in to a

processing technology to produce battery grade Vanadium Pentoxide and high-end Vanadium products, including other products arising from the Steelpoortdrift Ore such as Iron, Titanium, Silicon and Aluminium, which are not currently extracted using conventional processing methods.

Description of TCM Integrated Technology

The technology process commences with the supply of feed material in either the form of run-of-mine ore from the Steelpoortdrift Vanadium Project, or concentrate from the magnetic separator plant at Steelpoortdrift, or intermediate products or tailings from the salt roast process being put through a pelletisation sequence to eliminate dust in downstream processes, followed by a drying procedure to remove and recover water.

The **first stage** (Refer diagram 1) of extraction begins with a selective stage of rapid extraction of Iron, without the use of a carbon reductant. This substantially reduces mass of material for further processing by removing the FeO, which could make up between 70% – 80% of the feedstock. It also increases the grade of Vanadium and other credits in the residue for the next stage. During the first stage, oxygen is produced and excess energy is generated by harnessing the exothermic characteristics of the ore. This energy and oxygen are applied immediately or stored for later use in downstream segments of the process. This stage of the processing strategy does not create any carbon emissions and significantly enhances the reactivity of the remaining constituents (V, Al, Si, Ti). A “hot” transfer of the first stage residue occurs to the second stage of extraction whereat Vanadium, Titanium, Aluminium and Silicon are extracted.

In the **second stage** (Refer diagram 1) of extraction, separation and purification is achieved by a range of techniques, including fractional distillation, which is similar to processes applied in the petrochemicals industry and chemical vapour transport. Each metal is separated into a useful precursor, which is saleable in itself, or further processed into Oxides, Metals, Alloys or Chemicals. The production of an individual metal precursor enables the production of a diverse range of high purity end products.

During the two stages, any Carbon Monoxide (**CO**) is converted to Carbon Dioxide (**CO₂**) for carbon abatement, either by mineral carbonation or purification for industrial Carbon Dioxide applications. Any remaining CO₂ emissions are converted to Sodium Bicarbonate, a saleable product. Sodium Carbonate (**Na₂CO₃**) which is a reagent used in the Vanadium Salt Roast Process and therefore readily available on-site, can be used. Elevated levels of automation resulting from gas interaction in a sealed and controlled environment would limit human intervention. It is expected that processing methodologies assisted by modularised design would facilitate commercial scalability, thereby providing VR8 with financing flexibility.

Many of the process steps are exothermic (releasing contained energy in the form of heat). This heat energy can be harnessed for beneficial use in other process steps, like drying and distillation, or used for

on-site power generation. Stirling Engines and Organic Rankine Cycle Turbine Engines are being evaluated for this purpose.

The Process is essentially and overall a 'Dry' Process. There is no requirement for process water in any of the unit operations. This offers substantial operational advantage in eliminating the infrastructure requirements, costs and complexity of wastewater and effluent monitoring and treatment integral to hydrometallurgical operations.

The JV Co will conduct a pre-feasibility and feasibility study to produce a range of Vanadium products, namely:

- High Purity Vanadium Battery electrolyte precursor materials for both sulphate and chloride chemistries, with the potential for own electrolyte production
- Vanadium Oxides – Vanadium Pentoxide (V_2O_5) which is the predominant industrial product of Vanadium, Vanadium Trioxide (V_2O_3) and Vanadium Dioxide (VO_2)
- Vanadium Chlorides – Vanadium Tetrachloride (VCl_4) used as a catalyst in rubber production and Vanadium Oxychloride ($VOCl_3$)
- Vanadium-Titanium Chloride mixtures in customizable ratios for catalyst applications

The JV Co will also conduct studies to produce other products from the elemental credits resident in Steelpoortdrift ore, namely:

- Oxides – Iron Oxide (Fe_2O_3) and Titanium Dioxide (TiO_2) pigments, High Purity Alumina (Al_2O_3)
- Chlorides – Ferric Chloride ($FeCl_3$) for sewerage and waste water treatment, Titanium Chloride ($TiCl_4$) and Aluminium Chloride ($AlCl_3$)
- Metals, Alloys and Hydrogen: For the production of metals and alloys, Hydrogen is required. On-site hydrogen generation utilizing recovered processing energy, which will be supplemented from solar energy solutions are planned to be integrated into the overall process or be stored for later usage or sale

Terms of the Agreement

The Company and TCM have entered into an earn-in and joint venture agreement under which a new company (**JV Co**) will be incorporated in Ireland, to develop an energy and carbon efficient processing technology for the treatment of Vanadium bearing feed materials (specifically Vanadiferous Magnetite) and to investigate the feasibility of manufacturing Iron and Titanium bulk commodities and a range of other high value Vanadium products.

At commencement of the agreement, TCM will assign and transfer to the JV Co all of its intellectual property, copyright, know-how, source code, patents, software and other proprietary rights associated with or connected to the processing strategy. Upon the earlier of completion of a PFS utilising the processing technology in relation to VR8's Steelpoortdrift ore, or VR8 having spent A\$650,000, VR8 will

earn 50% in the JV Co. Further expenditure in concluding the PFS will be shared by VR8 carrying 75% of expenses and TCM 25%. Upon the earlier of completion of a DFS utilising the processing technology or VR8 having spent A\$1,850,000, VR8's interest in JV Co will increase to 74%. Additional expenditure in concluding the DFS will be shared by VR8 carrying 74% of expenses and TCM 26%.

The final equity proportions of VR8 and TCM in JV Co will remain as is described above, unless the yearly net profit margin arising from a sale of products produced at a plant constructed by VR8 exceeds 50% during any one of the first five financial years of JV Co, immediately after the VR8 Plant having reached optimal capacity production, in which event TCM will claw back 9% of JV Co to own 35%.

Following the completion of the DFS, VR8 will hold exclusive rights to utilise the processing technology to the exclusion of any other party at a royalty calculated over a sliding scale of net profit margin, maxing at 15% of the net profit margin when a profit margin of 100% or more is reached for any financial year, and bottoming out at 5% of an agreed net profit margin when a profit margin of more than 2.5% (but not less) is reached over any specific financial year. After completion of the DFS, VR8 will have two and a half years to secure funding to complete construction of a plant. Unless VR8 secures funding within two and a half years, or enters into a commercial arrangement under which the processing technology that belongs to JV Co being commercialised under license at similar royalty terms than what is applicable to VR8, then VR8's interest in the JV Co will automatically dilute to 50%. With VR8's approval, JV Co may license the technology for global application.

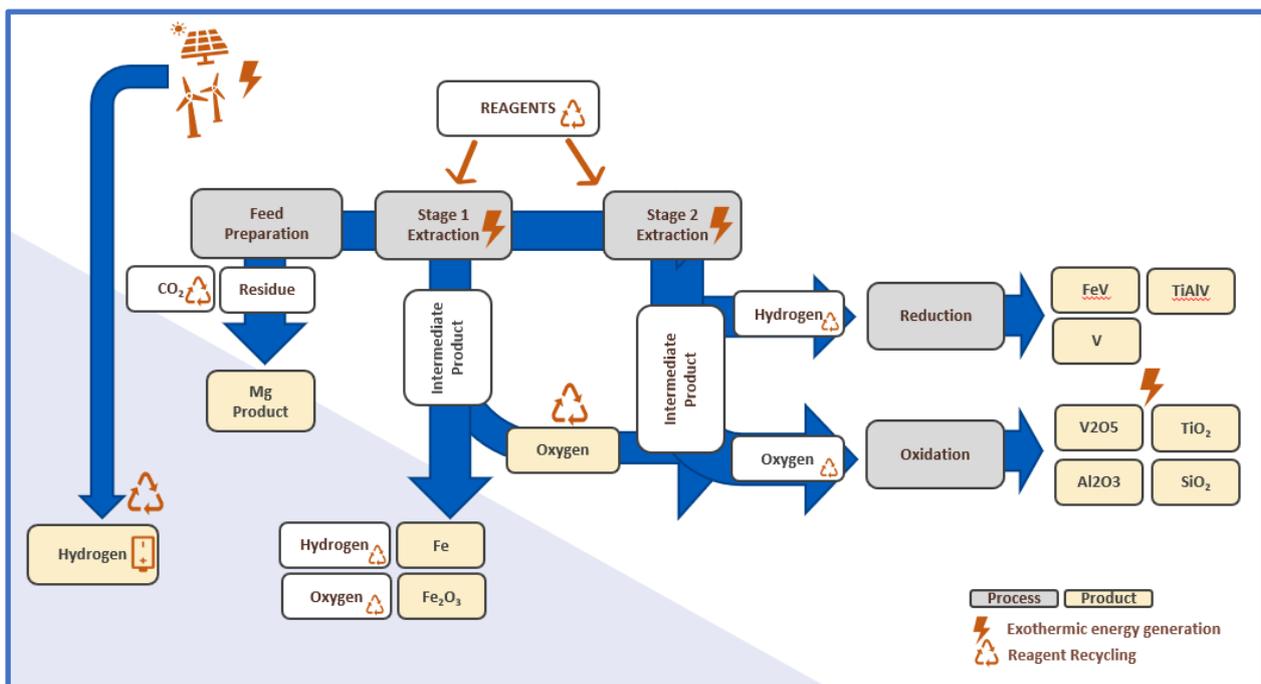


Diagram 1: Simplified Illustration of TCM Processing Technology

Placement and update on undrawn convertible note

VR8 has received firm commitments to raise A\$2 million under a placement for the issue of 41,666,667 shares at an issue price of \$0.048 per share (“Placement”). The purpose of the Placement is to raise funds to pursue the acquisition of the integrated ESG processing technology studies, immediate commencement of the Steelpoortdrift Vanadium Project DFS (at completion of PFS) and to provide working capital.

The \$0.048 placement price is equal to the last share price the Company traded at prior to entering into a trading halt on 29 March 2021, and is a 5.25% premium to the 15-day VWAP price prior to the trading halt. Kaai Capital acted as sole lead manager to the Placement and has elected to receive its 6% lead manager fee, through the issue of Shares at the same price as under the Placement, being a total of 2,500,000 shares. In addition, Kaai Capital has advised the Company that it will donate \$20,000 of the fees it will receive to Australian registered charitable deductible gift recipients.

The Company also wishes to advise that the A\$500,000 of funding secured from Directors and major shareholders through a convertible unsecured non-recourse loan facility, as announced on the ASX announcements of 27 August 2020 and 31 August 2020, **remains undrawn**. The Company advises that in light of the placement undertaken, that the convertible note will unlikely be drawn down and if undrawn at 26th of August 2021, it will automatically lapse as per the terms of the agreement.

About TCM Research

TCM Research Ltd is a company formed in the Republic of Ireland and has been established to develop, apply and commercialise a suite of metallurgical extraction, processing and manufacturing technologies that are innovative, environmentally responsible, highly competitive while adding value exponentially beyond their cost.

The projects undertaken by TCM Research Ltd includes:

- Feasibility Study for a 2.5M ton per annum laterite ore process plant; including Hydrogen production from renewables, Copper, Nickel, Cobalt and Platinum Group Metals, and integrated Steel Production.
- Pilot Plant and Pre-Feasibility Studies for Proprietary refractory Gold/Polymetallic process in USA and South Africa.
- Scoping Study for proprietary low grade Tin extraction and refining process.
- Scoping Study for valorization of slag and tailings from Highveld Steel and Vanadium in South Africa.
- Metallurgical Testwork and associated studies for the extraction and refining of Vanadium, Iron and Titanium from Vanadiferous Magnetite.

- Scoping Studies for the extraction and refining of Tantalum, Niobium, Tin and Tungsten from multiple sources in Africa and Australia.
- Preliminary Economic Assessment for an integrated Rare Earth Elements Refinery.
- Innovative Metals 3D Printing process for Earth and Space Applications; currently in commercialization.
- Design to Production - High Purity Nickel battery metals production.

TCM's innovations aim to bridge the gap between mining and manufacturing and its processes offer the ability to produce a range of high value products for a diverse and growing range of industries (including additive manufacturing), as well as being able to revert to bulk commodities should the need arise.

One such initiative is our 'Enhanced Resource Utilization Platform', where there exists far-reaching opportunities and extensive applications. Useful by-products create the opportunity to cultivate downstream industries; producing iron and steel feed, pigments, geopolymer cement, building materials and refractories. The secondary industries proposed would have the potential to significantly contribute to meeting the socio-economic responsibilities associated with mining and rehabilitation operations in surrounding communities. Developing social licence and evolving sustainability through engagement, actions and outcomes. Further, the greater resource utilization and the enhanced revenue generation would alleviate the burden of environmental bonds and closure liabilities.

The ability to produce oxides, metals, alloys and chemicals in the same process provides flexibility and agility whilst realizing higher revenues from value-added products. Seamless integration with TCM's 'Paradigm Shift Manufacturing Platform' for the production of metal and metal alloy powders, as well as coatings and 3D manufactured end-products presents a tangible vertically integrated mine to market technology package.

Specifically for Vanadiferous Magnetite ores, concentrates and tailings, where Vanadium is usually the only metal extracted, TCM presents the opportunity to produce commercial co-products like Iron Metal Powder, Iron Oxide Pigment, High Purity Alumina and Titanium Alloys as well as a suite of value-added Vanadium products.

This announcement has been authorised for release by the directors of Vanadium Resources Limited.

For and on behalf of the board:

Kyla Garic

Company Secretary

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Some of the statements appearing in this announcement may be in the nature of forward looking statements. You should be aware that such statements are only predictions and are subject to inherent risks and uncertainties. Those risks and uncertainties include factors and risks specific to the industries in which VR8 operates and proposes to operate as well as general economic conditions, prevailing exchange rates and interest rates and conditions in the financial markets, among other things. Actual events or results may differ materially from the events or results expressed or implied in any forward looking statement. No forward looking statement is a guarantee or representation as to future performance or any other future matters, which will be influenced by a number of factors and subject to various uncertainties and contingencies, many of which will be outside VR8's control.

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BACKGROUND ON VANADIUM

Current day demand for vanadium arises from its established use in strengthening steel via various alloys. Consumption is currently increasing with the recent implementation of stricter standards on the strength of steel to be used in construction (specifically rebar). The use of vanadium in steel making accounts for over 90% of current vanadium demand in today's market.

The most commonly traded vanadium product is 98% V₂O₅ flake, as it can be used directly in steel making or converted to ferrovanadium for additional uses in steel making. Higher purity vanadium products are either produced by a modern plant (such as being planned by VR8) or are further processed from 98% V₂O₅ flake for speciality uses in chemical industries, energy storage and high performance alloying technologies.

Such speciality uses are expected to provide additional longer term demand for vanadium. Vanadium redox flow battery (VRFB) technology was developed in Australia and has a number of advantages in

industrial and small town sized energy storage requirements. The global move towards renewable energy solutions will require a vast increase in energy storage installations, which in turn is forecast to result in an increase in the amount of VRFBs being manufactured and installed around the world.

Another emerging use of vanadium is in high-performance light weight alloys. Supply of such alloys is increasing in the aerospace industry, with aeroplanes such as the Boeing Dreamliner 787 and the Airbus A350 now incorporating up to 100 tons of vanadium per aircraft.

This month 98% V₂O₅ flake product continues to trade around \$7.00/lb (US\$15,420/tonne; Fastmarkets Metal Bulletin). Trade remains quiet globally with supply of product largely restored and buyers having restocked in recent weeks, with any excess material being sold on Chinese markets due to higher prices versus European buyers.

BACKGROUND ON THE STEELPOORTDRIFT VANADIUM PROJECT

The Steelpoortdrift titaniferous magnetite deposit is located in the prolific Bushveld Geological Complex surrounded by known mineral and vanadium production facilities within reach of proven processing plants, railway and road options and ports.

The Steelpoortdrift Vanadium project is licensed with a mining right and the Company is in the process of conducting work towards becoming fully permitted (such as acquiring a water use license) for production and towards studies to verify a pathway of options to produce high purity V₂O₅ flake and other niche products from the suite of elements present in the Titano-magnetite (V, Ti and Fe). The current Scoping Study aims to demonstrate the viability of producing high purity V₂O₅ flake from the Project.

The Steelpoortdrift Vanadium Project compares highly favourably to other vanadium deposits globally (Figure 1), as the largest published global undeveloped Mineral Resource (662 million tonnes at an in situ grade of 0.77% V₂O₅, defined above an in-situ grade of 0.45% V₂O₅), as well as the largest published high grade undeveloped resource (188 million tonnes at an in situ grade of 1.23% V₂O₅, defined above an in situ resource grade of 1% V₂O₅) (refer ASX Announcement 29 April 2020). A sizeable portion of this high grade resource (68Mt at 1.37% V₂O₅) is hosted in a discrete, massive magnetite unit which outcrops along 4km of strike within the project area. The Company confirms that all material assumptions and parameters underpinning the Mineral Resource Estimate reported in the ASX announcement dated 29 April 2020 continue to apply and have not materially changed, and that it is not aware of any new information or data that materially affects the information that has been included in this announcement.

The Steelpoortdrift Vanadium Project produces a high-quality concentrate containing approximately 2.2% V₂O₅, 12% TiO₂ and 58% Fe (ASX Announcements 18 March 2019 and 24 June 2020). Studies into downstream processing of this concentrate are in progress to confirm its ability to create high value

products suitable for the steel, renewable energy (VRFB battery) and industrial minerals markets. Initial roasting testwork return outstanding recoveries of almost 90% vanadium using the established salt roasting – leaching process (ASX Announcement 24 July 2020).

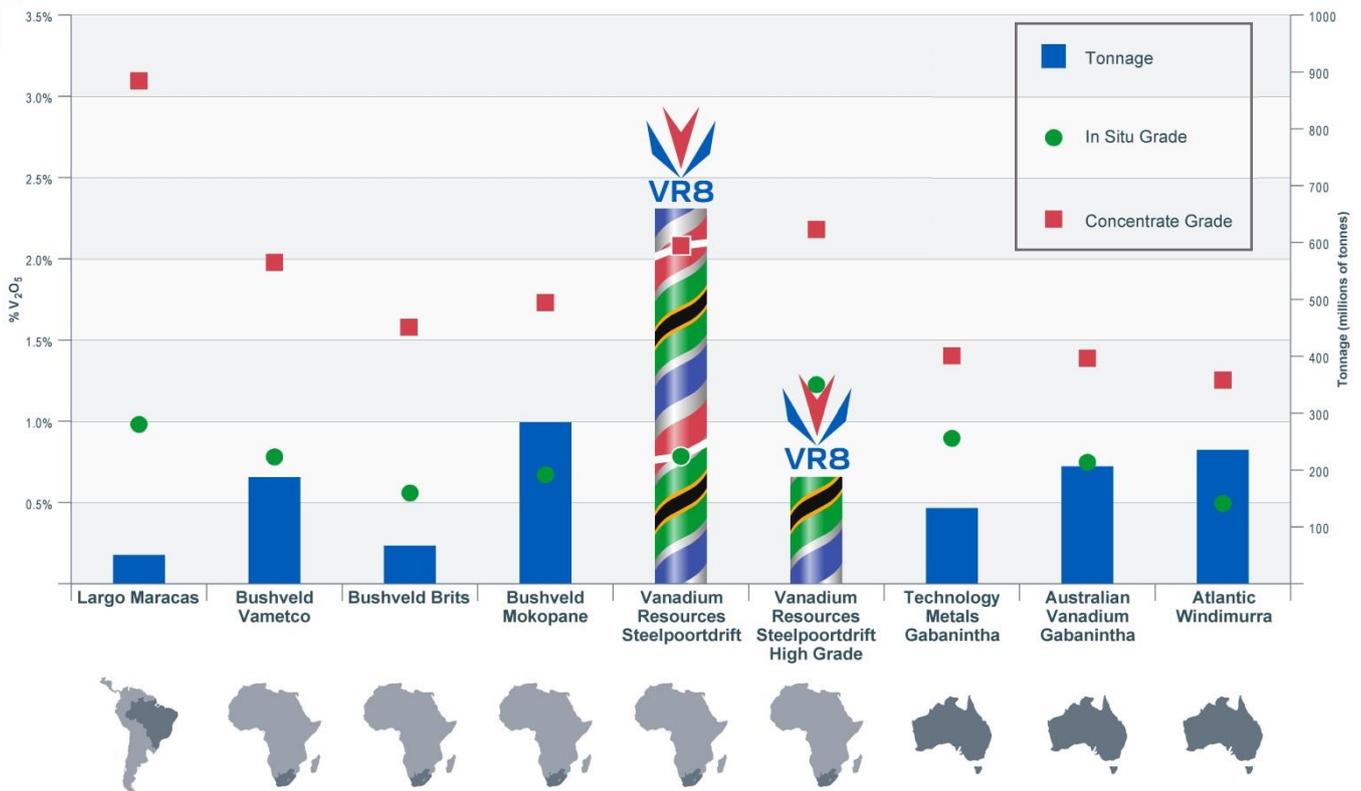


Figure 1. Global vanadium projects categorised by resource grade and grade in concentrate. Chart compares resources reported under different codes and companies at different stages of development as detailed in Appendix 1. Only resources with a quoted in situ grade > 0.45% V₂O₅ are shown in figure.

APPENDIX 1: Data and sources for Peer Comparison (Figure 1)

Company	Project	Stage	Resource Category	Resource Tonnes	Resource Grade	Concentrate Grade	Information Source
Largo LGO.TSX	Maracas	Production	Measured, Indicated & Inferred (43-101)	49.25	0.99	3.10	43-101 Technical Report dated 26/10/2017 http://www.largoresources.com/operations/maracas-menchen-mine
Bushveld BMN.LSE	Vametco	Production	Indicated & Inferred	186	0.78	1.98	Competent Persons' Report on the Vametco Vanadium Mine Jan 2020 https://www.bushveldminerals.com/technical-reports/
	Brits	Development	Indicated & Inferred	66.8	0.56	1.58	Competent Persons' Report on the Brits Vanadium Project Jan 2020 https://www.bushveldminerals.com/technical-reports/
	Mokopane	Development	Indicated & Inferred	285	0.68	1.75	Mokopane PFS Study Report Jan 2016 https://www.bushveldminerals.com/technical-reports/
TNG TNG.ASX	Mt Peake	Development	Measured, Indicated & Inferred	160	0.28	1.20	ASX Announcement 26/03/2013
King River KRR.ASX	Speewah	Development	Measured, Indicated & Inferred	4,712	0.30	2.11	ASX Announcement 01/04/2019 06/11/2019
Pursuit Minerals PUR.ASX	Koitelainen Vosa	Development	Inferred	116.4	0.11	2.25	ASX Announcement 06/02/2019
	Airijoki	Development	Inferred	44.3	0.23	1.70	ASX Announcement 08/03/2019
Australian Vanadium AVL.ASX	Gabanimtha	Development	Measured, Indicated & Inferred	208.2	0.74	1.39	ASX Announcement 04/03/2020, 17/03/2020
Technology Metals TMT.ASX	Gabanimth	Development	Indicated & Inferred	131	0.90	1.36	ASX Announcement 29/03/2019