



# VANADIUM RECOVERY PROJECT - PFS INDICATES ROBUST POTENTIAL ECONOMICS

## HIGHLIGHTS

- PFS indicates strong case for recovering vanadium from vanadium-bearing steelmaking by-products in Finland;
- Annual production of 13.4 million pounds of high-purity vanadium pentoxide secured by 10 year supply agreement with Scandinavian steelmaker SSAB;
- Lowest quartile cash cost (US\$4.25/pound) with potential to lower with by-product/carbon credits;
- Net Present Value<sub>10%</sub> of US\$230 million and pre-tax IRR of 31% on 100% ownership basis; and
- Completion of Pilot Plant trials and award of Feasibility Study on schedule for July 2021 to enable potential final investment decision in the second half of 2022.

Project developer Neometals Ltd (ASX: NMT) ("Neometals" or "the Company") is pleased to announce the completion of an Association for the Advancement of Cost Engineering ("AACE") Class 4 Preliminary-Feasibility Study ("PFS") on the recovery of high-purity vanadium pentoxide ("V<sub>2</sub>O<sub>5</sub>") from high-grade vanadium-bearing steel by-product ("Slag"). The PFS was completed with assistance from leading consulting engineers Hatch Pty Ltd.

As announced on the 6<sup>th</sup> April 2020 (see ASX announcement titled "High-Grade Vanadium Recycling Agreement"), Neometals has the right, subject to funding certain evaluation studies, to enter into a 50:50 incorporated joint venture ("JV") to develop a vanadium recovery project with unlisted Scandinavian mineral development company, Critical Metals Ltd ("Critical") ("Vanadium Recovery Project"). The parties are jointly evaluating the feasibility of constructing a facility to process and recover high-grade vanadium chemicals from vanadium-bearing steel making by-product generated by SSAB EMEA AB and SSAB Europe Oy (collectively "SSAB") in Scandinavia. Neometals is Critical's largest shareholder, holding approximately 19.8% of its issued capital.

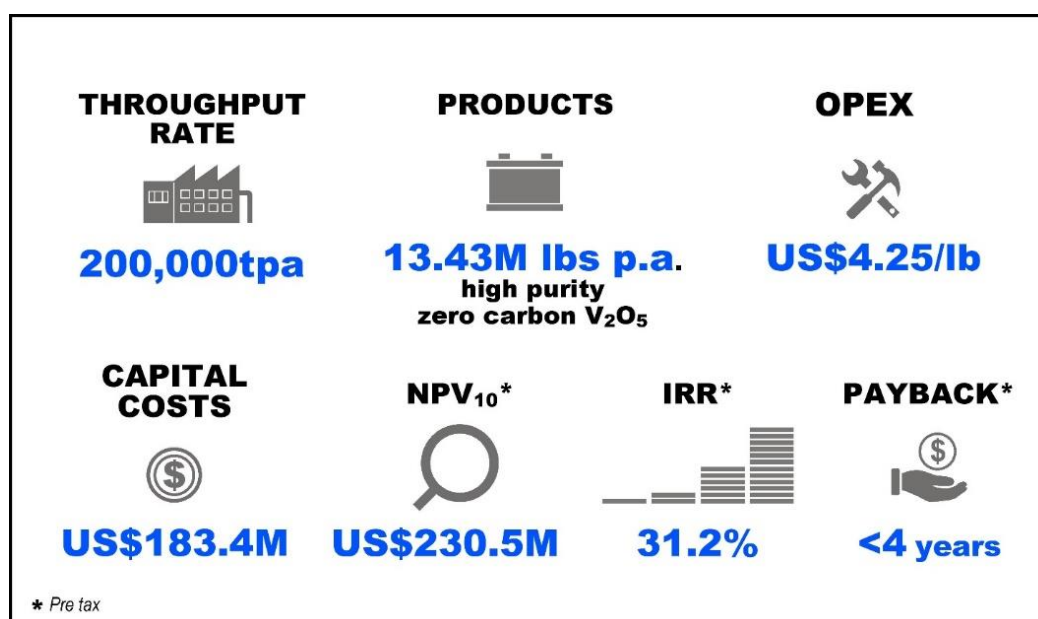


Figure 1: Key Highlights of the PFS (all figures expressed on a 100% ownership basis)

Neometals is extremely encouraged by the outcomes of the PFS which highlights robust economic margins with a first quartile position on the operating cost curve. The PFS supports Neometals' strategy to pivot towards more sustainable materials recovery and recycling projects to complement its upstream mineral projects. Given the positive results from the PFS, Neometals is funding the next stage of evaluation studies, comprising completion of a pilot plant ("Pilot") before commencing a Class 3 AACE Feasibility Study ("FS"). Critical will advance government and environmental approvals for the Vanadium Recovery Project and manage the SSAB relationship.

Neometals Managing Director Chris Reed said:

*"Completion of the PFS is a significant milestone for the Vanadium Recovery Project and its stakeholders. It has confirmed the robust economics of combining this high-grade feed stock with our innovative process flowsheet to deliver some of the highest-grade, lowest-cost vanadium chemicals globally with a zero-carbon footprint. I'd like to commend our team and partner, Critical, the collaborative relationship has delivered a realistic and realisable project which can provide this emerging critical battery material into Europe from existing industrial by-products, truly embracing their circular-economy desires."*

### Background

On the 6<sup>th</sup> April 2020, Critical executed a conditional agreement ("**Slag Supply Agreement**") with SSAB, a steel producer that operates steel mills in Scandinavia, to acquire Slag produced as by-product at SSAB's operations. The Slag Supply Agreement provides a secure basis for the evaluation of the Vanadium Recovery Project which will be capable of processing 200,000 tonnes of Slag per annum (with a reference grade of 3.93% V<sub>2</sub>O<sub>5</sub>, being the reference grade for pricing under the Slag Supply Agreement) without the need to build a mine and a concentrator like existing primary producers. The Slag Supply Agreement provides for the conditional purchase of at least 2,000,000 dry metric tonnes of Slag from SSAB.

Neometals has developed a proprietary processing method to recover vanadium from steel slag. This hydrometallurgical process utilises conventional equipment and operates at atmospheric pressure and mild temperatures. Mini-Pilot Plant testing of the selected flowsheet was completed in Perth and resulted in product purities of greater than 99.5% V<sub>2</sub>O<sub>5</sub> with metallurgical recoveries exceeding 77.5% (for full details refer to Neometals ASX announcement entitled "Successful Vanadium Recovery Mini-Pilot and Commencement of PFS" released on 4<sup>th</sup> November 2020). The information from the operation of the Mini-Pilot Plant was captured in a process design criteria and mass balance and was utilised to develop PFS (-20% +25%) operating expenditure and capital expenditure numbers for a 200,000 dry metric tonnes per annum ("**tpa**") hydrometallurgical processing circuit.

The PFS was based on establishing an operation at Tahkoluoto Port, Pori in Finland. This location has excellent infrastructure, including a deep-water port, as shown below in Figure 2 and was chosen after the completion of an extensive location study (for full details refer to Neometals ASX announcement entitled "Pori, Finland selected for Vanadium Recovery Project" released on 11<sup>th</sup> December 2020).



**Figure 2 - Aerial schematic showing location for the proposed Vanadium Recovery Project processing plant at Tahkoluoto Port, Pori in Finland**

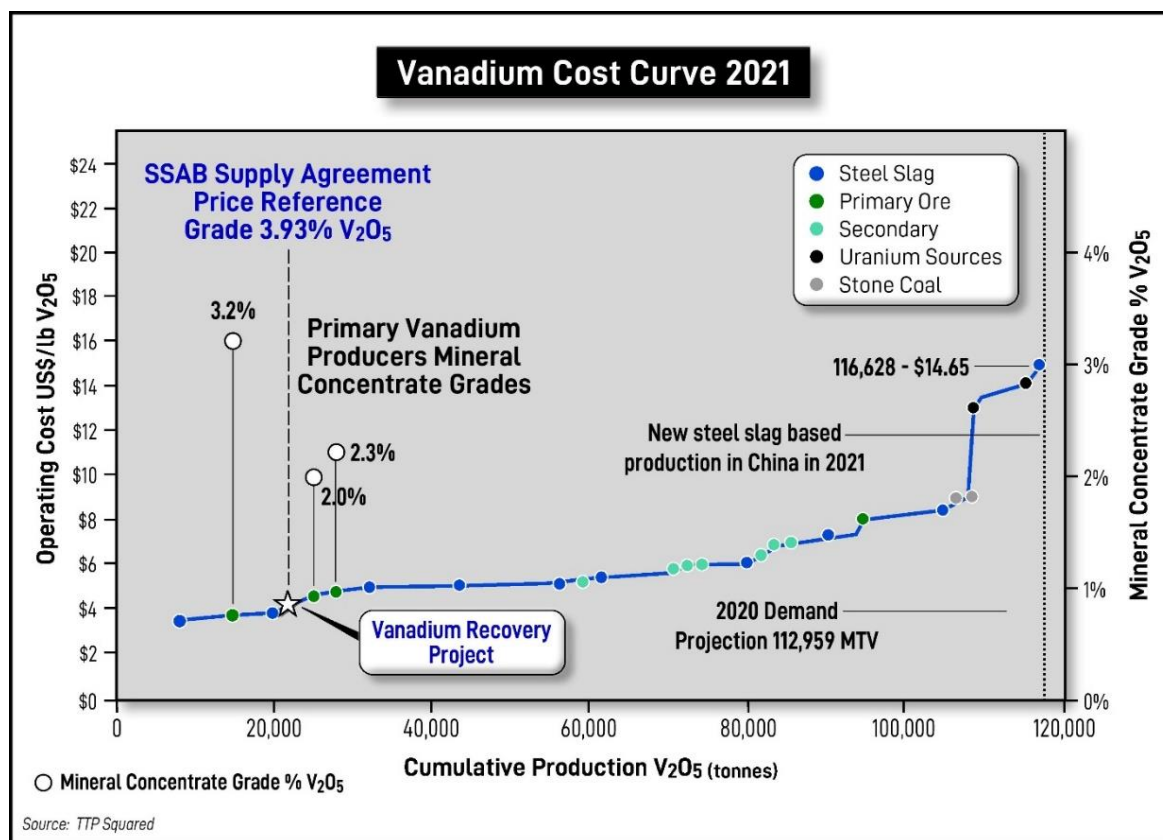
## Financial Summary

Key highlights from the PFS (200,000tpa processing feed rate) are summarised below. Financial analysis and estimates are denominated in US\$ dollars using an exchange rate of US\$0.763. The PFS assumes a selling price of US\$10.19/lb  $V_2O_5$ . The selling price was based on the Fastmarkets March 2021 monthly average price for 98% purity  $V_2O_5$  in warehouse Rotterdam (US \$8.31/lb  $V_2O_5$ ) plus a US\$1.88/lb premium for 99.5% purity (based on Asian Metal data 18/8/20 until 14/4/21). For further information on vanadium markets and pricing please see Appendix 1.

**Table 1 - PFS Highlights** (all figures expressed on a 100% ownership basis and pre-tax)

PFS Highlights	
Annual Production	13.43m lbs $V_2O_5$
Life of Plant	10.5 years
Life of Plant Revenue	US\$1,369 million
Pre-tax Operating Cashflow	US\$764 million
Pre-tax NPV (10% discount rate)	US\$231 million
Average Net Operating Cost of recovered $V_2O_5$	US\$4.25/lb
Total initial capital costs	US\$183 million
Payback of capital costs	<4 years

Figure 3 below highlights the competitive operating cost of the Vanadium Recovery Project, with a first quartile position on the industry operating cost curve (excluding royalties, taxes, depreciation, and amortisation).



**Figure 3 - 2021 Vanadium Operating Cost Curve**

## Development Scenario

The development scenario for this PFS is characterised by:

- Greenfields development starting with a cleared industrial site at Tahkoluoto Port, Pori in Finland
- Plant with a throughput capacity of 200,000tpa
- Feedstock comprising steel by-product Slag with a grade of 3.93%  $V_2O_5$  (being the reference grade for pricing under the Slag Supply Agreement)

### Feed Preparation

Slag material (predominantly less than 10mm in size) is received and screened prior to being placed through a comminution circuit.

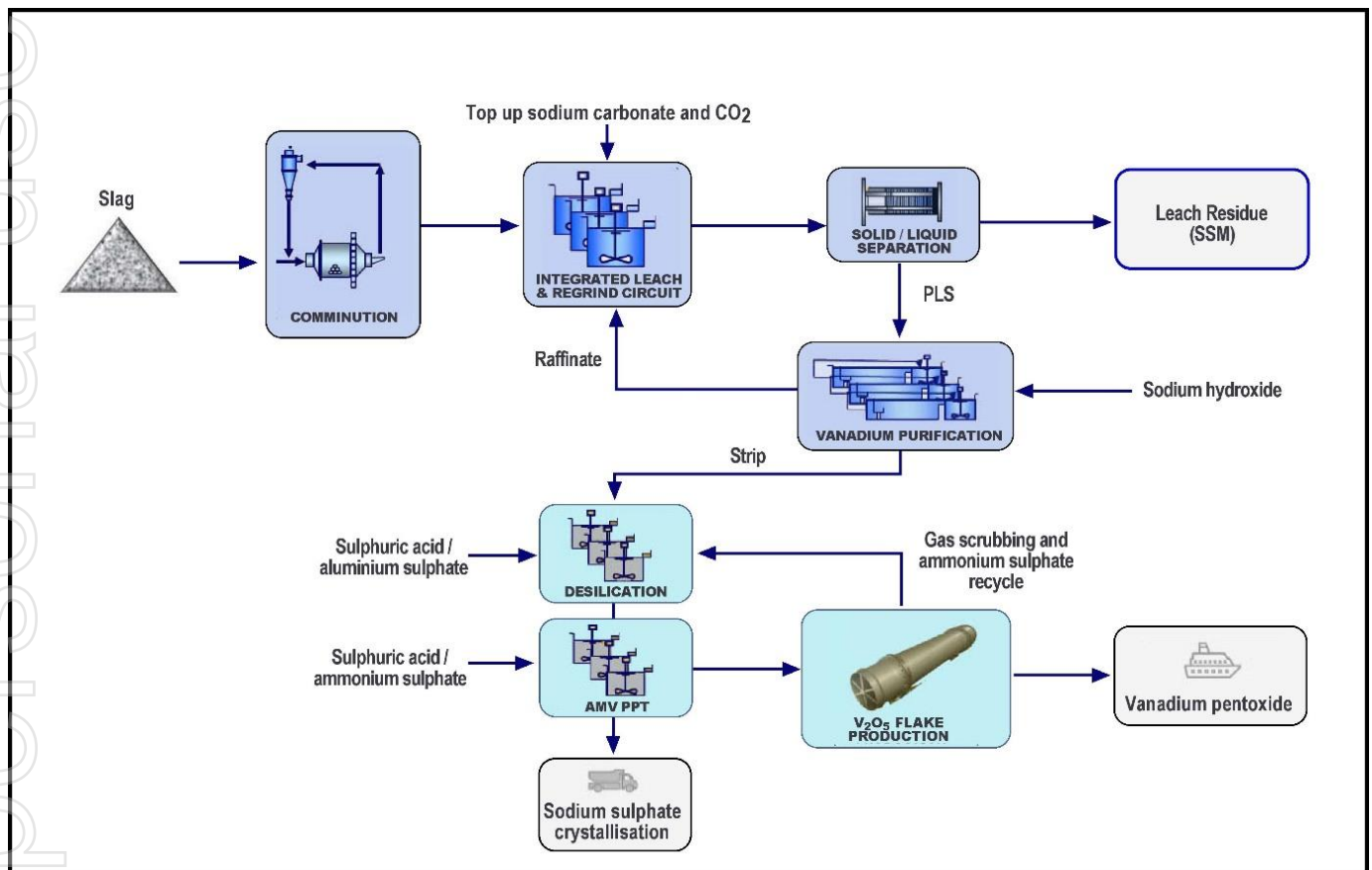


Figure 4 – Overview of Process Flowsheet

### Processing Flowsheet

The proprietary process flowsheet was developed by Neometals with assistance from an independent metallurgical laboratory. The process, for which a provisional patent has been applied for, is based on conventional equipment and configuration, employing novel chemistry, operated at atmospheric pressure and mild temperatures. The feed, referred to as Slag in Figure 4 above, is processed in the leach circuit to facilitate dissolution of the vanadium from the feed. The pregnant leach solution ("PLS") is then separated from the solid leach residue. Further extraction and purification of PLS results in the recovery of vanadium which is further processed through into vanadium pentoxide.



### Project Location

For the purpose of cost estimation Pori, Finland is the selected location with plant offices, administration, ablutions facilities and a laboratory included in the scope. The PFS includes tie-ins for water, electricity, district heating and natural gas, which are all available near the site boundary.

Critical and the City of Pori have formalised a memorandum of understanding which sets out the framework under which the parties will work together for the granting of tenure and permits required for the successful establishment of the proposed vanadium recovery processing plant on a 'build-ready' 20 hectare site at the Tahkoluoto Port, Pori in Finland.

### Capital Cost Estimate

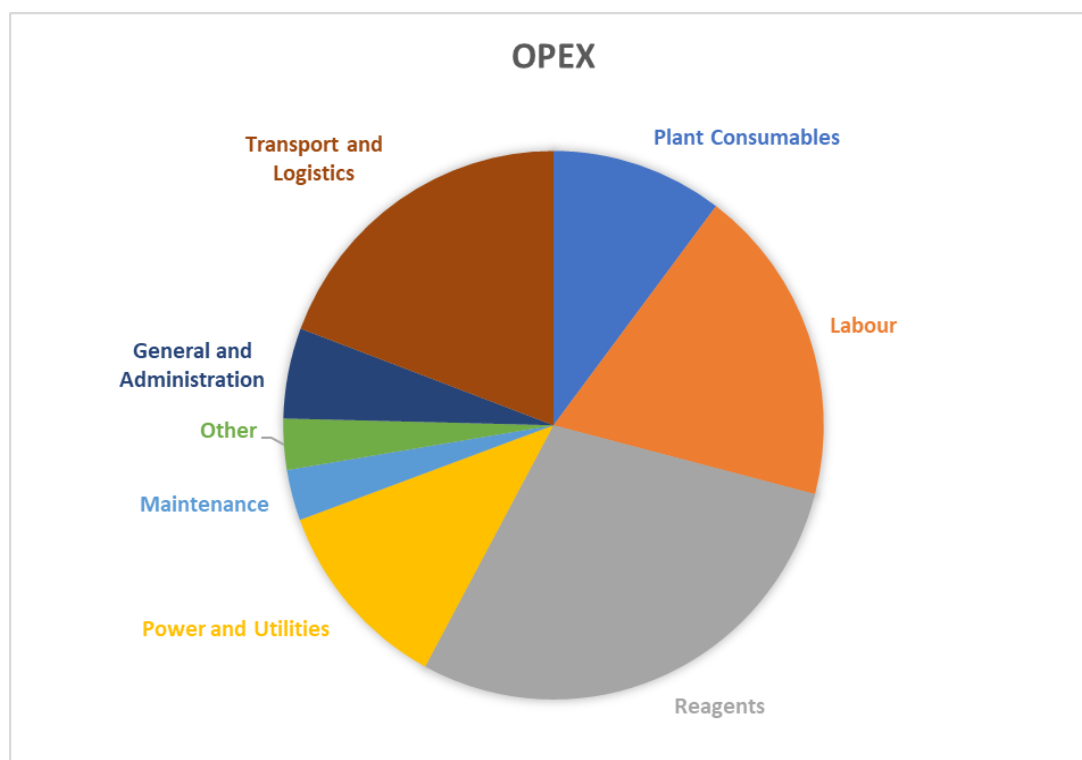
The capital cost estimate for the process plant and relevant infrastructure was developed to a PFS-level accuracy of -20% +25% based on budget price estimates obtained from equipment suppliers and appropriate agreed factors. **Table 2** below presents the summary of the project capital costs.

**Table 2 – Capital Cost Estimate (all figures expressed on a 100% ownership basis)**

Capital	US\$M
Direct – Buildings and Process Plant	126
Indirect – EPCM etc	27
Contingency (20%)	31
<b>Total</b>	<b>184</b>

### Operating Cost Estimate

The Vanadium Recovery Project operating cost was estimated by major cost type and is considered an AACE Class 4 level estimate with a nominal accuracy level of -20% +25%. The estimated operating cost excluding royalties is on average US\$4.25/lb V<sub>2</sub>O<sub>5</sub>. The operating cost breakdown is shown in Figure 5 below.



**Figure 5 – Operational cost breakdown by key areas**

## Economic Analysis

Neometals prepared a comprehensive discounted cash flow analysis to provide an indication of the potential of the Vanadium Recovery Project. The analysis makes the following assumptions:

- No allowance was made for tax
- No allowance was made for inflation
- NPV is calculated against the full capital cost of process plant and does not allow for debt or any other type of funding of the project

Additional important economic and technical assumption inputs are summarised below:

- Overall metallurgical recovery of  $V_2O_5$  is based on results from the Mini Pilot Plant and is 77.5%.
- Pricing of  $V_2O_5$  based on US\$10.19/lb (flat long-term forecast)

## Scheduling of Development and Production

For the purposes of this PFS the following assumptions have been made with respect to development and production:

<b>Final Investment Decision</b>	1/12/2022
<b>Date of NPV calculation</b>	1/6/2023
<b>Commence Construction</b>	1/6/2023
<b>Finish Construction</b>	30/11/2024
<b>Commence Operations</b>	1/12/2024

Ramp up of operations assumptions are based on 25% of throughput first quarter, 50% second and third quarter, 75% fourth quarter, 200,000tpa feed rate from fifth quarter, and total of 2,000,000 tonnes of feed processed over life of operation.

## Availability of Project Finance

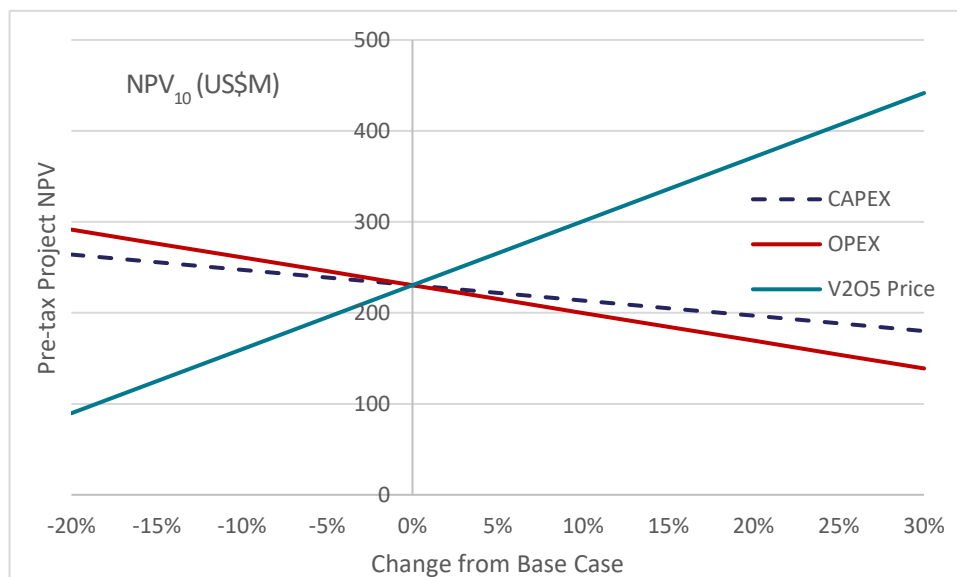
Investors should note that there is no certainty that the Company and/or Critical will be able to raise the required funding when needed, however, the Company believes that there is a reasonable basis to assume that funding will be available given:

- Neometals Board and executive team have a strong financing track record in developing projects;
- Neometals has a strong balance sheet and proven ability to attract new capital and supportive investors;
- Neometals considers that the PFS's financial metrics are positive and the underlying demand growth for the product suite is strong; and
- Institutional investors are supportive of the recovery of metals from residues/by-products rather than traditional mining.

Funding for the vanadium recovery plant would be underpinned by sales agreements resulting from the successful operation of a pilot plant and generation of commercial samples for evaluation by end users. A mixture of equity and conceivably some layered debt structures, such as debentures or conventional secured debt funding, along with a minor portion of offtake/working capital finance is a realistic assumption. The technical risks are considerably reduced compared to a standard mining development, but the sales price risk would depend on the nature of the sales agreements and the credit worthiness of the entities behind them. It should be noted that credit and equity markets can be volatile and that the required funding may only be available on terms that may be dilutive to or otherwise affect the value of Neometals existing shares.

### Project Sensitivities

A sensitivity analysis on the pre-tax NPV is provided in Figure 6 below.



**Figure 6 - Pre-Tax NPV Sensitivity (all figures expressed on a 100% ownership basis)**

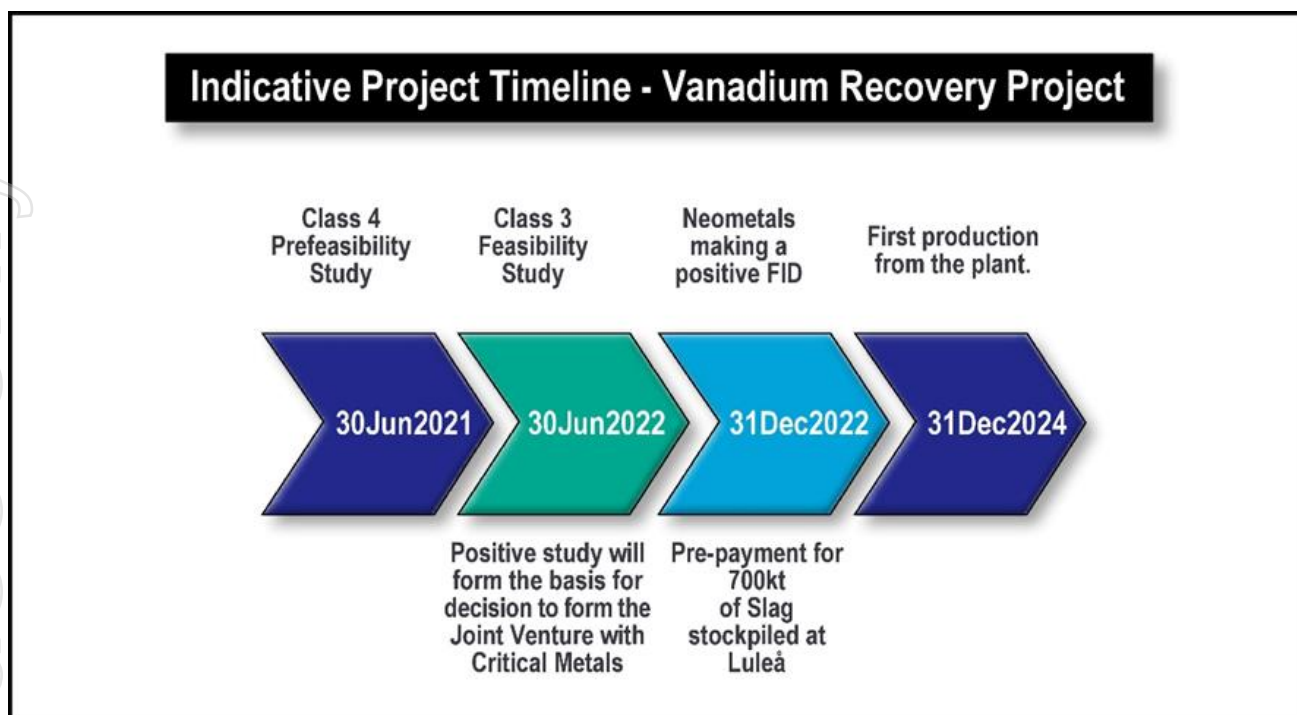
### Market and Marketing

World vanadium supply is dominated by China, Russia, and South Africa. With the inherent advantages that come with Slag as a feedstock (low cost and no mining risk) and the competitive operating cost position driven by Neometals' development of a patent pending hydrometallurgical process, Neometals believes the Vanadium Recovery Project is extremely well positioned to service European and North American markets with zero carbon vanadium.

See Appendix 1 for an overview of the global vanadium market.

### Next Steps:

- Pilot Plant already under construction for target commissioning in the June 2021 quarter.
- Commencement of DFS with Class 3 AACE Engineering Cost Study component planned to commence in July 2021.
- Supplying product marketing samples from the Pilot Plant to advance discussions with potential offtake partners.
- Conducting vendor test work to confirm equipment parameters.
- Environmental Impact Assessment and other permitting will continue to advance.
- Commence work targeting financiers and other European project stakeholders with a focus on sustainable recovery of critical metals to support resilient domestic supply chains from non-mining sources.



**Figure 7 - Indicative Timeline for the Vanadium Recovery Project**

#### Forward-looking Statements

This release contains “forward-looking information” that is based on the Company’s expectations, estimates and projections as of the date on which the statements were made. This forward-looking information includes, among other things, statements with respect to studies, the Company’s business strategy, plan, development, objectives, performance, outlook, growth, cash flow, projections, targets and expectations. Generally, this forward-looking information can be identified by the use of forward-looking terminology such as ‘outlook’, ‘anticipate’, ‘project’, ‘target’, ‘likely’, ‘believe’, ‘estimate’, ‘expect’, ‘intend’, ‘may’, ‘would’, ‘could’, ‘should’, ‘scheduled’, ‘will’, ‘plan’, ‘forecast’, ‘evolve’ and similar expressions. Persons reading this news release are cautioned that such statements are only predictions, and that the Company’s actual future results or performance may be materially different. Forward-looking information is subject to known and unknown risks, uncertainties and other factors that may cause the Company’s actual results, level of activity, performance or achievements to be materially different from those expressed or implied by such forward-looking information.

Forward-looking information is developed based on assumptions about such risks, uncertainties and other factors set out herein, including but not limited to general business, economic, competitive, political and social uncertainties; the actual results of current development activities; conclusions of economic evaluations; changes in project parameters as plans continue to be refined; future prices of metals; failure of plant, equipment or processes to operate as anticipated; accident, labour disputes and other risks of the chemical industry; and delays in obtaining governmental approvals or financing or in the completion of development or construction activities. This list is not exhaustive of the factors that may affect our forward-looking information. These and other factors should be considered carefully, and readers should not place undue reliance on such forward-looking information.

Neither the Company, nor any other person, gives any representation, warranty, assurance or guarantee that the occurrence of the events expressed or implied in any forward-looking statement will actually occur. Except as required by law, and only to the extent so required, none of the Company, its subsidiaries or its or their directors, officers, employees, advisors or agents or any other person shall in any way be liable to any person or body for any loss, claim, demand, damages, costs or expenses of whatever nature arising in any way out of, or in connection with, the information contained in this document. The Company disclaims any intent or obligations to or revise any forward-looking statements whether as a result of new information, estimates, or options, future events or results or otherwise, unless required to do so by law.



**Advice**

*Nothing in this document constitutes investment, legal or other advice. Investors should make their own independent investigation and assessment of the Company and obtain any professional advice required before making any investment decision based on your investment objectives and financial circumstances.*

*Authorised on behalf of Neometals by Christopher Reed, Managing Director*

**ENDS**

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**About Neometals Ltd**

Neometals innovatively develops opportunities in minerals and advanced materials essential for a sustainable future. With a focus on the energy storage megatrend, the strategy focuses on de-risking and developing long life projects with strong partners and integrating down the value chain to increase margins and return value to shareholders.

Neometals has four core projects with large partners that span the battery value chain:

**Recycling and Resource Recovery:**

- Lithium-ion Battery Recycling – a proprietary process for recovering cobalt and other valuable materials from spent and scrap lithium batteries. Pilot plant testing completed with plans well advanced to conduct demonstration scale trials with 50:50 JV partner SMS group, working towards a development decision in early 2022; and
- Vanadium Recovery – sole funding evaluation studies to form a 50:50 joint venture with Critical Metals Ltd to recover high-purity vanadium pentoxide from processing Slag from leading Scandinavian steelmaker SSAB. Underpinned by a 10-year Slag supply agreement, Neometals is targeting an investment decision to develop a 200,000tpa processing plant in December quarter 2022.

**Downstream Advanced Materials:**

- Lithium Refinery Project – evaluating the development of India's first lithium refinery to supply the battery cathode industry with potential 50:50 JV partner Manikaran Power, underpinned by a binding life-of-mine annual offtake option for 57,000 tonnes per annum of Mt Marion 6% spodumene concentrate, working towards a development decision in 2022.

**Upstream Industrial Minerals:**

- Barrambie Titanium and Vanadium Project - one of the world's highest-grade hard-rock titanium-vanadium deposits, working towards a development decision in early 2022.

## APPENDIX 1

### Vanadium Market

The schematic below provides an overview of the vanadium industry and identifies the main vanadium raw materials and intermediate products in the supply chain as well as the main consumer industries.

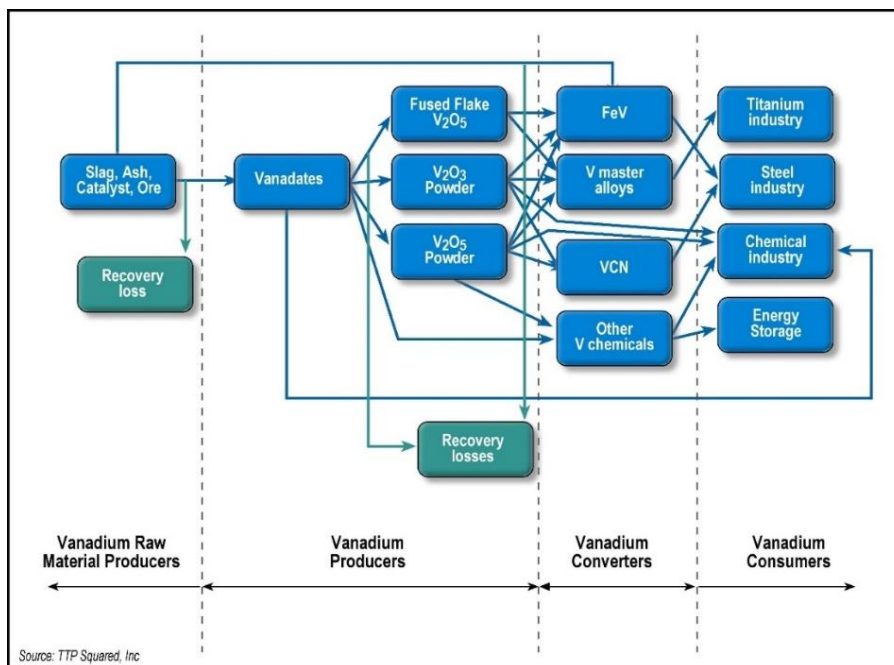


Figure 8 - Vanadium Industry Supply Chain

### Supply

Global vanadium supply reached 107,533 tonnes of vanadium in 2020, an increase of 5.7% on 2019. As shown in Figure 9, supply is dominated by China, which accounted for 62% of the total. Other significant producers include South Africa, Russia and Europe, each contributing approximately 8% of global production in 2020. Brazil's share of global supply has increased since 2014 with the commissioning and subsequent expansion of Largo's Maracas Menchen mine.

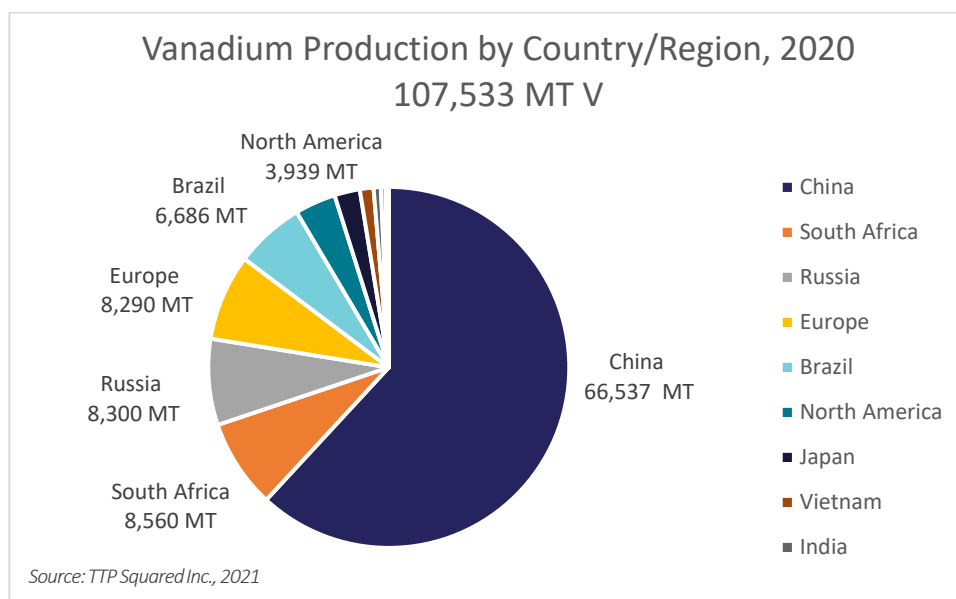
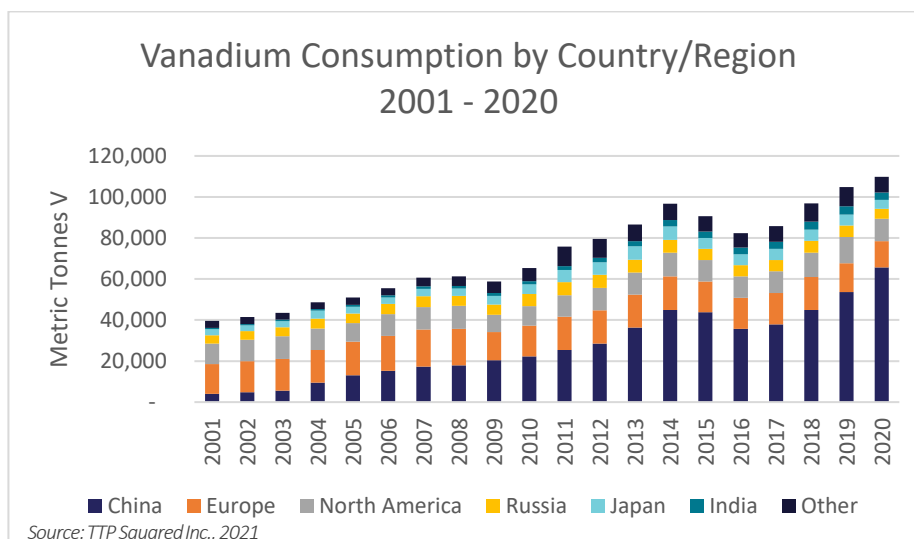


Figure 9 - Vanadium Production by Country, 2020

## Demand

Global vanadium consumption in 2020 was 109,850 tonnes of vanadium and China accounted for 60% of this consumption.

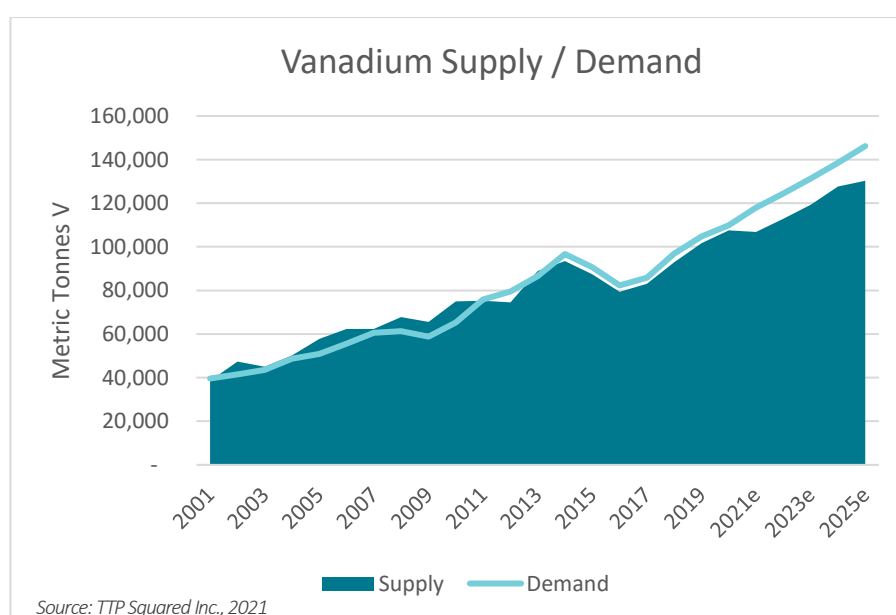
Nearly 90% of vanadium is consumed in the production of high strength steel including high strength low alloy steel, high alloy steel and stainless steel. The remainder is primarily consumed in the production of super alloys, titanium alloys and vanadium chemicals for energy storage.



**Figure 10 - Vanadium Consumption by Country, 2001-2020**

World vanadium supply and demand grew strongly between 2001 and 2014 as the Chinese steel industry expanded. However, consumption dropped in 2015 and 2016 due to lower Chinese steel production and the substitution of high-quality steels with inferior quality steels in the Chinese construction market. In 2017, after two years of decline, the previous upward trend in production and consumption resumed. In 2020 global vanadium production and consumption were nearly balanced where production totalled 107,533 metric tonnes of vanadium and consumption reached 109,850 metric tonnes of vanadium.

In 2021 it is likely that both vanadium production and consumption will increase as the world slowly recovers from the coronavirus pandemic. By 2025 total global demand is forecast to exceed 140,000 metric tonnes of vanadium, largely in response to a reversal of the substitution of inferior quality steels in the Chinese market.



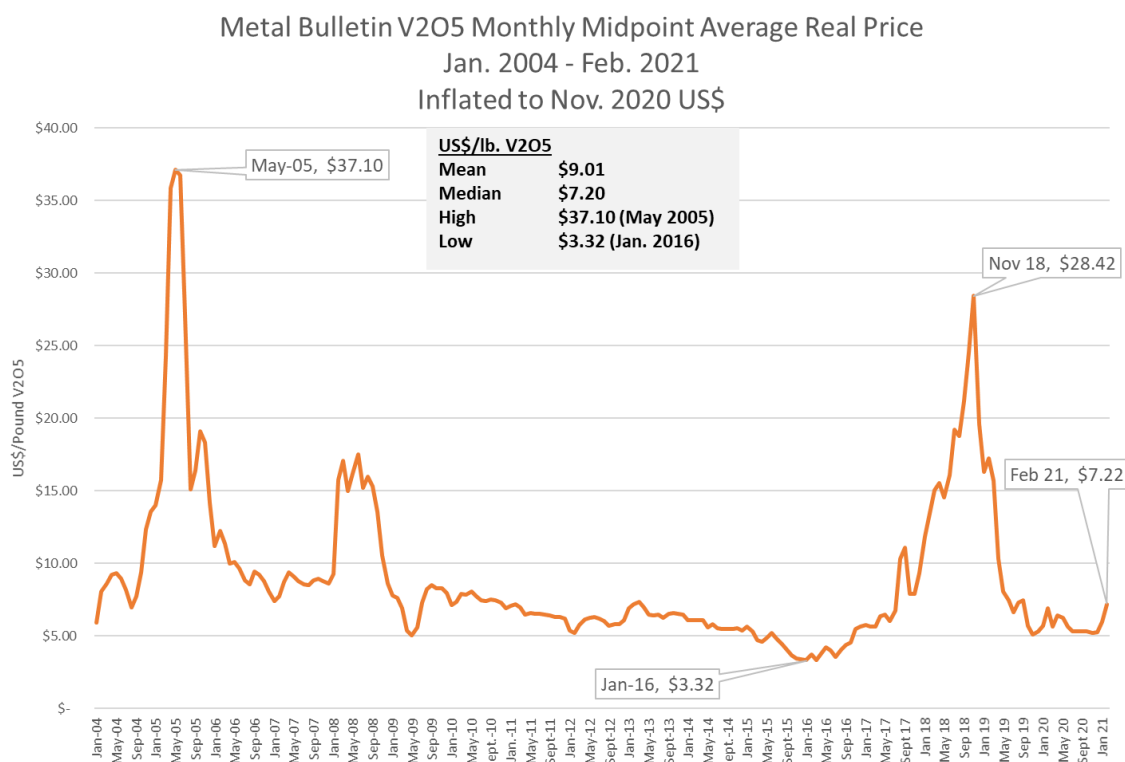
**Figure 11 - Vanadium Supply/Demand 2001-2025e**

In April 2021, industry consultancy TTP Squared Inc estimated that global consumption will outstrip production by more than 5,400 metric tonnes of vanadium. TTP Squared Inc estimates that the supply deficit is likely to exceed 20,000 metric tonnes of vanadium by 2025 if no new projects are brought into production.

### Market Price

Vanadium is not traded on any commodity exchanges such as the LME and prices are settled in private negotiations between sellers and buyers.

During the last 40 years there have been periods of vanadium price volatility.



Source: Metal Bulletin, TTP Squared

**Figure 12 - Annual V<sub>2</sub>O<sub>5</sub> 98% purity prices inflated to November 2020 (US\$)**