



Australian Vanadium Limited

Benchmark World Tour

September 2019 | ASX: AVL

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The views expressed in this presentation contain information derived from publicly available sources that have not been independently verified.

No representation or warranty is made as to the accuracy, completeness or reliability of the information.

Competent Person References

Competent Person Statement – Mineral Resource Estimation The information in this presentation that relates to Mineral Resources is based on and fairly represents information compiled by Mr Lauritz Barnes, (Consultant with Trepanier Pty Ltd) and Mr Brian Davis (Consultant with Geologica Pty Ltd). Mr Davis is a shareholder of Australian Vanadium Limited. Mr Barnes and Mr Davis are members of the Australasian Institute of Mining and Metallurgy and Mr Davis is a member of the Australian Institute of Geoscientists and both have sufficient experience of relevance to the styles of mineralisation and types of deposits under consideration, and to the activities undertaken to qualify as Competent Persons as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Specifically, Mr Barnes is the Competent Person for the estimation and Mr Davis is the Competent Person for the database, geological model and site visits. Mr Barnes and Mr Davis consent to the inclusion in this presentation of the matters based on their information in the form and context in which they appear.

Competent Person Statement – Ore Reserves The scientific and technical information in this presentation that relates to Ore Reserve estimates for the Project is based on information compiled by Mr Roselt Croeser, an independent consultant to AVL. Mr Croeser is a member of the Australasian Institute of Mining and Metallurgy. Mr Croeser has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a competent person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Croeser consents to the inclusion in the presentation of the matters related to the ore reserve estimate in the form and context in which it appears.

Competent Person Statement – Metallurgical Results The information in this presentation that relates to Metallurgical Results is based on information compiled by independent consulting metallurgist, Brian McNab (CP. B.Sc Extractive Metallurgy). Mr McNab is a member of the Australasian Institute of Mining and Metallurgy. Mr McNab is employed by Wood Mining and Metals. Mr McNab has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which is undertaken, to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr McNab consents to the inclusion in the presentation of the matters based on the information made available to him, in the form and context in which it appears.

The information is extracted from the announcement entitled "Gabanintha Pre-Feasibility Study and Maiden Ore Reserve" released to ASX on 19 December 2018 and is available on the Company website at www.australianvanadium.com.au.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources or Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the competent person's findings are presented has not been materially modified from the original market announcement.

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This presentation may contain certain "forward-looking statements" which may not have been based solely on historical facts, but rather may be based on the Company's current expectations about future events and results. Where the Company expresses or implies an expectation or belief as to future events or results, such expectation or belief is expressed in good faith and believed to have a reasonable basis. However, forward looking statements are subject to risks, uncertainties, assumptions and other factors which could cause actual results to differ materially from future results expressed, projected or implied by such forward-looking statements. Such risks include, but are not limited to Resource risk, metal price volatility, currency fluctuations, increased production costs and variances in ore grade or recovery rates from those assumed in mining plans, as well as political and operational risks in the countries and states in which we sell our product to, and government regulation and judicial outcomes. For more detailed discussion of such risks and other factors, see the Company's Annual Reports, as well as the Company's other filings. Readers should not place undue reliance on forward looking information. The Company does not undertake any obligation to release publicly any revisions to any "forward looking statement" to reflect events or circumstances after the date of this announcement, or to reflect the occurrence of unanticipated events, except as may be required under applicable securities laws.

Company Overview

AVL is a Perth-based mineral exploration company with a focus on vanadium exploration in WA.



The Australian Vanadium Project is one of the highest-grade vanadium projects currently being developed in the world.

In September 2019, The Project was awarded **Major Project Status** by the Federal Government.

Corporate Snapshot



Key Statistics (26/06/19)

Ordinary shares on issue	1.97b
Share price	A\$0.013
Average Daily Traded Volume	5,516,927
Market cap (undiluted)	A\$26m
Cash	~A\$4.4m
Shareholders	6,667
Enterprise value	A\$22m

AVL's Top Shareholders

J P Morgan Nominees Australia Pty Ltd	3.50%
HSBC Custody Nominees (Australia) Ltd	2.19%
Citicorp Nominees Pty Ltd	2.19%
Mr Peter James Muir	1.46%

Experienced Management Team



Vincent Algar – Managing Director

Geologist with over 25 years' experience in the mining industry spanning underground and open cut mining operations, greenfields exploration, project development and mining services. Significant experience in the management of publicly listed companies.

Daniel Harris – Technical Director

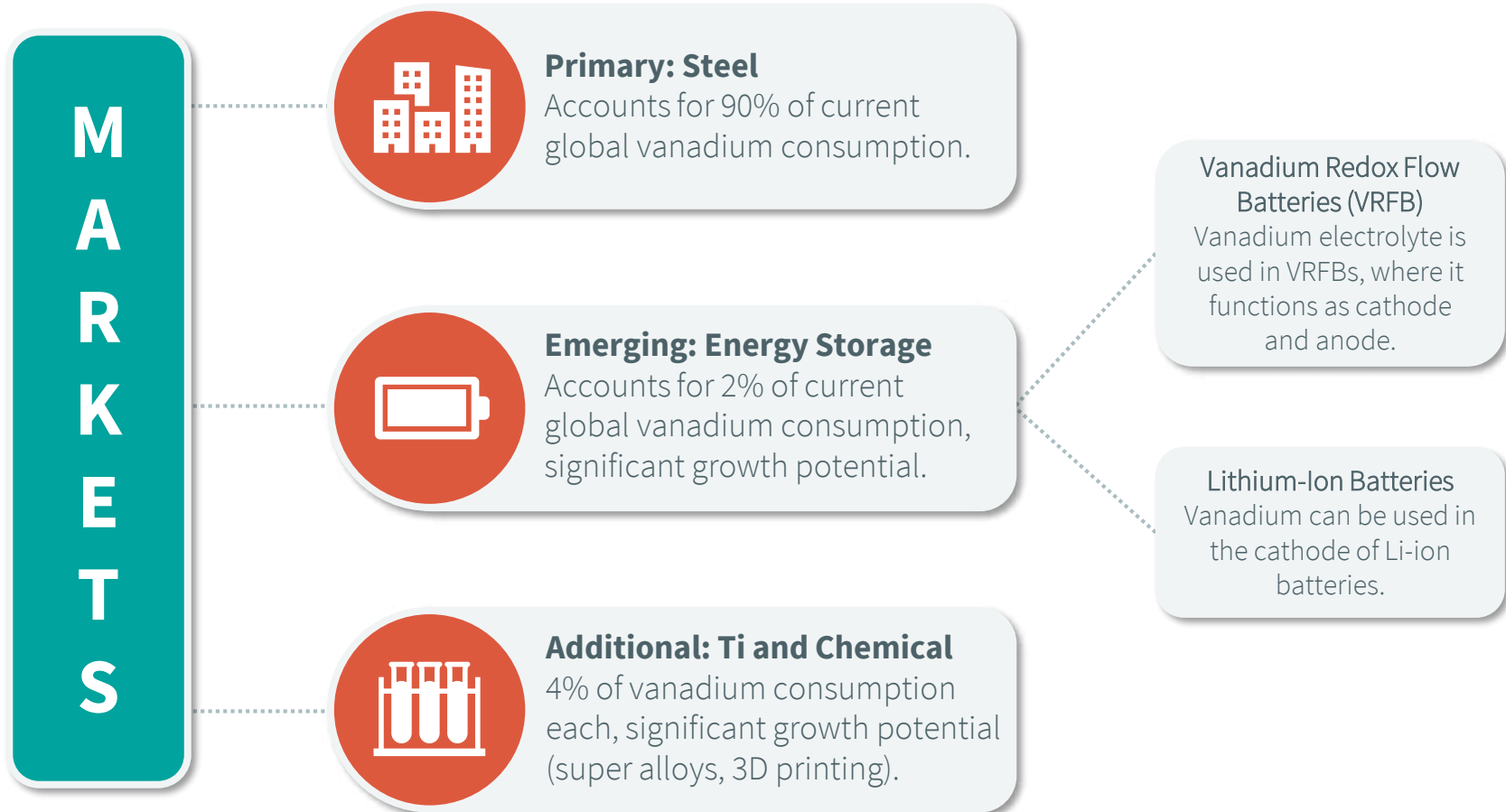
Over 40 years of global vanadium experience including processing and operation. Recent roles include interim CEO and Managing Director at Atlas Iron; Chief Executive & Operating Officer at Atlantic; Vice President & Head of Vanadium Assets at Evraz Group; and Managing Director at Vametco Alloys.



Todd Richardson – Chief Operating Officer

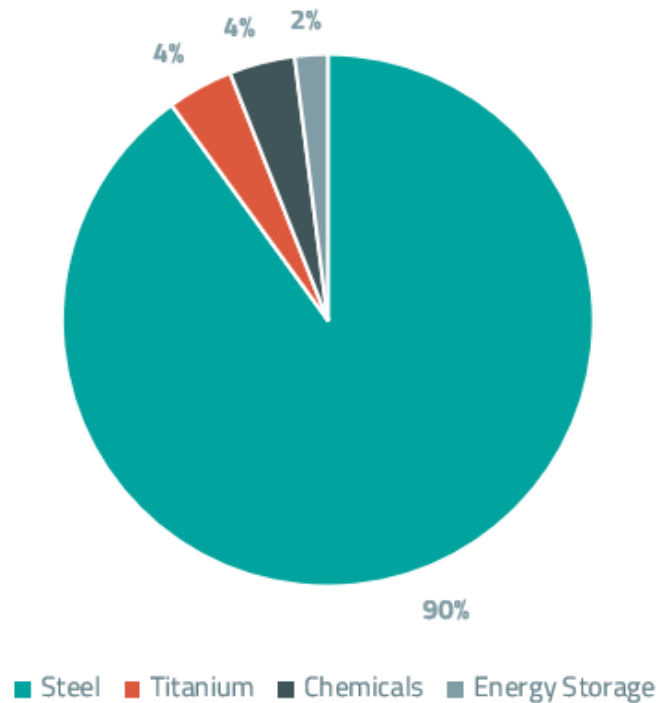
Over 20 years' experience in the vanadium sector and an expert in vanadium process design, commissioning and operations. Extensive background in operations, management and technical services both in the USA and Australia, in all phases of plant operation.

Vanadium Market Overview

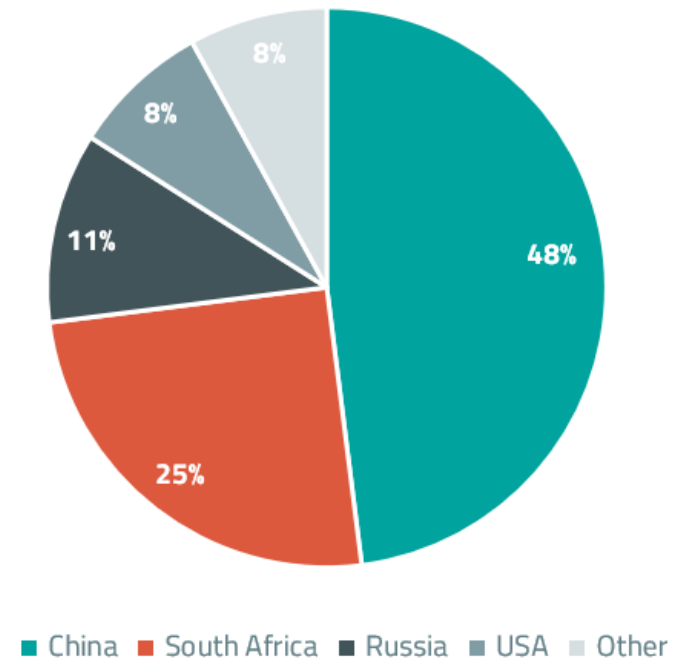


Vanadium Production

Vanadium Production by Market



Vanadium Production by Country



Production vs Consumption

Production/consumption
in balance in late 2018.

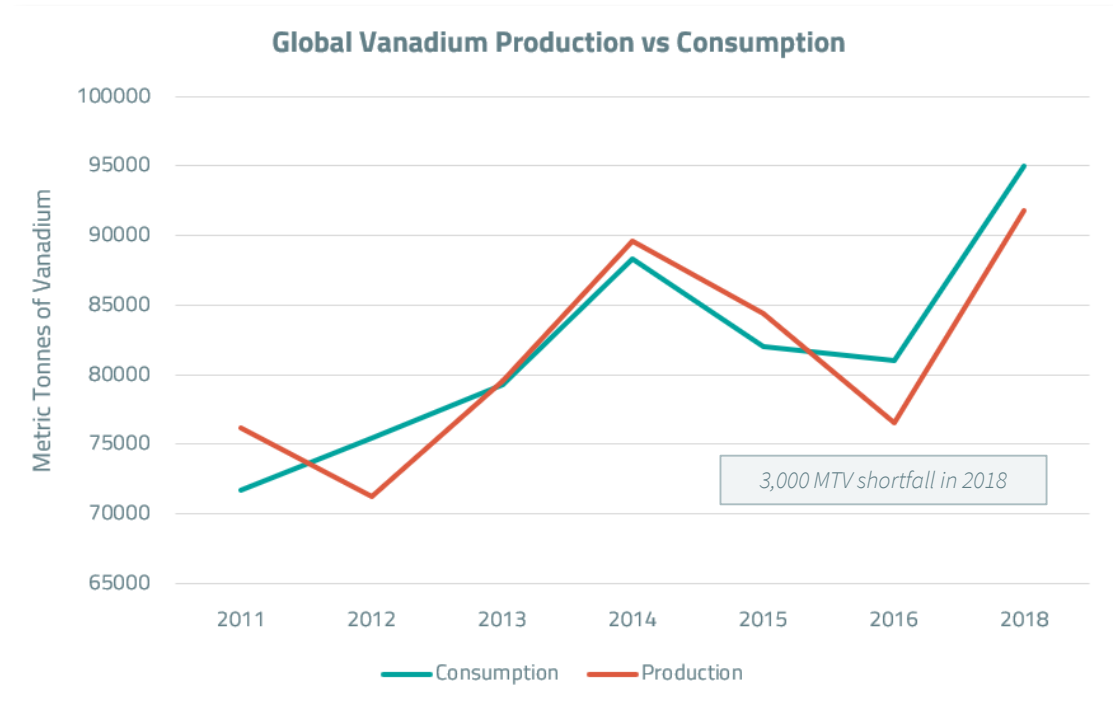
Chinese production
capacity at limits.

14% of world production
from 3 primary mines
(Brazil, South Africa).

60% from Chinese slag
production.

Market remains at risk
from supply shocks.

New market demand a
swing factor.





Steel Market

Primary Market

Steel is the primary market and price driver of vanadium – accounting for 90% of global consumption.

Chinese Rebar

Chinese rebar consumption is a key metric – new standards require increased vanadium content.

Risk of Substitution

Unique microalloy effects of vanadium reduce the risk of substitution.

Vanadium Supply Deficit

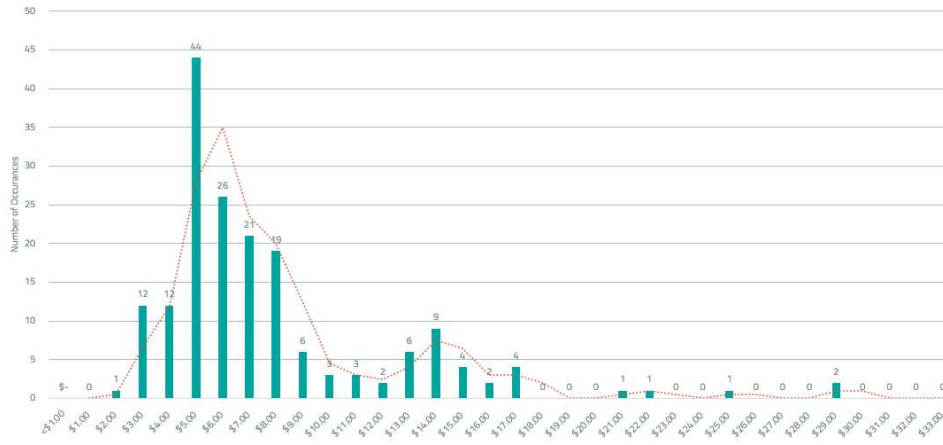
Current supply deficit that exists within all markets is projected to remain.

Factors Increasing Demand

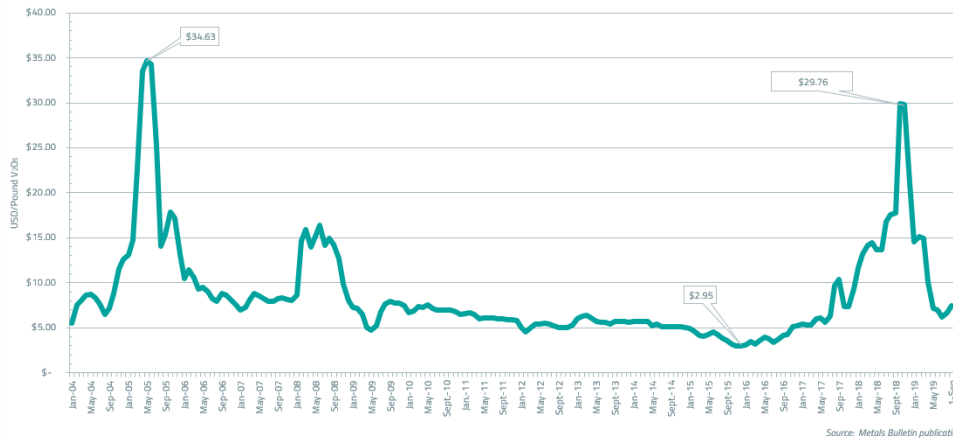
The development of new applications of vanadium in steel further increases demand – automotive, aviation and aerospace; powerlines and power pylons; high-strength structures.

Steel Market

V2Os Distribution Chart - Jan 2004 to August 2019
Inflated to Nov. 2019 USD



Metal Bulletin V2Os Monthly Midpoint Average Price
Inflated to August 2019 US\$



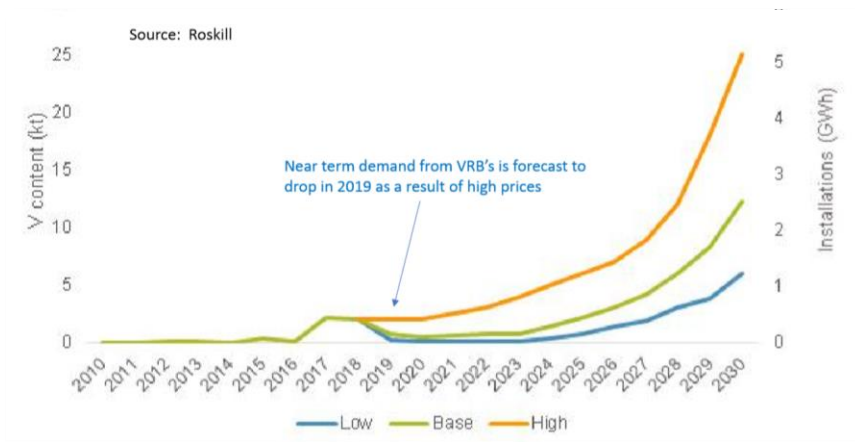
Source: Metals Bulletin publication

Vanadium has historically experienced long periods of low prices, followed by periods of high prices – lowest quartile producers are best positioned to survive and benefit.

Recent price drop due to niobium substitution and delayed implementation of new standards in China, reduction in steel market growth.

Price has now risen and is stabilising at market supply/demand balance. Expected to be between US\$8-12 for the foreseeable future.

Energy Storage Market



Emerging Market

Energy storage is an emerging market for vanadium, accounting for around 2% of global vanadium consumption.

Vanadium in Batteries

Vanadium electrolyte is used in vanadium redox flow batteries (VRFBs), and vanadium can also be used as the cathode material in Li-ion batteries.

Hybrid Systems

Hybrid systems that use VRFBs alongside Li-ion batteries are already being used – these systems combine the best of both technologies.



Vanadium Redox Flow Batteries



Redox Flow Batteries

A redox flow battery is made up of two tanks filled with electrolyte fluid – the electrolyte acts as cathode and anode and tank size determines battery capacity. In a vanadium redox flow battery, the fluid used is vanadium electrolyte, which contains 145g of high-purity V_2O_5 per litre.

New Market Entrants

Rising prices have led to innovations and new entrants. E.g. advancements using welded stack technology; electrolyte leasing; changing power-to-energy ratio; dispatchable energy at solar farms; government incentives; 1GWh of new vanadium energy storage needing ~10,000 tonnes of high-purity V_2O_5 .

VSUN Energy

VSUN Energy, AVL's 100% owned subsidiary is focused on growing the VRFB market.



VRFB Characteristics



The VRFB is **non-flammable**, making it safer than other batteries on the market.



Can charge and discharge **simultaneously**, with **100%** depth of discharge.



The vanadium electrolyte in a VRFB can be **reused indefinitely**.

**V
R
F
B**

An **energy battery**, able to store large amounts of energy for later use



It's **easy to scale**, just add modules or introduce larger electrolyte tanks.



Lifespan of over 20 years with **no degradation of capacity** over time.





VSUN Energy

About VSUN Energy

VSUN Energy is AVL's fully owned subsidiary. VSUN was launched by AVL in 2016 to drive growth of the VRFB market in Australia. Its first VRFB installation was at a native tree nursery in Busselton, Western Australia.



VRFB Sale Secured

In September 2019, VSUN Energy secured the sale of a solar and a 20kW/80kWh VRFB energy storage system to an orchard in Pakenham, Victoria.

- The system will provide a minimum of four hours of stored renewable energy with its configuration.
- It will allow the client to increase their onsite renewable generation and consumption.

Global VRFB Update

Vanadium Redox Flow Battery (VRFB)
technology is increasingly being tested or deployed across the globe

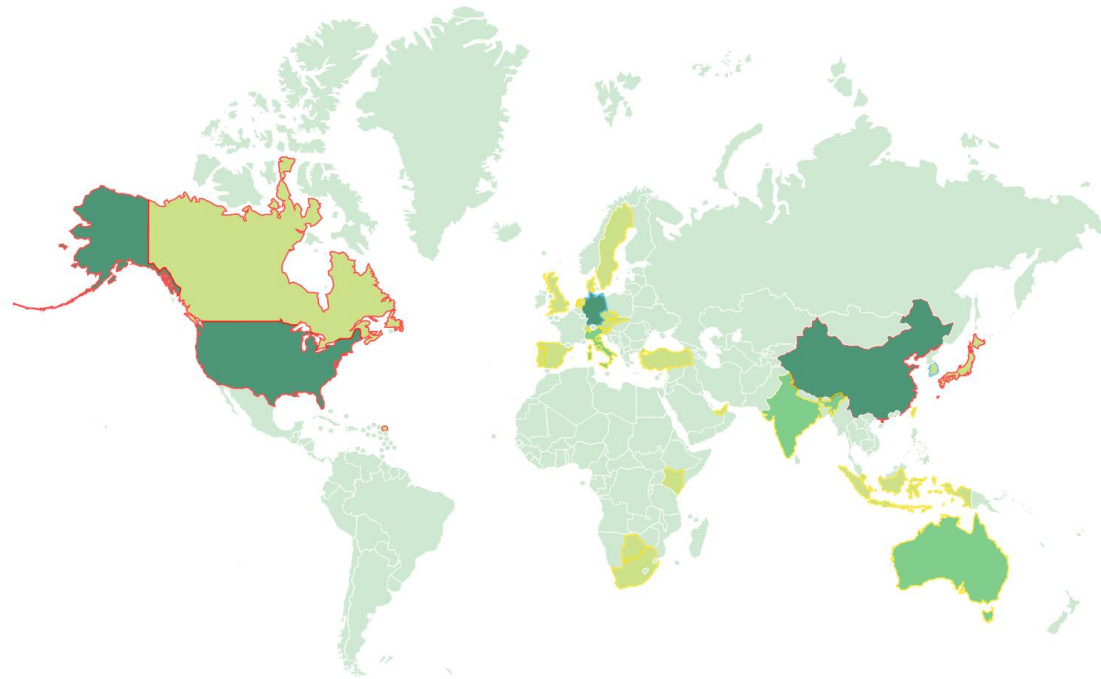


Number of VRFBs

● 1 - 5 VRFBs ● 6 - 10 VRFBs ● > 11 VRFBs

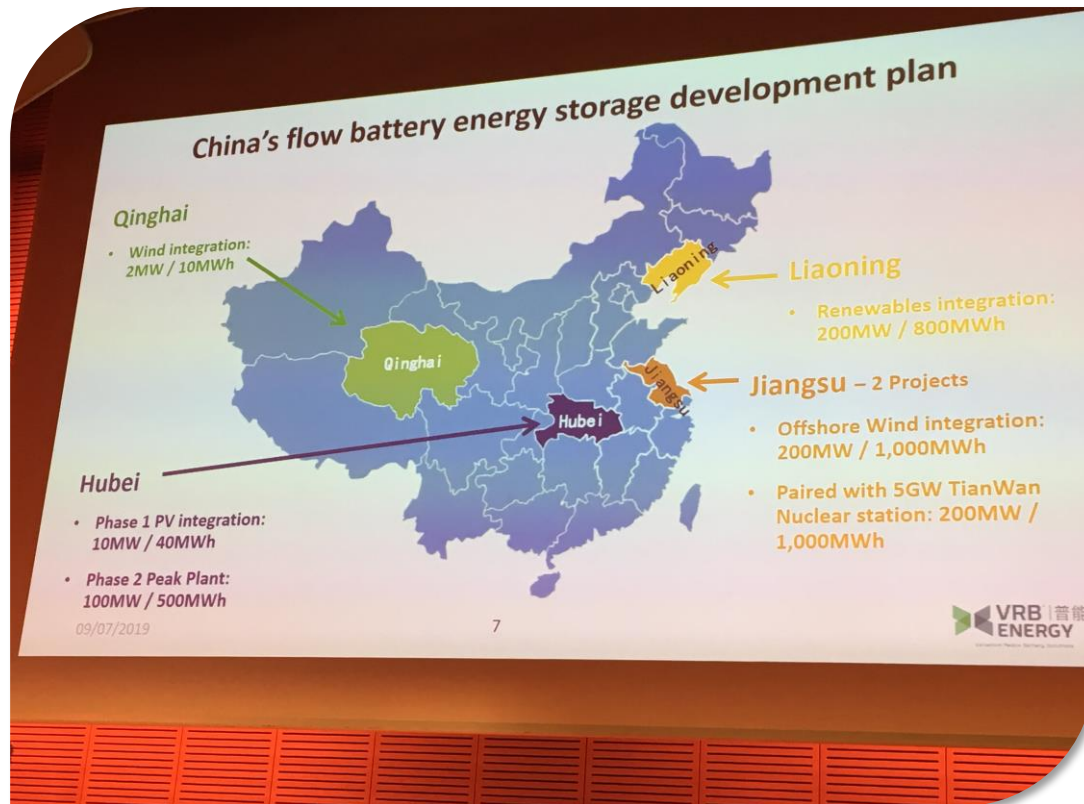
Size of VRFBs in Kilowatts

● 1 - 1000 kW ● 1001 - 2000 kW ● > 2000 kW



Country	VRFBs	kW	kWh
Australia	7	945	4,629.90
Barbuda	1	3,000	12,000.00
Botswana	1	112	560.00
Canada	3	2,500	10,000.00
China	17	15,825	48,005.00
Czech Rep.	3	47	209.90
Denmark	3	40	260.00
Germany	15	1,530	86,190.00
India	4	155	740.15
Indonesia	2	400	500.00
Italy	5	631	2,610.00
Japan	5	2,330	7,481.00
Netherlands	1	10	80.00
Portugal	5	5	60.00
Singapore	1	250	2,000.00
Slovenia	1	10	45.00
South Africa	2	745	2,950.00
South Korea	5	1,250	4,900.00
Spain	4	220	800.00
Sweden	1	800	1,800.00
Switzerland	2	210	460.00
U. Kingdom	5	805	5,180.00
USA	17	7,418	33,173.70
Austria	1	14	84.00
Kenya	1	140	84.00
Slovakia	2	107	640.00
UAE	1	10	40.00
Taiwan	1	125	750.00
Turkey	1	10	40.00

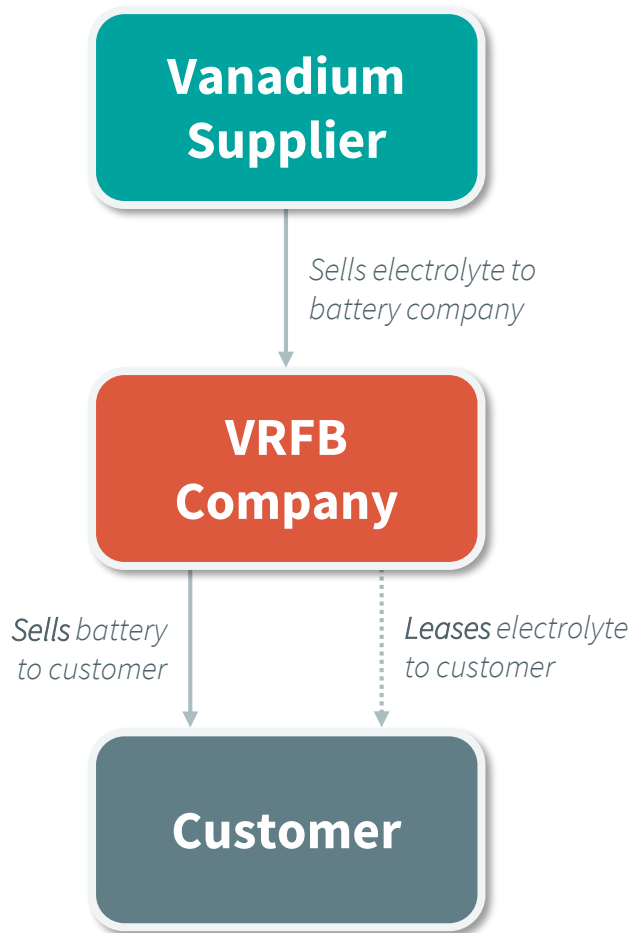
VRFB Installations in China



A new 5MW/20MWh vanadium redox flow battery project was announced at the vanadium and titanium conference in China, Sept 2019.

China committed to significant new VRFB installations in the near future. Map shows equivalent to 4 years production from The Australian Vanadium Project.

Leasing Vanadium Electrolyte



Direct Model

In the direct model for leasing vanadium electrolyte, the vanadium supplier sells the electrolyte directly to the VRFB company. The VRFB company leases the electrolyte to the customer and sells them the battery.



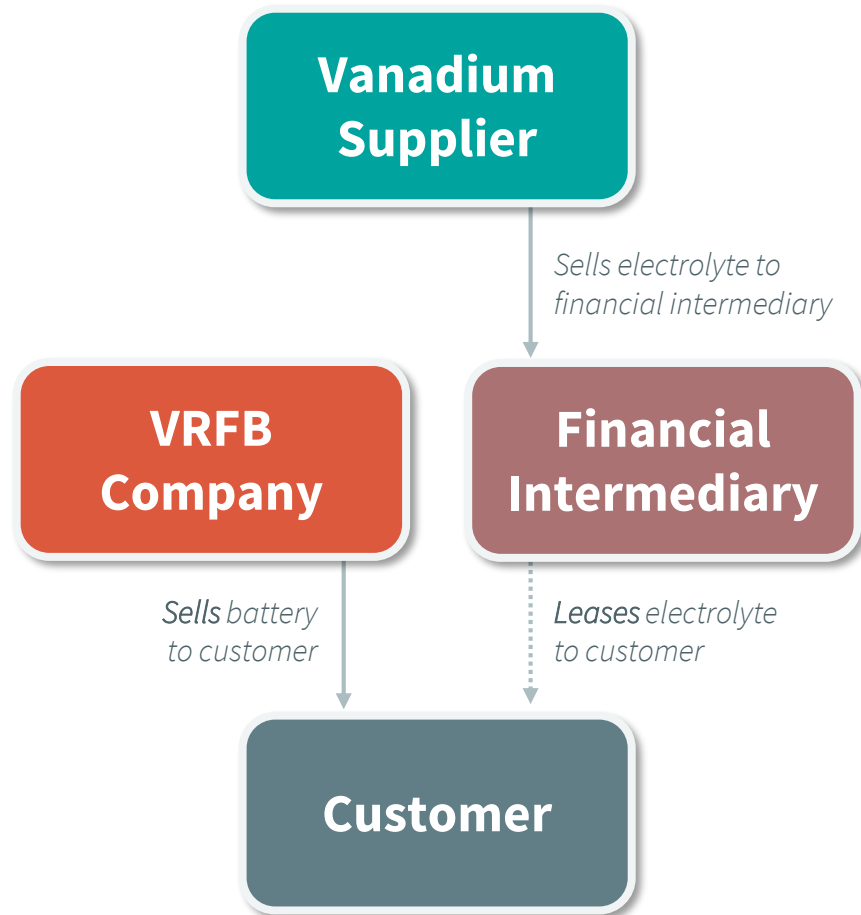
Leasing Vanadium Electrolyte

Indirect Model

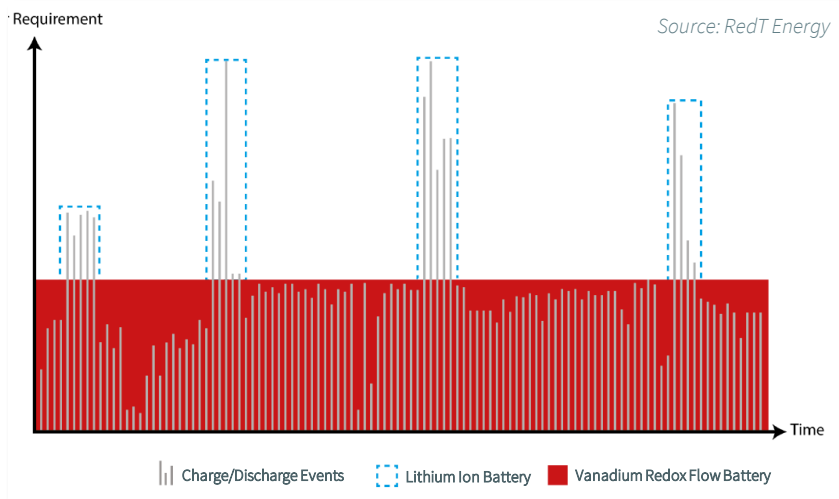
The vanadium supplier sells the vanadium electrolyte to a financial intermediary. The financial intermediary leases the electrolyte to the customer and the VRFB company sells the customer the battery.



Image Source: VanadiumCorp



Li-Ion and Hybrid Systems



Hybrid Systems

A hybrid setup incorporates a VRFB and a Li-ion battery within the same system, for complex energy requirements – the VRFB is used as the ‘workhorse’ while the Li-ion battery is used infrequently for a high-power boost.

Vanadium as Cathode

In addition to its use in VRFBs, vanadium can also be used as the cathode material in Li-ion batteries. Research for this application is ongoing.



The Australian Vanadium Project



Awarded Major Project Status in September 2019.

Bushveld-type VTM deposit amenable to conventional processing.

Completed PFS with strong fundamentals through all price cycles.

High-grade Resource of 96.7Mt at 1% V₂O₅ Reserve of 18Mt at 1.05% V₂O₅.

Expert team with extensive vanadium & corporate experience.

PFS opex of US\$4.15/lb V₂O₅ with potential to be the world's lowest cost vanadium producer.

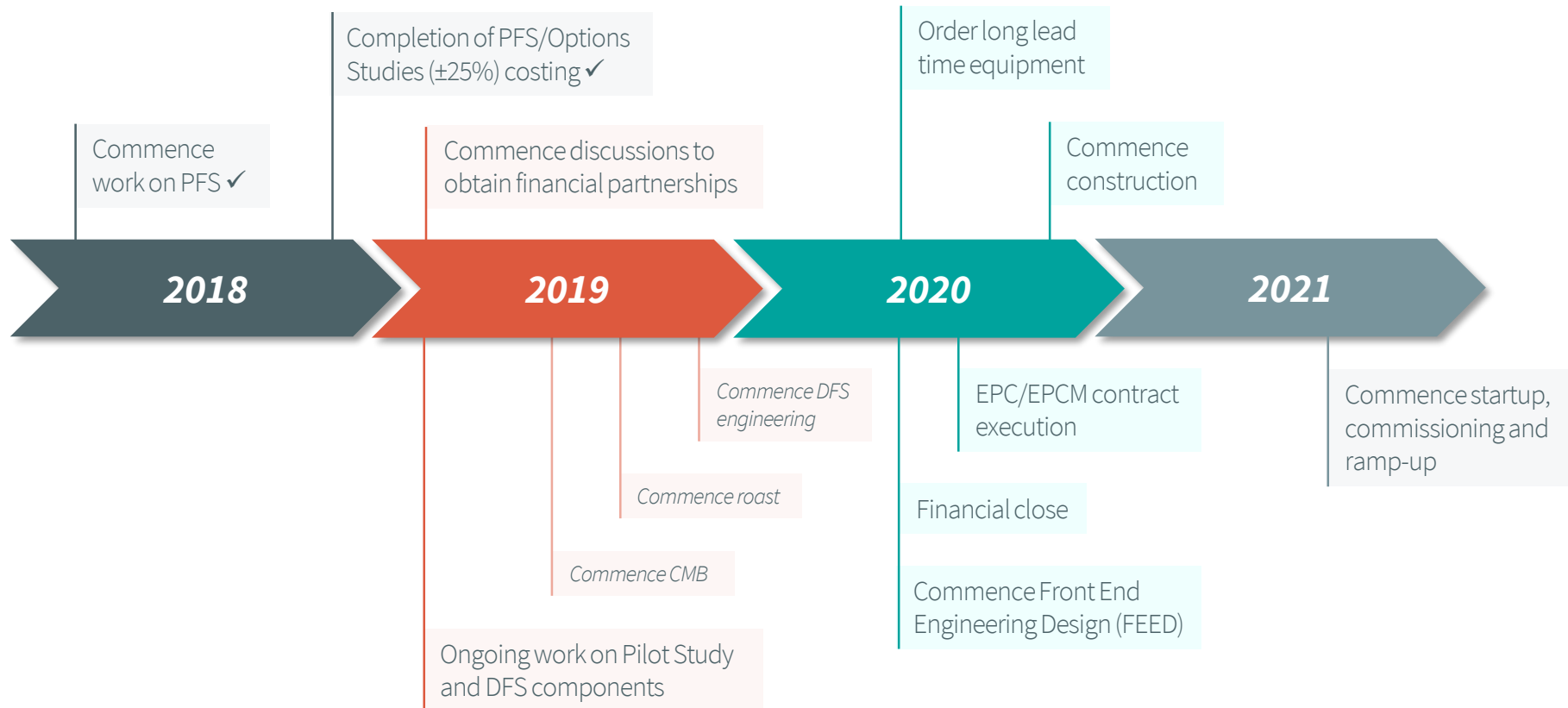
High-purity (99.4%) V₂O₅ flake and powder product – for steel, chemical & battery markets.

22.5Mlbs (10,100t) V₂O₅ production per annum – equal to 6.8% current global production.

Initial mine life 17+ years, with 65.9Mt at 0.97% of Inferred Resources for extension.

The Path Forward

The Australian Vanadium Project



An aerial photograph of a mining site in a red dirt landscape. A white truck with a large white tank is parked on a dirt road. In the foreground, there are workers in hard hats and safety gear, along with some equipment and a small structure. The background shows a vast, flat, red dirt area with scattered green trees.

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