

Australian  
VANADIUM  
LIMITED



# DIGGERS AND DEALERS 2022

August 2022

ASX:AVL

# ASX CHAPTER 5 COMPLIANCE AND CAUTIONARY AND FORWARD-LOOKING STATEMENTS

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.

## ASX Listing Rules 5.19 and 5.23

### ASX Listing Rule 5.19

The information in this Presentation relating to production targets, or forecast financial information derived from a production target, is extracted from the announcement titled "Bankable Feasibility Study for the Australian Vanadium Project" released to the ASX on 6 April 2022 which is available on the Company's website [www.australianvanadium.com.au](http://www.australianvanadium.com.au).

The Company confirms that all material assumptions underpinning the production target, or the forecast financial information derived from a production target, in the original market announcement continue to apply and have not materially changed.

### ASX Listing Rule 5.23

The information in this Presentation relating to exploration results and mineral resource and ore reserve estimates for the Australian Vanadium Project (other than the information on slide 36) is extracted from the announcement titled "Bankable Feasibility Study for the Australian Vanadium Project" released to the ASX on 6 April 2022 which is available on the Company's website [www.australianvanadium.com.au](http://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 that all material assumptions and technical parameters underpinning the estimates in the original 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 have not been materially modified from the original market announcement.

## Forward Looking Statements

This Presentation may contain certain forward-looking statements with respect to matters including but not limited to the financial condition, results of operations and business of AVL and certain of the plans and objectives of AVL with respect to these items. These forward-looking statements are not historical facts but rather are based on AVL's current expectations, estimates and projections about the industry in which AVL operates and its beliefs and assumptions.

Words such as "anticipates," "considers," "expects," "intends," "plans," "believes," "seeks," "estimates," "guidance" and similar expressions are intended to identify forward looking statements and should be considered an at-risk statement. Such statements are subject to certain risks and uncertainties, particularly those risks or uncertainties inherent in the industry in which AVL operates.

These statements are not guarantees of future performance and are subject to known and unknown risks, uncertainties, and other factors, some of which are beyond the control of AVL, are difficult to predict and could cause actual results to differ materially from those expressed or forecasted in the 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.

AVL cautions shareholders and prospective shareholders not to place undue reliance on these forward-looking statements, which relate only to events as of the date on which the statements are made.





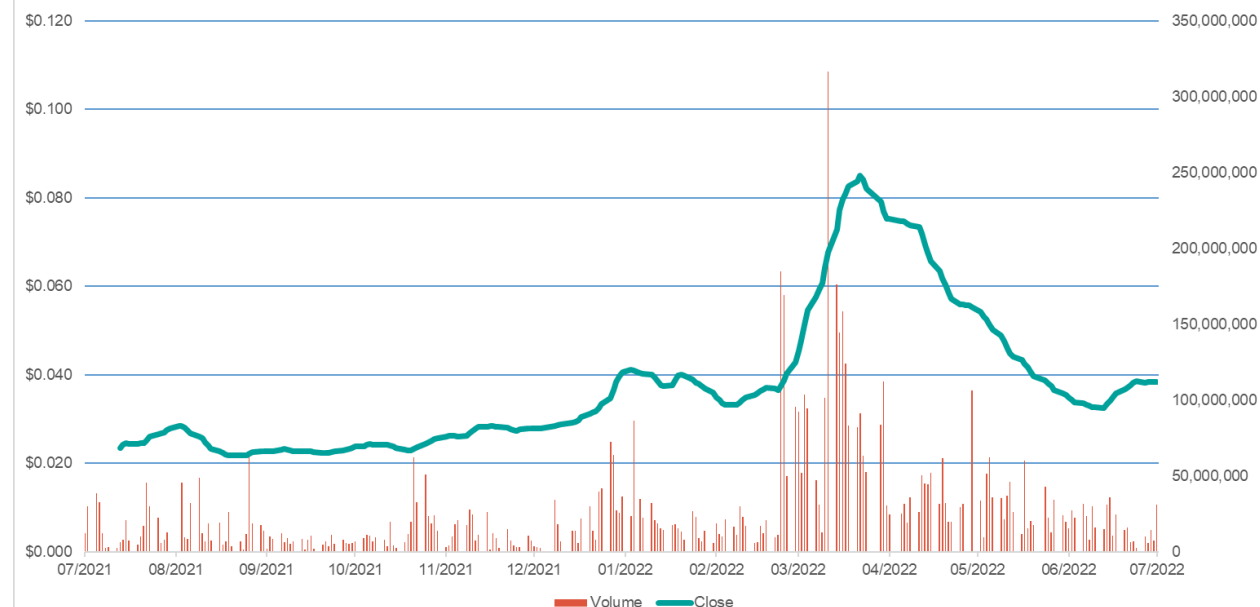
## CORPORATE OVERVIEW

## Australian Vanadium

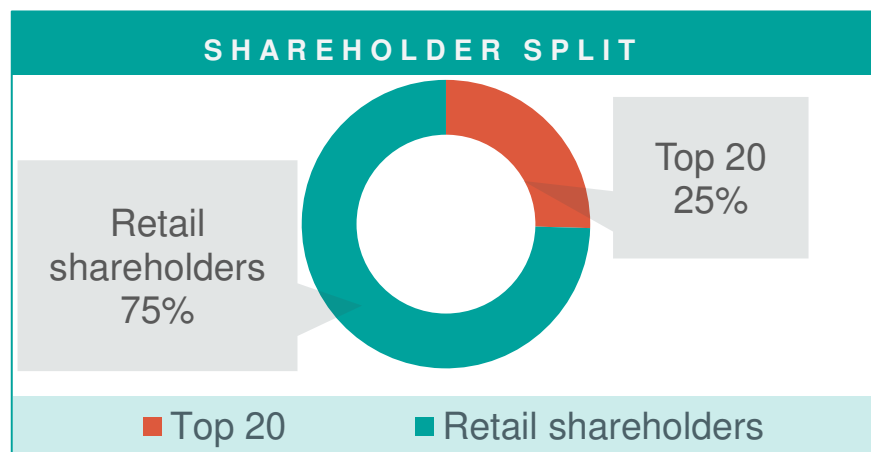
## KEY STATISTICS AS AT 22/07/22

Ordinary Shares on Issue	3.94b
Share Price	A\$0.041
Options on Issue Exp 18/12/22 @ \$0.025	355,385,353
Option Price (AVLOA)	A\$0.017
Average Daily Traded Volume	27.3M (~\$1.39M)
Market Cap (Undiluted)	A\$161.5M
Shareholders	15,703
Cash at the end of last quarter	\$26.5M

## AVL SHARE PRICE HISTORY (22/7/2022)



## SHAREHOLDER SPLIT



## TOP 5 SHAREHOLDERS

		%
1	Citicorp Nominees Pty Ltd	6.92%
2	BNP Paribas Nominees Pty Ltd ACF Clearstream	3.91%
3	Mr & Mrs Hoeksema	2.18%
4	Kalemois Pty Ltd	1.90%
5	HSBC Custody Nominees (Australia) Ltd	1.85%



AUSTRALIAN VANADIUM LIMITED

# Executive Summary



## Highest Grade

The Australian Vanadium Project is located near Meekatharra, Western Australia and is among the highest-grade vanadium projects in the world.



## Attractive Economics

Recently announced Bankable Feasibility Study. 25+ year mine life. Cash available to fund ongoing vanadium project work and developing key downstream markets ahead of finalising debt financing.



## Front End Engineering and Contractor

CMB EPC and Processing Plant EPCM evaluation and engagement underway



## Critical Mineral Project

AVL has recently been awarded a A\$49 million grant under the Australian Government's Modern Manufacturing Initiative Collaboration Stream towards the development of the Australian Vanadium Project.



## Focus on Export Finance and Offtake engagement

Targeting FID in Q4 2022.



## Downstream Options

AVL is also focused on developing key downstream markets - 100% owned subsidiary VSUN Energy promotes vanadium redox flow batteries (VRFBs) for renewable energy storage, a vanadium supply growth market.



# Vanadium Markets

## PRIMARY

### STEEL



# 92%

of current global  
vanadium consumption



Construction  
Industry



Ships



Tools



Trains

### CHEMICAL, AEROSPACE & OTHER



# 6%

of current global  
vanadium consumption



Jet Engines



Chemical uses



Aerospace  
Industry



3D Printing

## EMERGING & FUTURE

### RENEWABLE ENERGY STORAGE & AUTOMOTIVE



# 2%

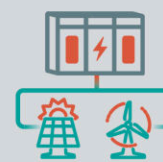
of current global  
vanadium consumption



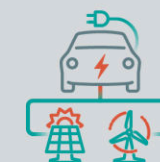
Vanadium Redox  
Flow Batteries



Automotive  
Industry



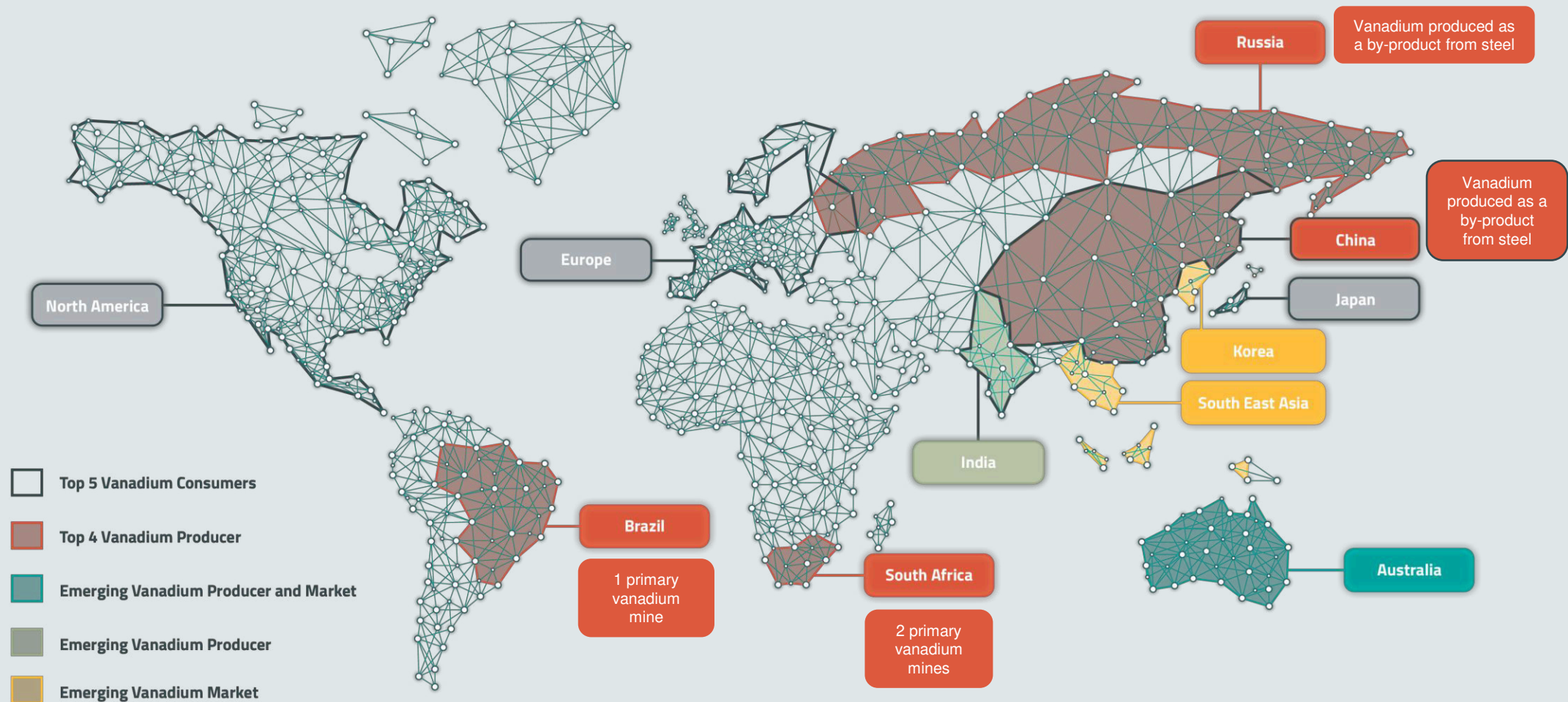
Standalone  
Power Station



EV Charging

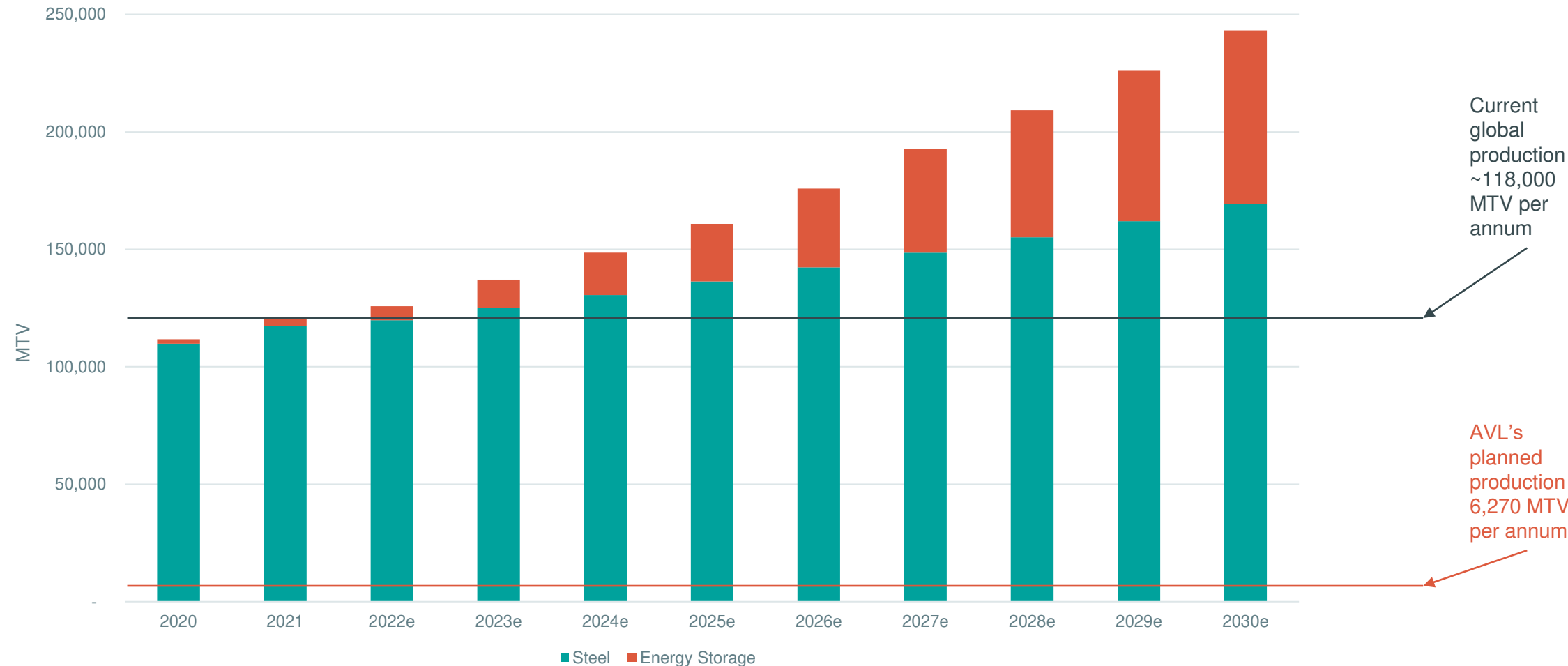


# Global Vanadium Dominated by China and Russia



VANADIUM MARKETS

# Projected energy storage growth to shift demand



Source – US based vanadium market specialist: TTP Squared, Inc

<sup>1</sup> See ASX Announcement "Bankable Feasibility Study for Australian Vanadium Project" dated 6<sup>th</sup> April 2022. All material assumptions underpinning the production target continue to apply and have not materially changed.





# Why use the VRFB for energy storage?



Able to store large amounts of **energy** for later use



**Easy to scale** power and energy separately



Lifespan over 20 years with **no degradation in performance** over time



**Non-flammable** making it safer than other batteries on the market



Multiple daily cycles, with **100% depth of discharge** available



Vanadium electrolyte can be **reused indefinitely** or used in steel market





## CORPORATE OVERVIEW

Experienced Corporate Team *International vanadium credentials*

**Cliff Lawrenson**  
Non-Executive  
Director

Over 10 years of experience chairing public and private companies post extensive executive career in resources, energy, infrastructure and investment banking.

Currently Non-Executive Chair of Paladin Energy (ASX: PDN), Caspin Resources (ASX:CPN), Canyon Resources (ASX:CAY) and privately owned Pacific Energy and Onsite Rental Group.



**Vincent Algar**  
Managing  
Director

Has over 25 years of 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. Currently Director of US Vanadium LLC.



**Leslie Ingraham**  
Executive  
Director

Has over 30 years of experience in business and has performed the roles of Executive Director and Non-executive Director for ASX listed companies.

Extensive experience in capital raising and mineral prospecting and exploration, corporate advisory, investor relations and building long lasting relationships with high end investors in Australia and overseas.



**Todd Richardson**  
Chief Operating  
Officer

Over 20 years of **experience in the vanadium sector** and an expert in vanadium process design, commissioning and operations.

An extensive background in operations, management and technical services, both in the USA and Australia, in all phases of plant operation.



**Liesl Strachan**  
Chief Financial  
Officer

More than 15 years of experience in the resources sector, both in Australia and the UK.

Currently provides financial services to ASX listed exploration companies Big River Gold Ltd (ASX: BRV) and Bryah Resources Ltd (ASX: BYH).

## CORPORATE OVERVIEW

## Experienced Technical Team in Place and Growing



**Gemma Lee**  
Principal  
Geologist

20 years of experience in resource development in WA across multiple commodities. Undertakes and oversees geological modelling and reporting for resource updates. Assists with DMP and environmental approvals.



**Tony Standish**  
Exploration  
Manager

Responsible for drilling and field safety programs at the Australian Vanadium Project. His strong relationship with pastoralists and Traditional Owners has been invaluable as the project moves towards development.



**Greg O'Connor**  
Process  
Engineer  
Metallurgist

More than 20 years of experience in multi commodity metallurgy with extensive experience in comminution, hydrometallurgy and flotation at laboratory and pilot scale. Significant plant experience and Process Mineralogy skills and a PhD in metallurgy.



**Trevor Smith**  
Project Manager

A chartered chemical engineer with more than 30 years of experience in minerals processing bulk materials handling and project management.



**Ashley Jones**  
Geology  
Consultant

Experienced in resource development in WA across multiple commodities. Provides oversight for geological resources and exploration strategy. Responsible for mine planning, scheduling and water. Non-Executive Director Star Minerals, Director AI Exploration Services Australia and Director Kamili Geology.



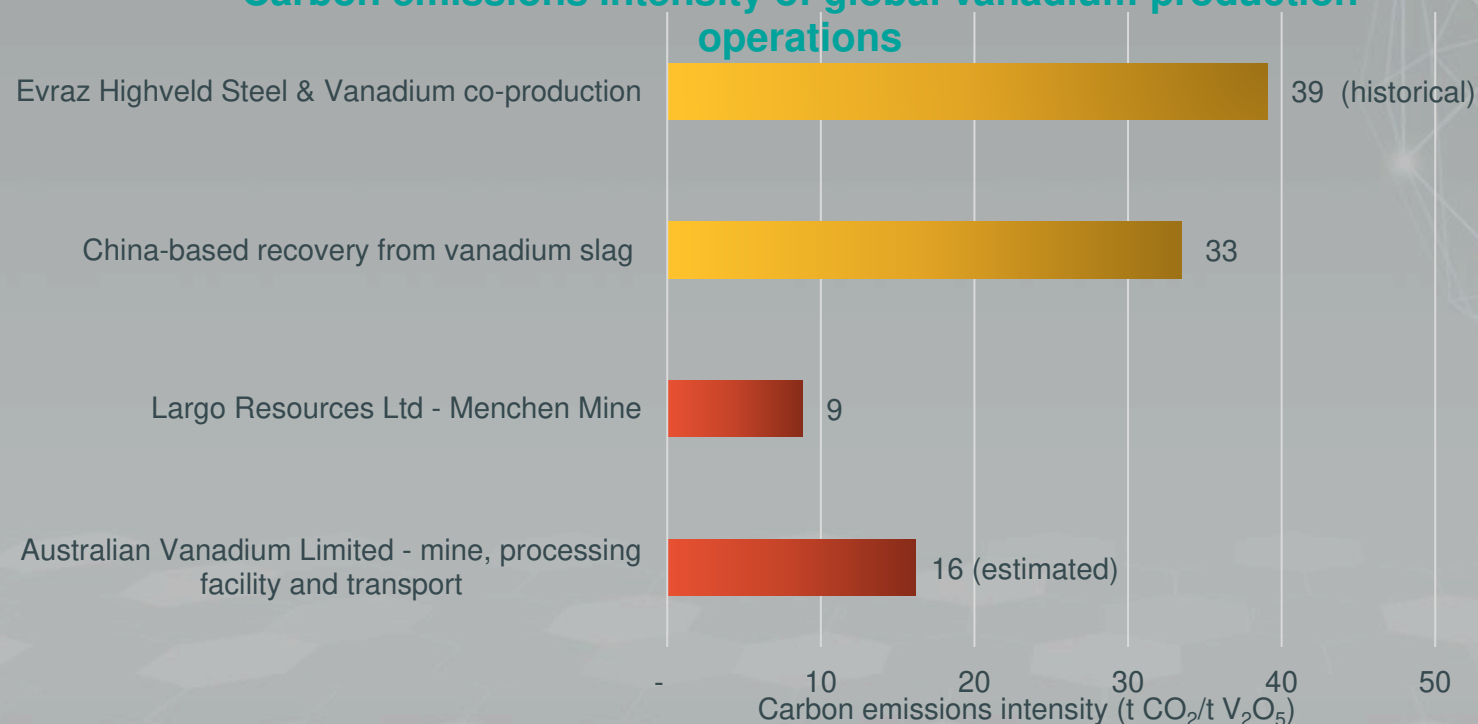
**Samantha McGahan**  
VSUN Energy  
Manager

Over 25 years in a diverse range of industries spanning education, law and technology. Has led the development of VSUN Energy since 2016. Fosters a strong network throughout both vanadium and energy markets and has experience in marketing.

## ESG IN ACTION

# Strong ESG Focus

## Carbon emissions intensity of global vanadium production operations



The vanadium produced by the AVL Project is estimated to result in a **net reduction** in GHG emissions of approximately 1,250 t CO<sub>2</sub>/t V<sub>2</sub>O<sub>5</sub> or **14 million t CO<sub>2</sub>-e per annum**, considering direct and indirect GHG emissions. (if used in 400MPa HSLA steel and VRFBs)

*The pathway to net zero for the minesite and processing plant has been mapped to 2050*

Largo Resources. (2019). *2019 Sustainability Report*.

Kumar, Santos, Braham, Sellers, Banerjee and Dixit, Texas A&M (2021). Punching above its weight: life cycle energy accounting and environmental assessment of vanadium microalloying in reinforcement bar steel

Weber, Peters, Baumann and Weil (2018). Life Cycle Assessment of a Vanadium Redox Flow Battery

Umwelt (2021) Greenhouse Gas Management Plan for the Australian Vanadium Project





## ESG IN ACTION

# Strong ESG Focus

## Community Partners

- ▶ AVL is working with the Yugunga-Nya People to provide employment opportunities and help build a brighter future for the younger members of the group
- ▶ AVL is a proud supporter of the Stephen Michael Foundation and its work supporting children in education through sports and other activities
- ▶ Sponsorship of the Foundation has enabled AVL to engage with and build relationships in the wider Meekatharra community
- ▶ AVL has a Community Relations Advisor based in Geraldton
- ▶ The Company is supporting Mid West students by sponsoring awards and scholarships at Central Regional TAFE
- ▶ AVL is actively involved in the Mullewa community sponsoring community events and organisations such as the Mullewa CRC, the Mullewa Football Club and the Mullewa Agricultural Show
- ▶ AVL is an active member of the Mid West Chamber of Commerce and Industry and Pollinators Inc, a member-based social enterprise association



## ESG IN ACTION

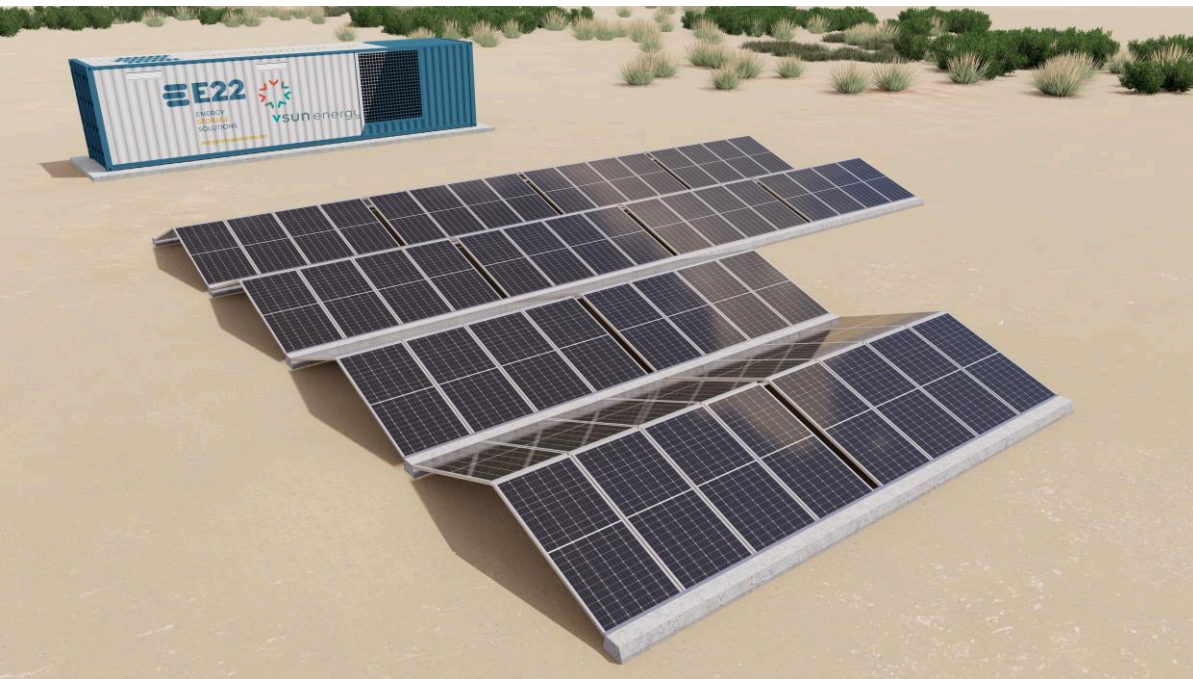
# Strong ESG Focus

## Governance

- ▶ Experienced and competent Board of Directors
- ▶ Tight adherence to ASX listing rules
- ▶ Long term engagement with Environmental Protection Agency
- ▶ Company policies being refined by consultant Jukes Todd
- ▶ Strong corporate culture within the organisation at all levels

## Renewable energy strategy

- ▶ AVL will utilise renewable energy resources on its sites
- ▶ Use of solar and/or wind generation at the minesite and processing plant
- ▶ Installation of VRFBs at both sites for energy storage and EV charging
- ▶ Collaboration with ATCO for delivery of green hydrogen into the natural gas supply at the processing plant
- ▶ Potential use of electric or green hydrogen fuelled vehicles onsite and for haulage
- ▶ Downstream processing of vanadium electrolyte
- ▶ Subsidiary focused on growing the vanadium redox flow battery market through installation and maintenance of systems



*Pictured left* – standalone power system for IGO's Nova Nickel Operation







# THE AUSTRALIAN VANADIUM PROJECT





**Unique FeTi Co  
Product sales  
opportunity**

**Infrastructure – port,  
water, gas, rail, road,  
power, airport**

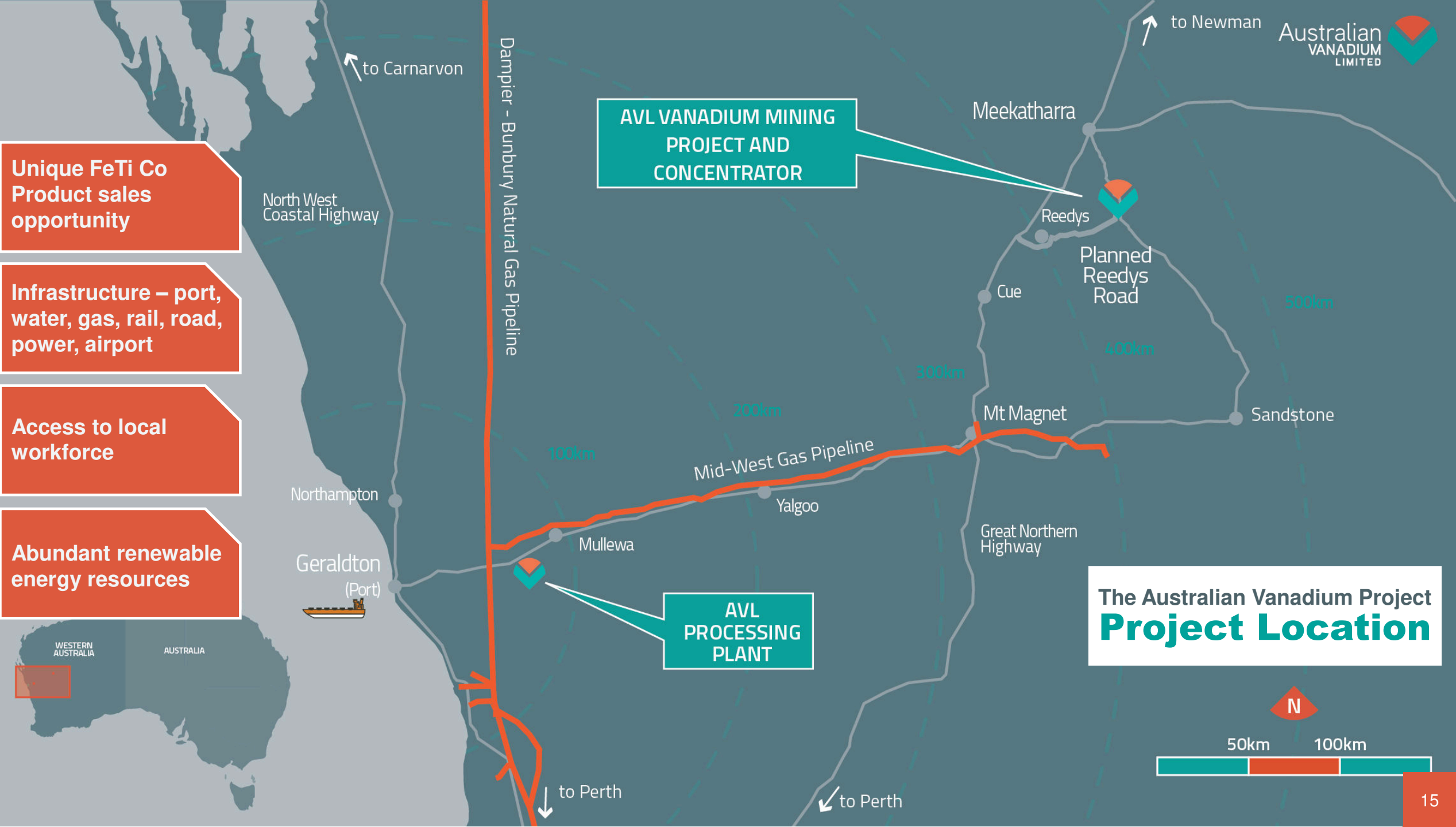
**Access to local  
workforce**

**Abundant renewable  
energy resources**

**AVL VANADIUM MINING  
PROJECT AND  
CONCENTRATOR**

**AVL  
PROCESSING  
PLANT**

**The Australian Vanadium Project  
Project Location**



# Recent BFS – Robust Project Metrics



## RESOURCE

Total Resource

**239Mt @ 0.73% V<sub>2</sub>O<sub>5</sub>**

High-grade 95.6Mt @ 1.07 V<sub>2</sub>O<sub>5</sub>

Ore Reserve

**30.9Mt @ 1.09 V<sub>2</sub>O<sub>5</sub>**

Proved 10.5Mt @ 1.11% V<sub>2</sub>O<sub>5</sub>

Probable 20.4Mt @ V<sub>2</sub>O<sub>5</sub>

**11,200tpa V<sub>2</sub>O<sub>5</sub>**

Vanadium production

**25+ years**

mine life



## STRONG FINANCIAL OUTCOMES

Pre-Tax NPV<sub>7.5</sub>

**A\$833M**

IRR

**20.6%**

EBITDA Annual Average

**A\$175M**

EBITDA Project

**A\$4.4B**

NPAT Project

**A\$2.2B**



## OPEX, CAPEX

**C1 OPEX**

**US\$4.43/lb V<sub>2</sub>O<sub>5</sub>**

**PRE-PRODUCTION**

**CAPEX US\$435M**

**900,000tpa**

FeTi coproduct annual export

*Note: Information within this slide as detailed in ASX Announcement "Bankable Feasibility Study for Australian Vanadium Project" dated 6th April 2022. All material assumptions underpinning the production target and forecast financial information derived from a production target continue to apply and have not materially changed.*

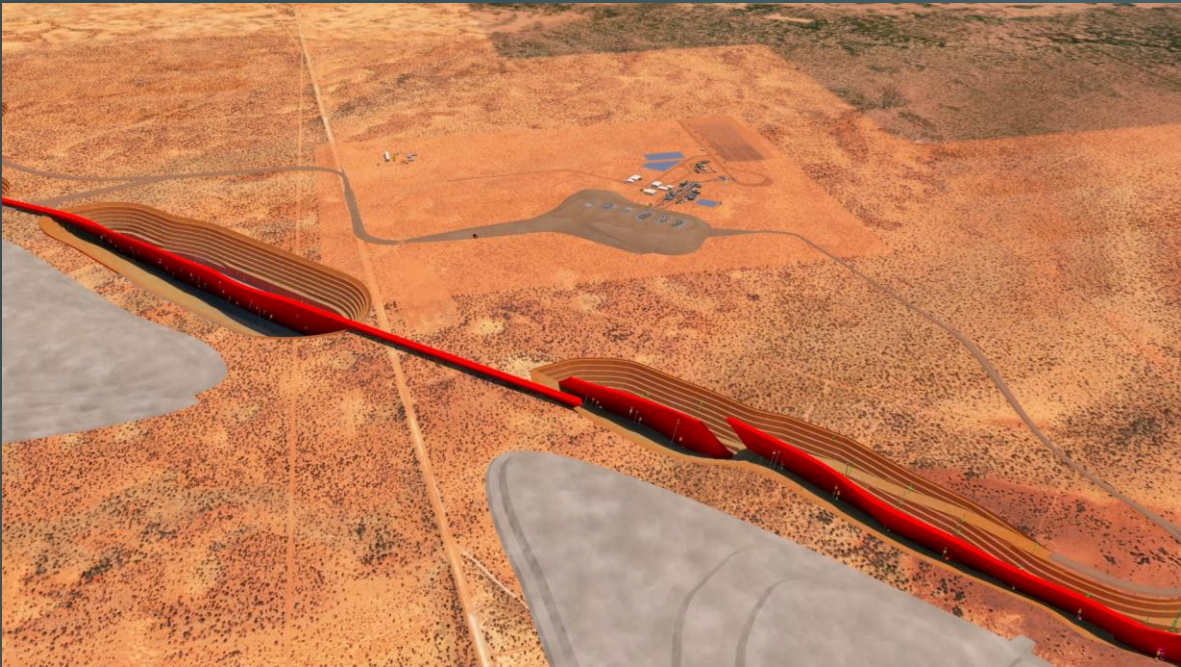






## THE AUSTRALIAN VANADIUM PROJECT

# Pit, Beneficiation Plant and Processing Plant







# Project Delivery





# Vertical Integration Vanadium Production





## THE AUSTRALIAN VANADIUM PROJECT

# Vanadium Electrolyte Plant

- Vanadium electrolyte plant being built at Kwinana industrial area, south of Perth
- Partly funded by Australian Government manufacturing grant of \$3.69M
- Vanadium electrolyte technology and vanadium feedstock to be provided by U.S. Vanadium LLC
- Plant build being undertaken by WA engineering group Primero
- Initial plant to produce 1.6M litres per annum (able to store 33MWh) of vanadium electrolyte for use in Australian deployed VRFBs
- Local electrolyte production provides AVL and VSUN Energy with competitive advantage



*U.S. Vanadium LLC electrolyte plant in Arkansas, US*

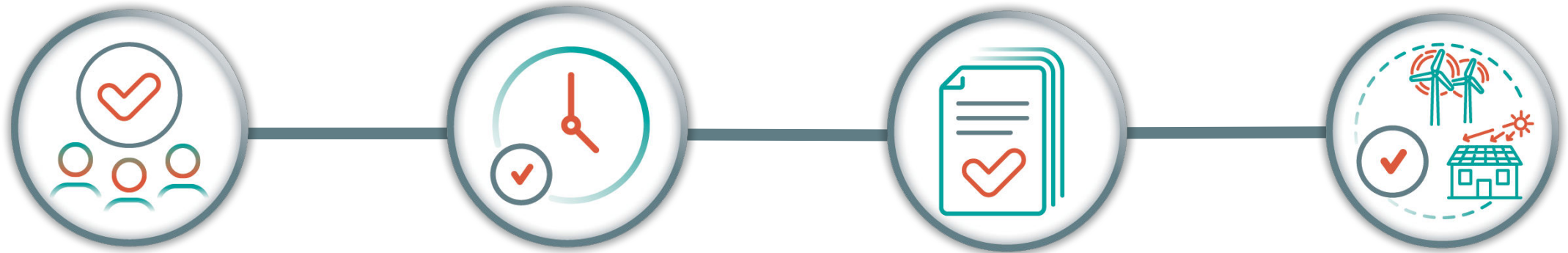
## AUSTRALIAN VANADIUM PROJECT

# Project Delivery



## IN SUMMARY

# Australian Vanadium Project



## Expertise

International vanadium experience, skilled knowledgeable technical and commercial team

## Timing

Increased vanadium consumption in the steel market, steel alloys and vanadium's use in VRFBs are major global drivers

## Project



Globally significant resource, strong business fundamentals, long mine life and a focus on more than mining

## Business Model

Vertically integrated approach, collaboration with renewable energy and battery markets, underpinned by an action-based approach to assist global pathway to Net Zero Emissions





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Level 1, 85 Havelock Street, West Perth,  
Western Australia 6005



[australianvanadium.com.au](http://australianvanadium.com.au)

Australian Vanadium Limited | ASX: AVL

## GEOLOGY &amp; MINING

## Resource table

DOMAINS	CATEGORY	Mt	V <sub>2</sub> O <sub>5</sub> %	Fe %	TiO <sub>2</sub> %	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	LOI %
HG 10	Measured	11.3	1.14	43.8	13.0	9.2	7.5	3.7
	Indicated	27.5	1.10	45.4	12.5	8.5	6.5	2.9
	Inferred	56.8	1.04	44.6	11.9	9.4	6.9	3.3
	<b>Subtotal</b>	<b>95.6</b>	<b>1.07</b>	<b>44.7</b>	<b>12.2</b>	<b>9.1</b>	<b>6.8</b>	<b>3.2</b>
LG 2-5	Measured	-	-	-	-	-	-	-
	Indicated	<b>54.9</b>	<b>0.50</b>	<b>24.9</b>	<b>6.8</b>	<b>27.6</b>	<b>17.1</b>	<b>7.9</b>
	Inferred	<b>73.6</b>	<b>0.48</b>	<b>25.0</b>	<b>6.4</b>	<b>28.7</b>	<b>15.4</b>	<b>6.6</b>
	<b>Subtotal</b>	<b>128.5</b>	<b>0.49</b>	<b>24.9</b>	<b>6.6</b>	<b>28.2</b>	<b>16.1</b>	<b>7.2</b>
Trans 6-8	Measured	-	-	-	-	-	-	-
	Indicated	-	-	-	-	-	-	-
	Inferred	14.9	0.66	29.0	7.8	24.5	15.1	7.8
	<b>Subtotal</b>	<b>14.9</b>	<b>0.66</b>	<b>29.0</b>	<b>7.8</b>	<b>24.5</b>	<b>15.1</b>	<b>7.8</b>
Total	Measured	11.3	1.14	43.8	13.0	9.2	7.5	3.7
	Indicated	82.4	0.70	31.7	8.7	21.2	13.5	6.2
	Inferred	145.3	0.71	33.0	8.7	20.7	12.0	5.4
	<b>Subtotal</b>	<b>239.0</b>	<b>0.73</b>	<b>33.1</b>	<b>8.9</b>	<b>20.4</b>	<b>12.3</b>	<b>5.6</b>

Note: Mineral Resource estimate by domain and resource classification using a nominal 0.4% V<sub>2</sub>O<sub>5</sub> wireframed cut-off for low grade and nominal 0.7% V<sub>2</sub>O<sub>5</sub> wireframed cut-off for high grade (total numbers may not add up due to rounding).  
See ASX announcement "Bankable Feasibility Study for Australian Vanadium Project" dated 6th April 2022.



## GEOLOGY &amp; MINING

# Ore Reserve Table

The Ore Reserve for the Australian Vanadium Project 2022 Bankable Feasibility Study is detailed in the table below.

Ore Reserve	Mt	V <sub>2</sub> O <sub>5</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	SiO <sub>2</sub> %	LOI%	V <sub>2</sub> O <sub>5</sub> production kt	Ore Reserve	Mt
Proved	10.5	1.11	61.6	12.8	9.5	3.7	70.9	Waste	238.5
Probable	20.4	1.07	63.4	12.2	9.2	3.0	152.9	Total Material	269.4
<b>Total Ore</b>	<b>30.9</b>	<b>1.09</b>	<b>62.8</b>	<b>12.4</b>	<b>9.3</b>	<b>3.2</b>	<b>223.8</b>	Strip Ratio	7.7

Note: Tonnage and contained metal have been rounded to reflect the accuracy of the estimate, and numbers might not add due to rounding.

The Ore Reserves and Inferred Resources utilised for the life of mine (LOM) schedule for the Australian Vanadium Project 2022 Bankable Feasibility Study, inclusive of the Ore Reserve above, is detailed in the table below.

Ore Reserve	Mt	V <sub>2</sub> O <sub>5</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	SiO <sub>2</sub> %	LOI%	V <sub>2</sub> O <sub>5</sub> production kt	Ore Reserve	Mt
Proved	10.5	1.11	61.6	12.8	9.5	3.7	70.9	Waste	296.5
Probable	20.4	1.07	63.4	12.2	9.2	3.0	152.9	Total Material	335.7
Inferred Resources	8.2	1.04	63.4	12.0	9.2	3.1	57.6	Strip Ratio	7.6
<b>Total Ore</b>	<b>39.2</b>	<b>1.08</b>	<b>62.9</b>	<b>12.3</b>	<b>9.3</b>	<b>3.2</b>	<b>281.4</b>		

Note: Tonnage and contained metal have been rounded to reflect the accuracy of the estimate, and numbers might not add due to rounding.

The Ore Reserve for the Australian Vanadium Project 2022 Bankable Feasibility Study was developed by Orelogy Consulting Pty Ltd. The economic evaluation of the Project in this presentation is underpinned by Reserves and Inferred Resources comprising:

- the Ore Reserve including both Proved and Probable classified material.
- additional Inferred Mineral Resources comprising approximately 20.5% of the proposed process plant feed material.

See ASX Announcement "Bankable Feasibility Study for Australian Vanadium Project" dated 6<sup>th</sup> April 2022.





# Social Media Impact

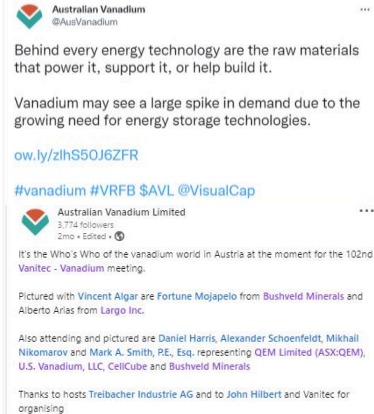
AVL's world renowned social media channels provide followers with updates on the company's activities and additional market information about vanadium as a critical metal and battery metal.



Australian Vanadium @AusVanadium · Jul 15  
AVL's Project Manager Trevor Smith is in Meekatharra this weekend for meetings. He was lucky enough to catch up with artist Helen Ansell who grew up in Meeka and now lives in Mullewa - our two project locations. Helen is currently painting this fantastic mural in Meeka



Australian Vanadium @AusVanadium · May 19  
Alison Reeve from @GrattanInst talks about a need for us to care about the embodied carbon in the construction industry as an enabler for green products such as green steel. #Vanadium's role in carbon reduction in the construction industry is already having a positive impact



Australian Vanadium @AusVanadium · Jul 15  
Behind every energy technology are the raw materials that power it, support it, or help build it.

Vanadium may see a large spike in demand due to the growing need for energy storage technologies.

ow.ly/zH50J6ZFR

#vanadium #VRFB \$AVL @VisualCap

Australian Vanadium Limited 3,774 followers 2mo · Edited ·

It's the Who's Who of the vanadium world in Austria at the moment for the 102nd Vanitec - Vanadium meeting.

Pictured with Vincent Algar are Fortune Mojapelo from Bushveld Minerals and Alberto Arias from Largo Inc.

Also attending and pictured are Daniel Harris, Alexander Schoenfeldt, Mikhail Nikomarov and Mark A. Smith, PE, Esq. representing QEM Limited (ASX:QEM), U.S. Vanadium, LLC, CelCube and Bushveld Minerals

Thanks to hosts Treibacher Industrie AG and to John Hilbert and Vanitec for organising

#vanadium #VRFB

Australian Vanadium @AusVanadium · Jun 3, 2022 · Hootsuite Inc.

Did you know Emeritus Professor Maria Skyllas-Kazacos, was appointed Member of the Order of Australia "for service to science & technology, particularly in the development of the vanadium redox battery as an alternative power source."

#VRFB #vanadium #energystorage @UNSW

"I'm keen to see more vanadium production, especially here in Australia, because I mean, this is where we invented the battery and this is where we would like some returns to come back to the community."

Maria Skyllas-Kazacos

11:49 AM · Jun 3, 2022 · Hootsuite Inc.

1 comment · 3 shares

Reactions

454



Australian Vanadium @AusVanadium · Jun 3, 2022 · Hootsuite Inc.

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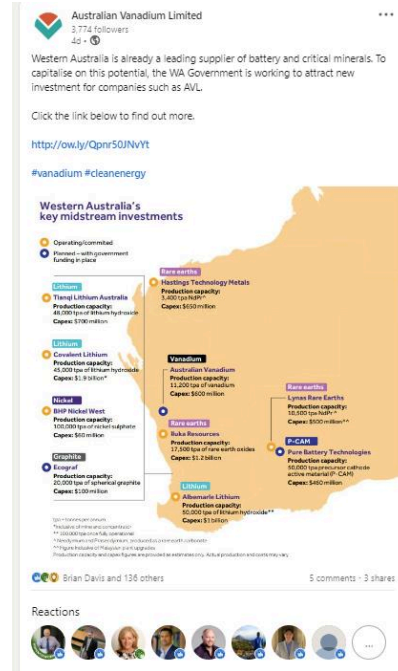
Maria Skyllas-Kazacos

11:49 AM · Jun 3, 2022 · Hootsuite Inc.

1 comment · 3 shares

Reactions

454



Australian Vanadium Limited @AusVanadium · Jun 3, 2022 · Hootsuite Inc.

Western Australia is already a leading supplier of battery and critical minerals. To capitalise on this potential, the WA Government is working to attract new investment for companies such as AVL.

Click the link below to find out more.

http://ow.ly/Qpnr50JNVt

#vanadium #cleanenergy

Australian Vanadium @AusVanadium · May 19

The construction sector is the biggest consumer of steel products and vanadium plays an essential role in providing high strength, cost effective solutions.

Source: @VanitecVanadium

#vanadium #criticalmineral \$AVL

USES OF VANADIUM

CONSTRUCTION

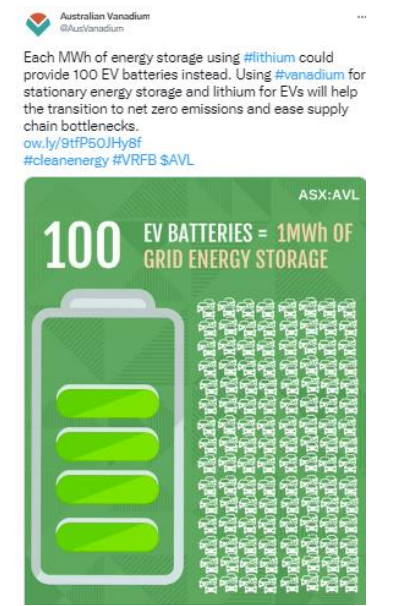
Vanadium is the most widely used alloying element for strengthening steels employed in buildings and bridges.

ASX:AVL

1 comment · 3 shares

Reactions

454



Australian Vanadium @AusVanadium · May 26, 2022 · Twitter Web App

Each MWh of energy storage using #lithium could provide 100 EV batteries instead. Using #vanadium for stationary energy storage and lithium for EVs will help the transition to net zero emissions and ease supply chain bottlenecks.

ow.ly/9tF60JHy8f

#cleanenergy #VRFB \$AVL

Australian Vanadium @AusVanadium · May 19

Australian vanadium battery technology gets fresh shot at long duration game @renew\_economy

reneweconomy.com.au/australian-van...

#vanadium #VRFB \$AVL @VSUNEnergy

reneweconomy.com.au

Australian vanadium battery technology gets fresh shot at long duration game

Australian vanadium flow battery maker signs MoU with Sydney-based firm to develop grid-scale opportunities for its long-duration storage technology.

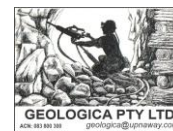
2:38 PM · May 26, 2022 · Twitter Web App

11 View Tweet analytics

14 Retweets 35 Likes



# Our Partners



Australian Government  
Department of Industry, Science,  
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Business  
Cooperative Research  
Centres Program



Metso:Outotec





# FINANCE

Index ▲ 1.56 ▼ 0.78





The Australian Vanadium Project

# Financial Sensitivities

- NPV - Highest sensitivity to long term V<sub>2</sub>O<sub>5</sub> price, operating costs and exchange rate
- NPV - Relatively low sensitivity to Capex, short term V<sub>2</sub>O<sub>5</sub> price and FeTi coproduct pricing
- Acceptable rates of return on investment at sub US\$8/lb pricing
- Exchange rate and operation expenses have the largest impact on the internal rate of return. A 30% reduction in foreign exchange increases IRR from 13.67% to 20% and a 30% reduction in operating expenses increases IRR to 18.8%
- Upside case offers pre-tax NPV<sub>7.5</sub> of **\$1,287M** assuming US\$12/lb V<sub>2</sub>O<sub>5</sub> price. This increases to **\$1,450M** with additional improvements in operating expense of 10%

Project Vanadium Pricing Sensitivity (A\$)

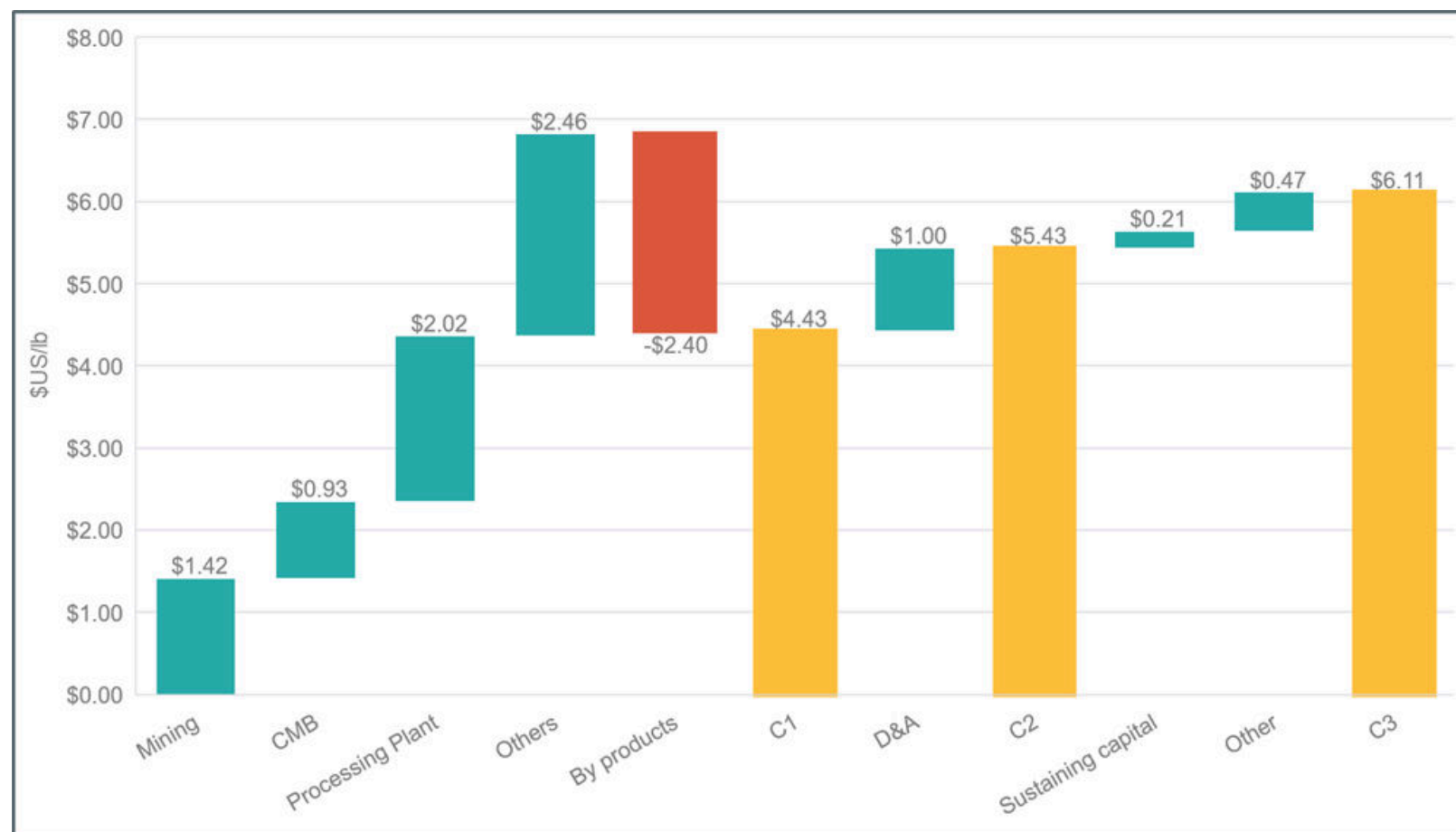
	V <sub>2</sub> O <sub>5</sub> Pricing Scenarios				
Year 1-5	(US\$)	\$9.50/lb V <sub>2</sub> O <sub>5</sub>	\$10.50/lb V <sub>2</sub> O <sub>5</sub>	\$10.50/lb V <sub>2</sub> O <sub>5</sub>	\$12/lb V <sub>2</sub> O <sub>5</sub>
Year 6-25	(US\$)	\$9.50/lb V <sub>2</sub> O <sub>5</sub>	\$9.50/lb V <sub>2</sub> O <sub>5</sub>	\$10.50/lb V <sub>2</sub> O <sub>5</sub>	\$12/lb V <sub>2</sub> O <sub>5</sub>
pre-tax NPV <sub>8%</sub>	(A\$)	\$531M	\$623M	\$833M	\$1,287M
post-tax NPV <sub>8%</sub>	(A\$)	\$295M	\$361M	\$507M	\$823M
IRR	%	16.1%	18.4%	20.6%	26.9%
Payback period	years	8.6	7.8	7.3	6.2

NPV (US\$) and IRR (%) Sensitivities Relative to the Basecase



# BFS Opex Breakdown

	USD/lb V2O5
Mining	\$ 1.42
CMB	\$ 0.93
Refinery	\$ 2.02
Others	\$ 2.60
Co0 product FeTi	-\$ 2.51
<b>C1</b>	<b>\$ 4.46</b>
D&A	\$ 1.01
<b>C2</b>	<b>\$ 5.46</b>
Sustaining capital	\$ 0.21
Other associated costs	\$ 0.49
<b>C3</b>	<b>\$ 6.16</b>



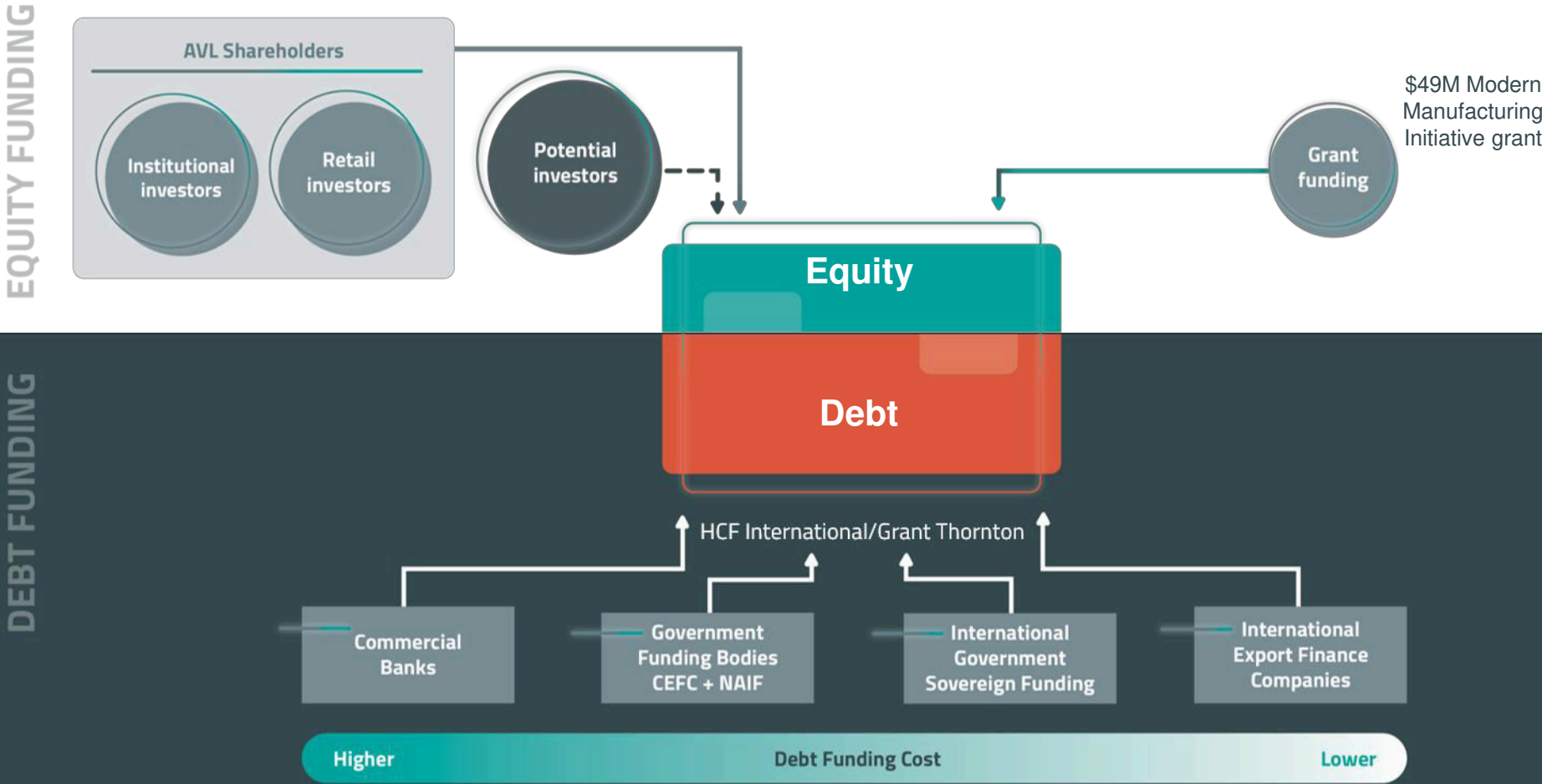
# BFS Capex Breakdown

Pre V <sub>2</sub> O <sub>5</sub> Production Capex		
	(A\$ M)	(US\$ M)
<b>Gabanintha (Mine and CMB)</b>		
Mining	4	3
CMB Plant	82	59
CMB Infrastructure	45	33
Area Infrastructure	26	19
Regional Infrastructure	0	0
Miscellaneous	4	2
<i>Sub-Total</i>	<b>162</b>	<b>116</b>
<b>Tenindewa (Processing Plant)</b>		
Processing Plant	265	191
Processing Plant Infrastructure	47	34
Area Infrastructure	6	4
Regional Infrastructure	0	0
Miscellaneous	9	6
<i>Sub-Total</i>	<b>326</b>	<b>235</b>
<b>Project Direct Capital Costs</b>	<b>488</b>	<b>351</b>
<b>Other Project Capital</b>		
Indirects and EPCM	103	75
Owner's Cost	13	9
<i>Sub-Total</i>	<b>116</b>	<b>84</b>
<b>Total</b>	<b>604</b>	<b>435</b>

Post V <sub>2</sub> O <sub>5</sub> Production Capex (Yrs 1-4)		
	(A\$ M)	(US\$ M)
<b>Gabanintha (Mine and CMB)</b>		
Mining	7	5
CMB Plant	9	7
CMB Infrastructure	2	2
Area Infrastructure	32	23
Regional Infrastructure	6	4
Miscellaneous	5	3
<i>Sub-Total</i>	<b>61</b>	<b>44</b>
<b>Tenindewa (Processing Plant)</b>		
Processing Plant	19	14
Processing Plant Infrastructure	9	7
Area Infrastructure	3	2
Regional Infrastructure	0	0
Miscellaneous	8	6
<i>Sub-Total</i>	<b>39</b>	<b>28</b>
<b>Project Direct Capital Costs</b>	<b>100</b>	<b>72</b>
<b>Other Project Capital</b>		
Indirects and EPCM	29	20
Owner's Cost	0	0
<i>Sub-Total</i>	<b>29</b>	<b>20</b>
<b>Total</b>	<b>129</b>	<b>92</b>



# Funding Model



Australian  
VANADIUM  
LIMITED



E22

ENERGY

TRANSITION

SOLUTIONS



vsunenergy

**VSUN Energy**

## VANADIUM IN ENERGY STORAGE

# VSUN Energy – Renewable Energy Storage Company



VSUN Energy is a 100% owned subsidiary of AVL dedicated to grow the vanadium redox flow battery (VRFB) market in Australia.

VSUN Energy offers clients VRFB solutions from a **range of manufacturers** appropriate to the energy solution needed and uniquely able to offer locally manufactured vanadium electrolyte.





# VRFBs – long duration energy storage



## COLLABORATION WITH BRYAH RESOURCES LIMITED (ASX: BYH)

# Nickel, Copper and Cobalt from tails stream

- Bryah holds a suite of mineral rights including nickel, copper and gold over the Australian Vanadium Project at Gabanintha
- AVL holds the mineral rights to vanadium, titanium, iron and cobalt and is a major shareholder (7.14%) of Bryah
- Collaboration project between Bryah and AVL
- Sustainable solution to extract as much as possible from what would be a waste material
- 31.3 Mt @ 761 ppm **Nickel**, 210 ppm **Copper** and 228 ppm **Cobalt**





# Offtake status - Vanadium



**HBIS** - Hebei Yanshan Vanadium and Titanium Industry Technology Research Co Ltd, a subsidiary of HBIS Group Chengsteel in China, one of the world's largest steelmakers

- ▶ Letter of Intent to negotiate and sign a binding technical services and vanadium purchase agreement



**U.S. Vanadium** - vanadium specialty chemical producer

- ▶ MOU for 2,000 tonnes per annum of vanadium offtake



**CellCube** - Austrian VRFB manufacturer

- ▶ MOU for vanadium offtake, vanadium electrolyte supply and Value Added Reseller Agreement signed with VSUN Energy

**CEC VRFB** - Chinese VRFB manufacturer

- ▶ MOU for 2,000 tonnes per annum of vanadium offtake, vanadium electrolyte, residential VRFB manufacture and sales

**V-Flow Tech** - Singaporean VRFB manufacturer

- ▶ MOU for vanadium offtake, vanadium electrolyte supply and a VRFB sales agreement for VSUN Energy



*Vanadium Pentoxide powder product  
grading 99.6% V<sub>2</sub>O<sub>5</sub> by AVL*



## FETI COPRODUCT MARKETS

# FeTi coproduct after vanadium extraction

- 3.5mm crushed FeTi pellet ready for shipping “as is” after vanadium extraction
- Fe 55%,  $\text{TiO}_2$  15% material has established market in Chinese blast furnaces.
- Used as blast furnace refractory protection
- Unique sale opportunity for AVL due to strategic location near Geraldton Port
- Planned annual production of 900kt per annum for the life of the mine



# Offtake status – FeTi coproduct



Letters of Intent have been signed for offtake of iron titanium (FeTi) coproduct from the Australian Vanadium Project.

- ▶ Non-binding and record interest of the buyers to support the Project and to negotiate and agree a binding ore sale contract.
- ▶ AVL has a dedicated team member based in Beijing focused solely on multiple FeTi coproduct end user market development.

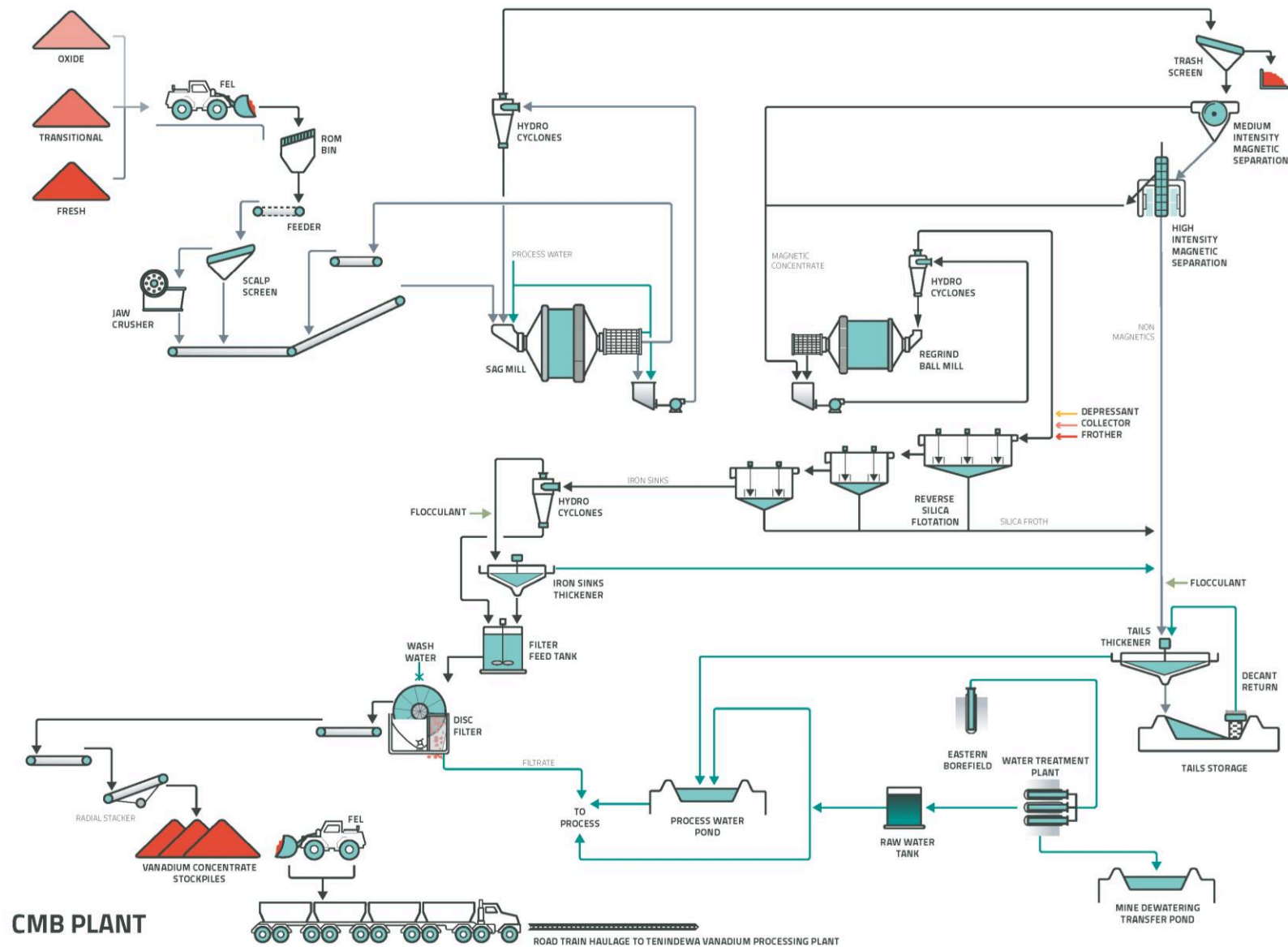
**Shenglong** – Shenglong Metallurgy International Pte Limited, the Hong Kong based commercial arm of Guangxi Shenglong Metallurgy Co. Ltd, a 12 million tonne (Mtpa) steel producer located in Southern China's Fangchenggang Port

**Wingsing** – Wingsing International Limited, the commercial arm of Tianzhu Steel, a 5 Mtpa steel producer based in Hebei Province, P.R. China



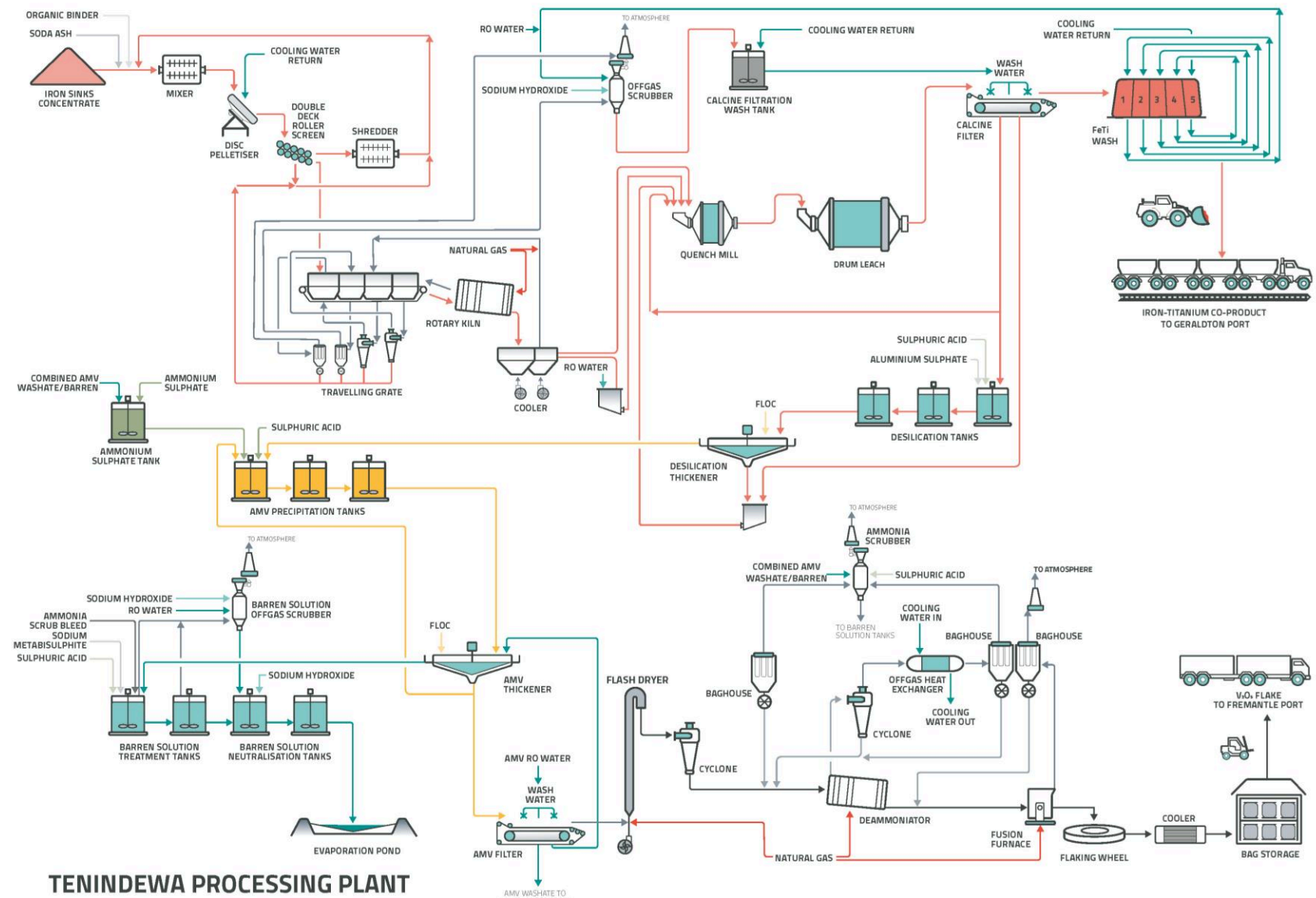
# CMB Flowsheet

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# Processing Plant Flowsheet



TENIDEWA PROCESSING PLANT





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