

Australian
VANADIUM
LIMITED



E22

ENERGY
TRANSFORMATION
SOLUTIONS



vsunenergy

MARCH 2023

Paydirt Battery Minerals Conference

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.

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 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.

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.

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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.

AUSTRALIAN VANADIUM LIMITED

Why Vanadium? Industrial, critical, and (battery metal)²

Steel Alloy: Growth Market

Industrial Metal

- Increased use of vanadium alloyed steels is a force multiplier in reducing carbon footprint
- 20 years of continuous demand growth, set to accelerate as higher specific V use continues to increase

Quality of Life: Growth Market

Critical Metal

- Vanadium contributes to sustaining and improving our quality of life. It is used extensively in **aerospace, defence and chemical catalysts**
- Over 75% of global vanadium supply currently sourced from China, Russia, and South Africa
- There is a case to diversify supply chains toward stable, ESG credentialled jurisdictions

WHY VANADIUM?



Energy Storage: Growth Market

Battery Metal (Horizon 1 VRFBs)

- Vanadium redox flow batteries (VRFBs) are a mature and proven technology ideally positioned to meet demand for long duration storage.
- 2% of V market historically, expected to be >10% in 2023
- More VRFB capacity has been commissioned in the last 12 months than the entire prior 40 year history of VRFB technology combined

Innovation: Future Upside

Battery Metal (Horizon 2 Lithium-ion)

- Multiple advanced pre-commercialisation technologies showing significant economic and technical merits of **vanadium use in lithium-ion cathodes and anodes**
- Potential to improve Li-ion batteries including energy density, charge rate, cycling, and safety
- Vanadium use in solid state lithium metal batteries is another exciting application for vanadium under research



AUSTRALIAN VANADIUM LIMITED

Vanadium – consensus on demand growth



Vanadium demand to **double by 2032**, with more than 90% of this growth from Vanadium Redox Flow Batteries (VRFBs).



VRFBs will **fundamentally restructure** the vanadium supply chain.



Massive growth in batteries will **stress supply**.

‘Assuming even modest growth in vanadium consumption in energy storage applications, the industry will be **challenged to meet surging demand** in the coming decade.’
TTP Squared



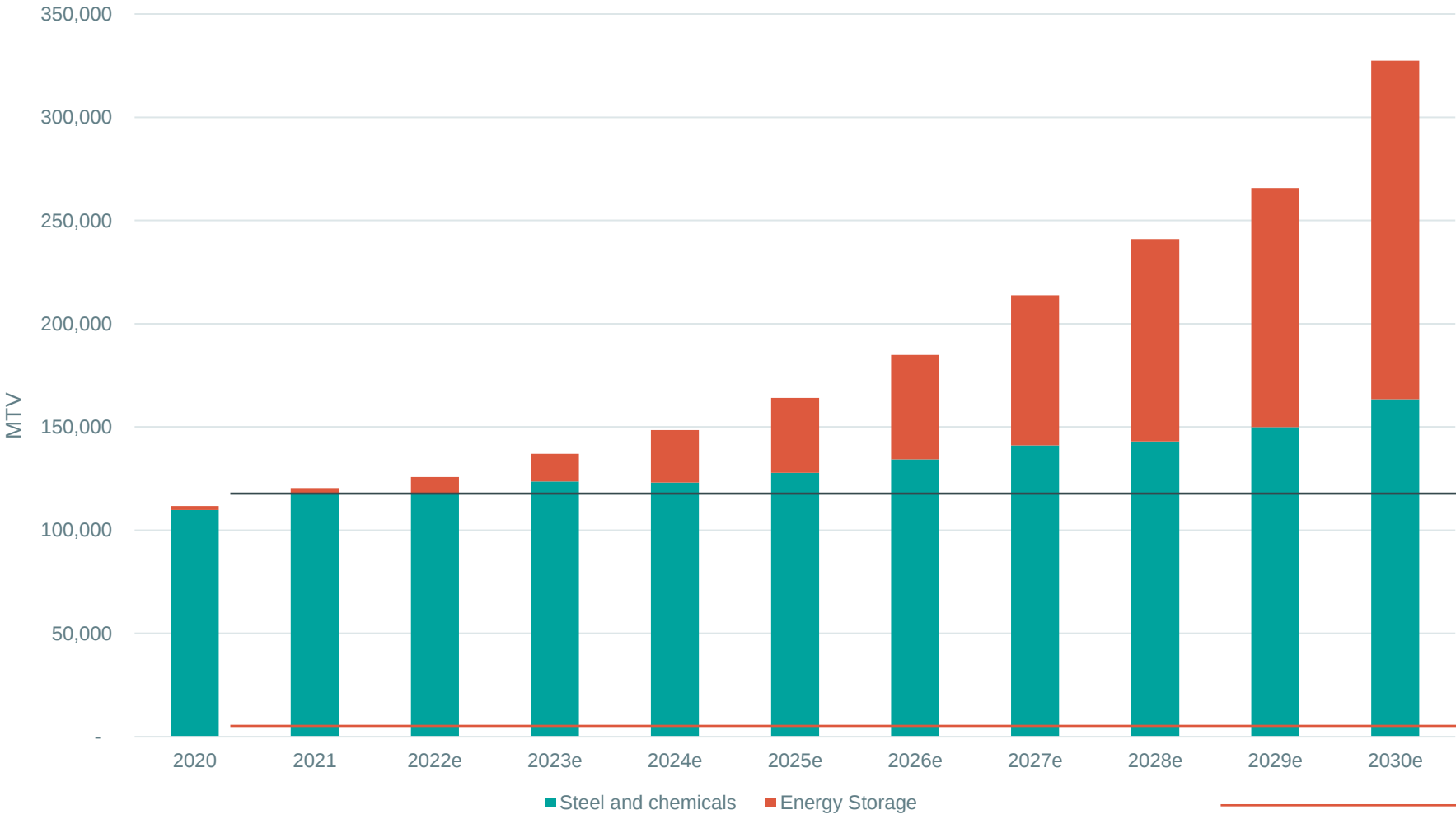
Currently, it is estimated that the VRFB market only accounts for 3%-5% of vanadium production but the continued shift to renewable energy solutions could trigger a surge in vanadium demand and account for **20% of vanadium consumption by 2030**.

Sources: Stockhead, TTP Squared, Project Blue, eResearch, Wood Mackenzie



VANADIUM MARKETS

Industrial metal and battery metal demand growth



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

2021 global production ~118,000 MTV per annum

AVL's planned production 6,270 MTV per annum¹



VRFB: Technical merit



Long duration



Easy to scale
power and energy
separately



Lifespan over
20 years with little to
no degradation
in performance
over time



Non-flammable
making it one of the
safest and most
stable battery
chemistries



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

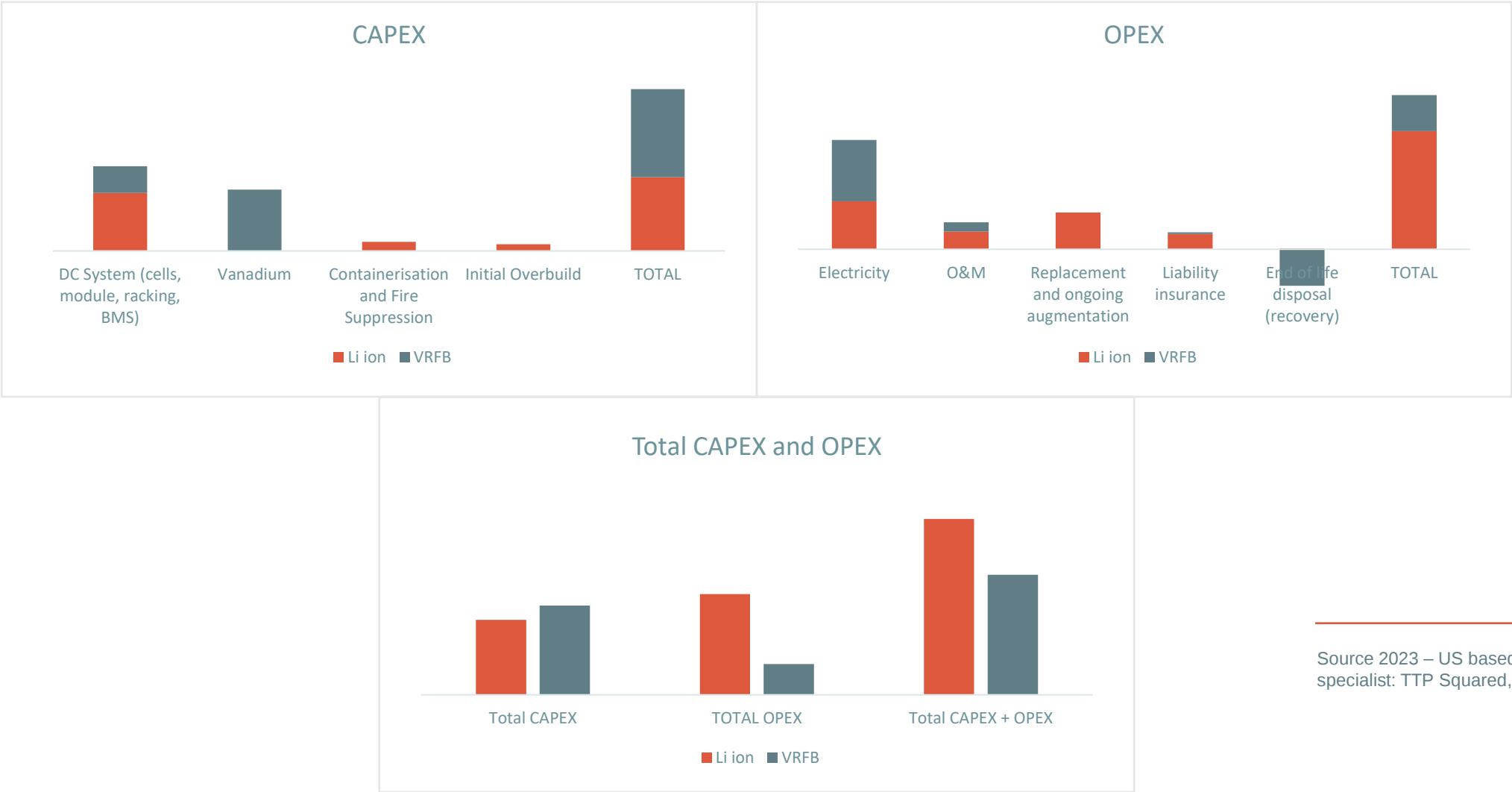


Vanadium electrolyte
can be **reused**
indefinitely or
recycled for use in
steel market



VRFB: Financial merit

Example cost comparison for VRFB vs Lithium-ion 3MW / 24MWh (8 hour) system over 20-year lifespan



Source 2023 – US based vanadium market specialist: TTP Squared, Inc



AUSTRALIAN VANADIUM LIMITED

Vanadium in lithium-ion (Energy Storage, Growth Horizon 2)

- **Vanadium is an ideal candidate for use in lithium-ion batteries due to unique properties and scalability**
- Vanadium known for decades to improve lithium-ion performance, but earlier use impacted cycle life.
- Multiple promising technologies (eg Dimien-cathode, Tyfast-anode) claim to overcome past challenges
- Opportunity to substantially reduce the cost of lithium-ion cathodes, improve energy density, charge times, cycling, safety
- Vanadium is also considered an important ingredient in lithium metal batteries (eg Pure Lithium)

	High Nickel (NMC/NMA)	Iron Phosphate (LFP)	Dimien (z-V ₂ O ₅)
Cost/kWh	-	✓	✓
Energy Density	✓	-	✓
Safety	-	✓	✓
Cycle Life	-	✓	✓
Fast Charge	✗	✗	✓
Secure Supply	✗	✓	✓
Future Proof	-	-	✓
Add'l cost down	✗	✗	✓

TYFAST

Dimien



BELENOS

 Clean Power Holding Ltd


PURE LITHIUM

Sources – 'V Market Data', TTP Squared, Inc,
<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-2030-resilient-sustainable-and-circular>, Company websites, Interview with Joe Lowry 26/2/23

Why AVL?

Track Record

- Track record in raising capital and securing significant government grants to fund and build value in the company.

Asset & Scalability

- **25+ years mine life, competitive C1 OPEX**
- **Hub Processing Configuration:** built for scalability
- **Scalable Infrastructure:** gas and logistics
- **Scalable Feed:** proximal to 1B tonnes similar ore types
- **Premium mining & processing jurisdiction:** Western Australia

Green Lights

- A recent, comprehensive BFS, advanced approvals status
- Strong relationships: \$49M MMI-C Federal Government Grant (Multiple Grants, Major Project Status), Critical Minerals Office Austrade; State Government (Lead Agency Status)
- One of the most advanced undeveloped vanadium projects in the world
- Positioned with early mover advantage and supplier of choice status in the battery market.

Vertical Integration

- Industry leading product quality, LoM
- True “Pit to Battery” integration optionality

Ethically Sourced

- Distinctive ability to produce an ethical, low carbon product

Collective Expertise

- Technical team in place from inception of asset development strategy
- Commodity experience in board, executive, and technical teams

Quality of Board and AVL Team

- A future-proofed board with the right skillsets to finance, build, and operate the project and grow a globally relevant company in this commodity
- A team that can deliver with proven technical and commercial track record in vanadium, project development, operations



A TEAM THAT CAN DELIVER

International vanadium expertise

Track record in project execution and operations



Board



Cliff Lawrenson
Non-Executive
Director

Experienced Chair with extensive executive career in resources, energy, infrastructure and investment banking.



Vincent Algar
Managing
Director

Mining, exploration, project development, mining services and management of publicly listed companies.



Daniel Harris
Non-executive
Director

Over 40 years of **vanadium experience** including executive leadership of global vanadium companies, and operations.



Miriam Stanborough
Non-Executive
Director

Over 20 years of experience in mineral processing, research, operations, technology & innovation. Roles with Monadelphous, Iluka, Alcoa and WMC.



Peter Watson
Non-Executive
Director

40 years of experience in senior technical, project and management roles, executive experience running ASX-listed companies.

Executive Team



Graham Arvidson
Chief Executive
Officer

Mineral sector experience spans **vanadium** and lithium project development and operations.



Todd Richardson
Chief Operating
Officer

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



Louis Mostert
Chief Legal and
Commercial Officer

20 years of experience in project contracting and finance, corporate advisory, mergers and acquisitions.



Liesl Strachan
Chief Financial
Officer

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





Mining & CMB

- ✓ Proximity to Great Northern Highway (31km)
- ✓ Proximity to water
- ✓ BOO power generation station using LNG and renewables
- ✓ Close to airport (Meekatharra 40km)
- ✓ Historical and current mining region

Processing Plant

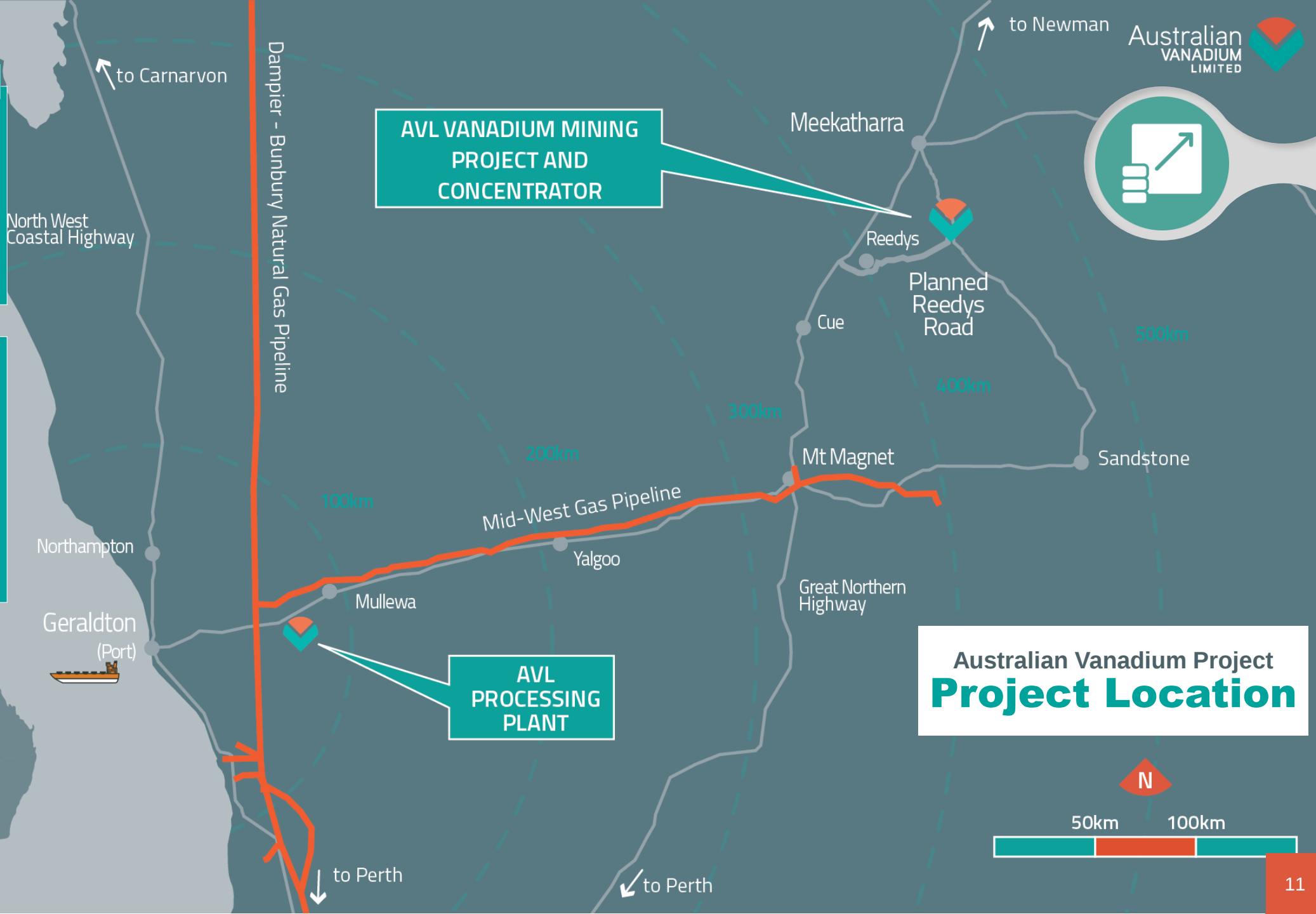
- ✓ Proximity to gas & water (25km)
- ✓ Proximity to Port of Geraldton (80km) for sale of FeTi
- ✓ Existing road and rail
- ✓ Local & regional workforce available
- ✓ Unique consumption opportunity for new regional green hydrogen use
- ✓ No assessment required



AVL VANADIUM MINING PROJECT AND CONCENTRATOR

AVL PROCESSING PLANT

Australian Vanadium Project Project Location



Australian Vanadium Project BFS – Robust Project Metrics



RESOURCE

Total Resource

239Mt @ 0.73% V₂O₅

High-grade 95.6Mt @ 1.07 V₂O₅

Ore Reserve

30.9Mt @ 1.09 V₂O₅

Proved 10.5Mt @ 1.11% V₂O₅

Probable 20.4Mt @ V₂O₅

25+ years

mine life



STRONG FINANCIAL OUTCOMES

Pre-Tax NPV_{7.5}

A\$833M

IRR

20.6%

EBITDA Annual Average

A\$175M

EBITDA Project

A\$4.4B

NPAT Project

A\$2.2B



OPEX, CAPEX, PRODUCTS

C1 OPEX

US\$4.43/lb V₂O₅

PRE-PRODUCTION

CAPEX **US\$435M**

ANNUAL V PRODUCTION

11,200t V₂O₅ (6,270 MTV)

LoM V₂O₅ Grade 99.5%

FeTi Coproduct

900,000tpa



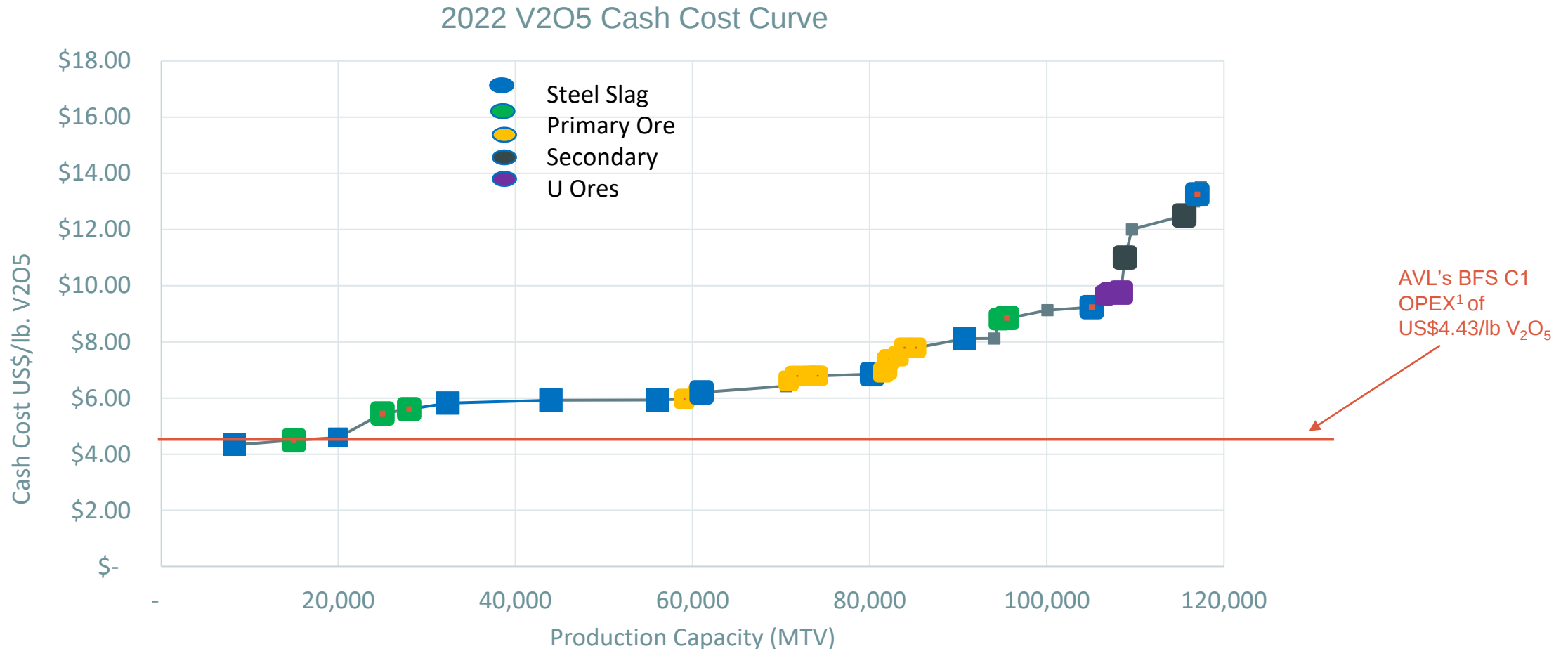
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Note: MTV = metric tonnes vanadium

Supply curve – AVL Project well positioned



“The cash cost of the last incremental units required to satiate demand in 2022 is above US\$12.00/lb V₂O₅” – TTP Squared



Source: TTP Squared, inc.

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

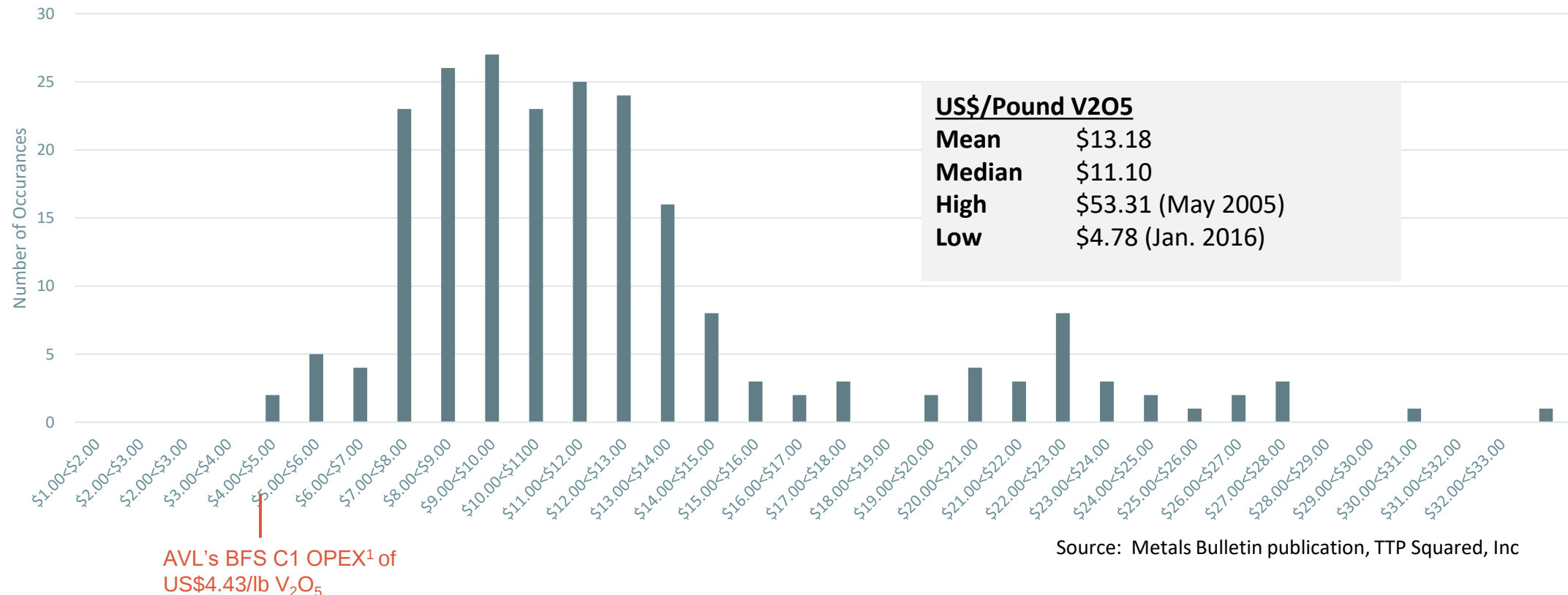


Historical pricing – AVL Project well positioned

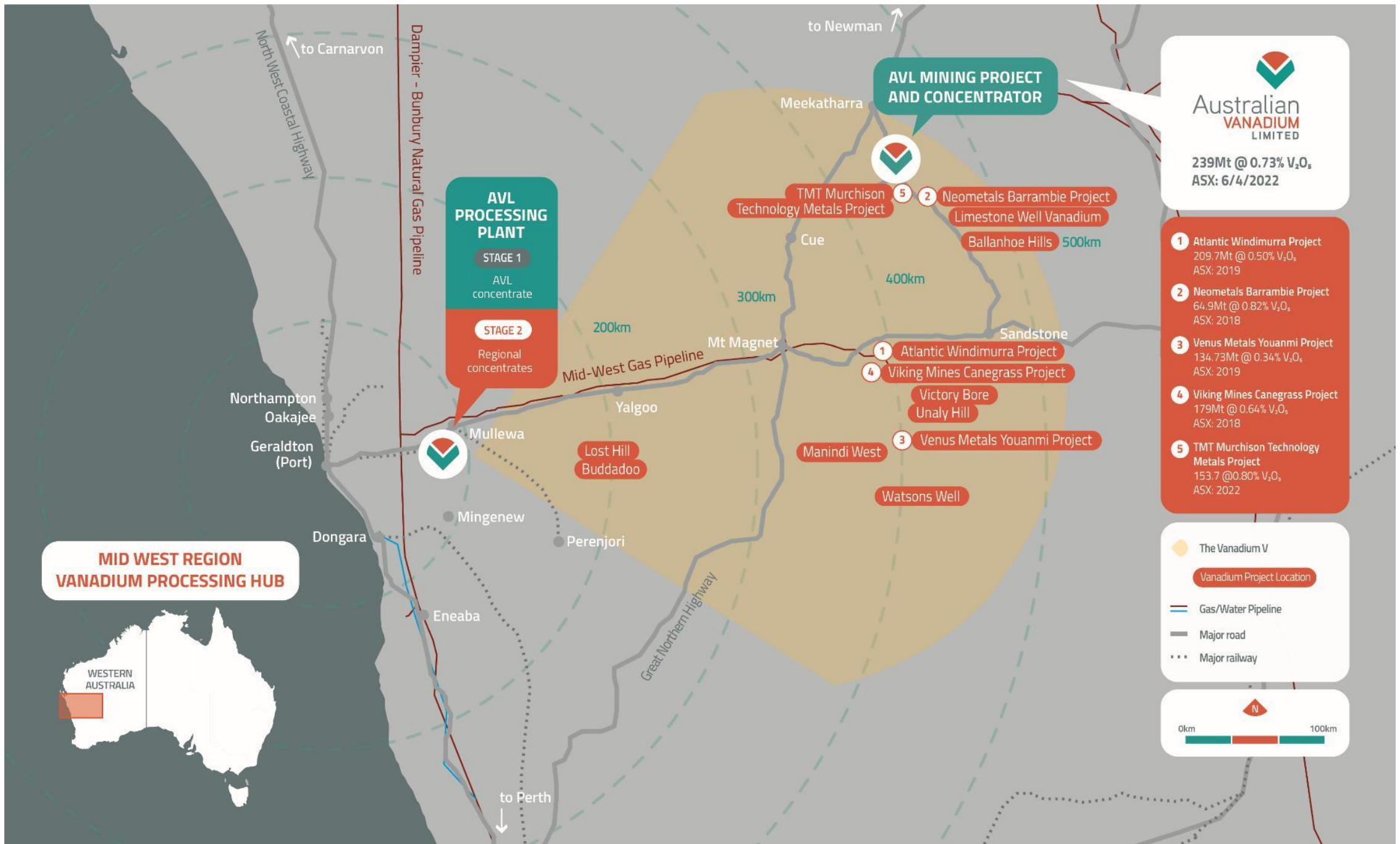


“Long term inflated V_2O_5 historical prices are in the range of US\$9.00-\$12.00/lb V_2O_5 ” – TTP Squared

V2O5 Real Price Distribution Chart, Jan. 2004-Nov. 2022, Inflated to Aug 2022 US\$

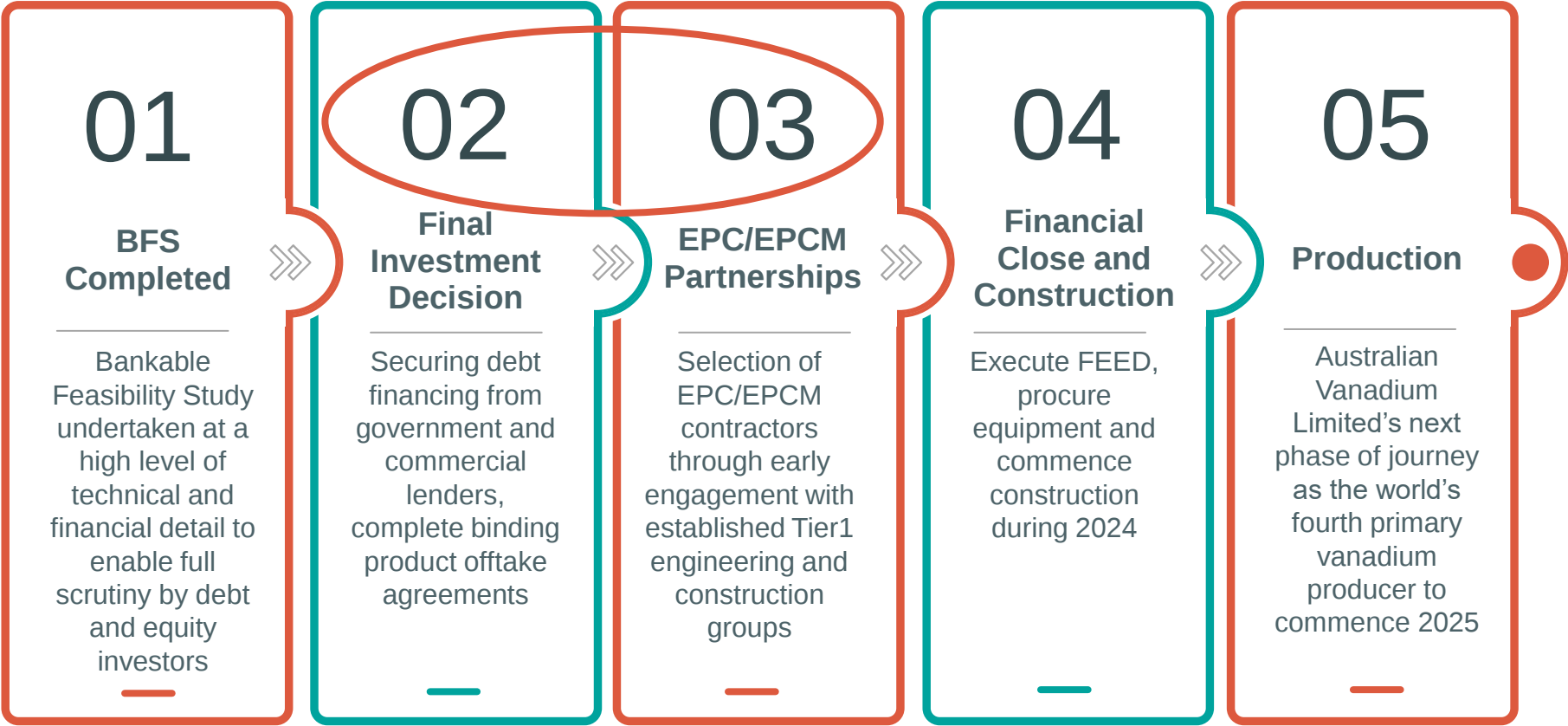


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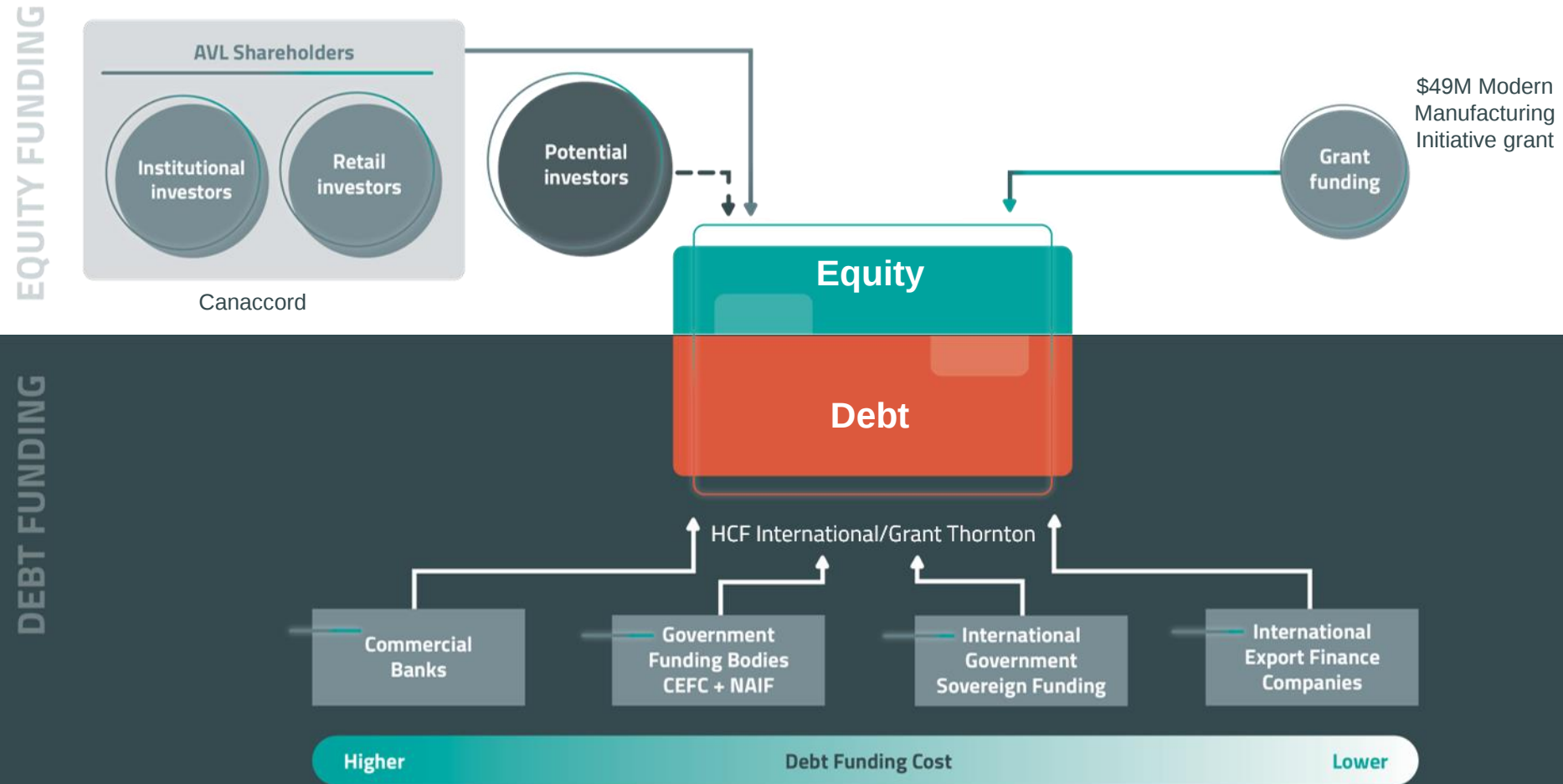


AUSTRALIAN VANADIUM PROJECT

Project Delivery Path



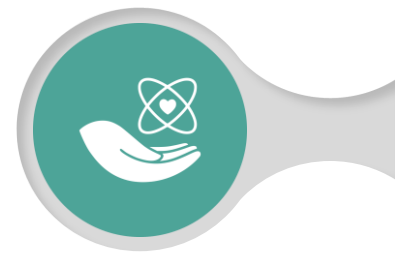
Funding model



Strong ESG Focus

Renewable energy strategy

- Ability to produce ethical, low carbon vanadium product, expecting to be 50% lower carbon intensity per unit of vanadium than existing co-production vanadium producers¹
- Use of solar and/or wind generation
- Use of VRFBs for energy storage
- Collaboration with ATCO for use of green hydrogen into the natural gas supply at the processing plant through ATCO collaboration
- Exploring use of electric or green hydrogen fuelled vehicles onsite and for haulage



Community relationships

- Workforce participation opportunities for Yugunga-Nya traditional owners
- Regional Engagement Manager based in Geraldton
- Sponsorship of awards and scholarships at Central Regional TAFE
- Mullewa community sponsorship
- Stephen Michael Foundation and Shooting Stars sponsorship



Governance

- Developing ESG reporting structure aligned to the developing ISSB framework through application of SASB, TCFD, and GRI reporting structures
- Experienced and competent Board of Directors
- Long term engagement with Environmental Protection Agency
- Organisational culture

¹Source: AVL internal benchmarking, public information from co-producers

Vertical Integration

Pit to Battery

Vertical integration optionality can give AVL the ability to produce the world's highest quality vanadium products tailored to our customers' needs from steel (low purity requirements) through to speciality chemicals (ultra high purity).

In addition to production, AVL will seek to participate economically in the vanadium value chain through partnerships and joint ventures



VSUN Energy: Current Projects Overview



VSUN Energy is a 100% owned subsidiary of ASX-listed Australian Vanadium Limited (ASX: AVL)

Current Projects

- **Water Corporation** – successful completion of trial of a 5kW/30kWh vanadium redox flow battery (VRFB) to power a chlorinator.
- **IGO (ASX: IGO)** – installation of an 80kW/300kWh VRFB standalone power system (SPS) to provide power to a bore pump at the Nova Nickel Operation (pictured right, currently being tested in Perth).
- **Priest Bros Orchard**, Victoria – installation of a 20kW/80kWh VRFB.
- Consultancy work for major mining clients underway
- Tender applications underway
- Well positioned to position in a significant future pipeline

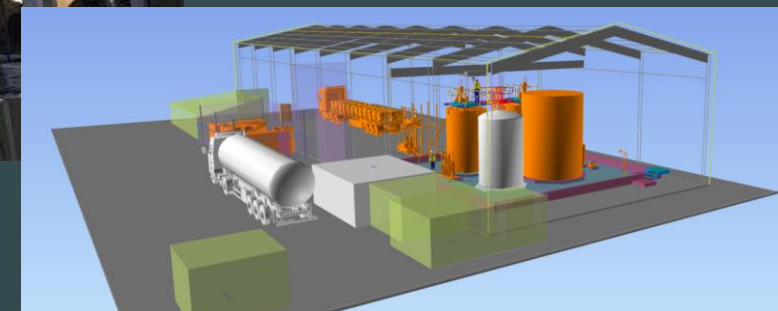


Vanadium Electrolyte Project Update

- 33MWh per annum electrolyte plant under development
- AVL to be an early mover in electrolyte manufacture in Australia
- Location secured in Perth, Western Australia
- Detailed design complete
- Long lead equipment ordered
- Utilises proven US Vanadium technology



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



 **US VANADIUM**

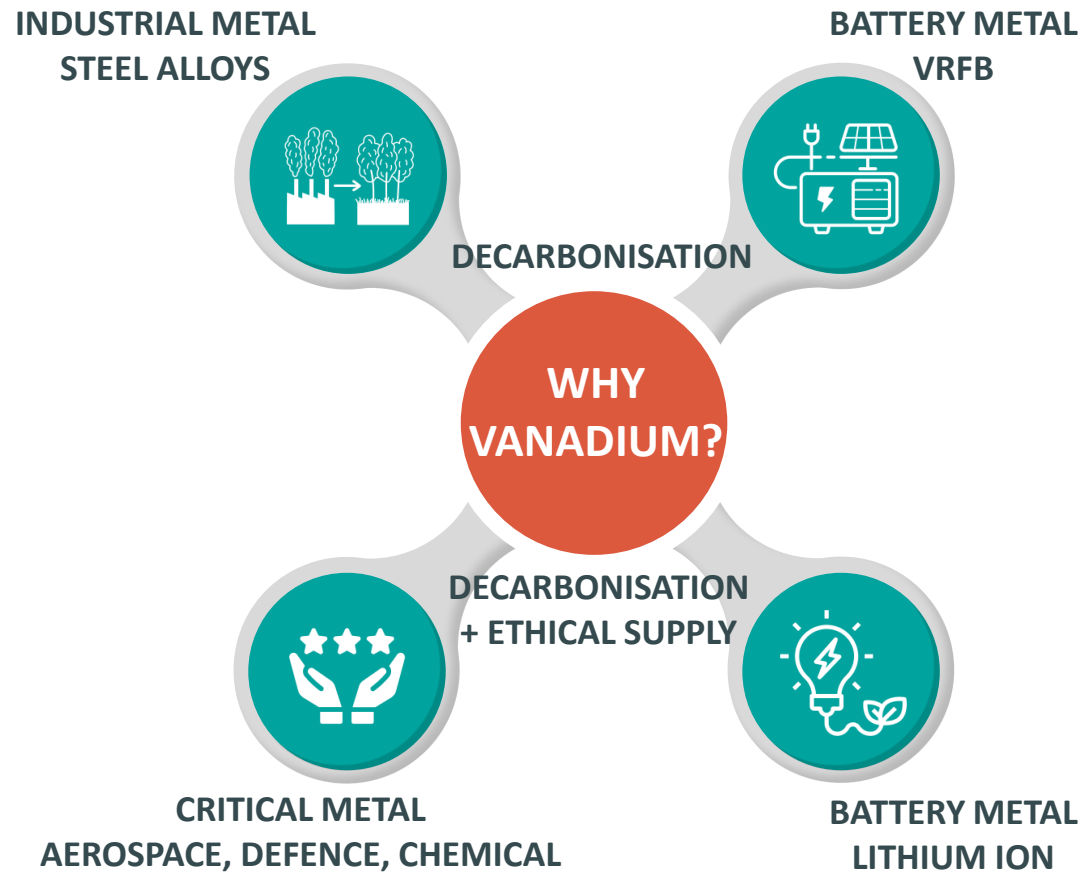


**VANADIUM
ELECTROLYTE
MANUFACTURE**



In Summary

Why Vanadium, and why AVL?





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