

Australian  
VANADIUM  
LIMITED



# Future Facing Commodities Conference

Singapore  
March 2024

**An Australian  
Vanadium Leader**

ASX:AVL

# Compliance & Cautionary Forward-looking Statements

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## 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.avl.au](http://www.avl.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.avl.au](http://www.avl.au) and Technology Metals Australia (formerly ASX: TMT) announcements of 5 August 2022 and 7 November 2022 which are available on TMT's website [www.tmtlimited.com.au](http://www.tmtlimited.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 announcements, 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 announcements.

## 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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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 (AVL) – An Australian Vanadium Leader



A leading Australian vanadium company with a world class asset located in Western Australia, a Tier-1 mining jurisdiction



AVL has a major vanadium resource in a market dominated by Russia, China and South Africa



Recent merger consolidates two adjoining projects across one orebody, providing opportunity to realise significant synergies



Optimised Feasibility Study (OFS) underway, aimed at creating one project, with superior economics



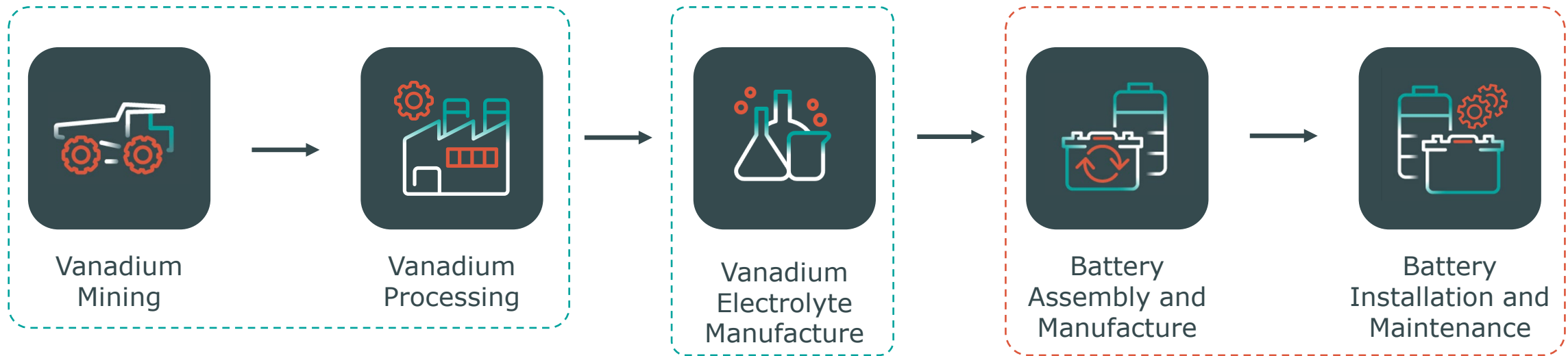
Demand for vanadium predicted to grow, driven by need for long duration energy storage to enable decarbonisation



Installation of vanadium flow battery (VFB) technology accelerating. Chinese VFB vanadium demand in 2025 is anticipated to be more than 11 times AVL's annual production



# Pit to battery – transformative 2023 positions AVL for super charged 2024



← **Vanadium Market Structural Changes** →

← **Energy Market Structural Changes** →

# Growing need for long duration energy storage (LDES)

LDES provides greater flexibility of storage and aids the growth in delivery of variable renewable energy (VRE)



Growing requirement for energy storage with long lifespan (4 to 12 hours+) and limited degradation in performance



Vanadium flow batteries (VFB) are currently the most technologically advanced LDES technology



LDES market will be valued at US\$223B in 2044<sup>1</sup>



US\$30bn of LDES capacity in construction or operation<sup>2</sup>

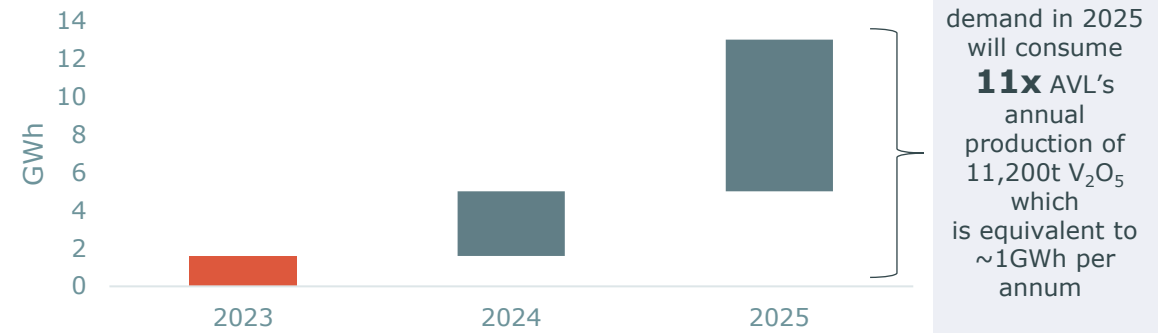


From 2024-2044, the annual installation of LDES technologies is forecast to increase at a **CAGR of 48%**<sup>1</sup>

Source: 1: IDTechEx 2: <https://www.energy-storage.news/wood-mackenzie-investment-pours-in-for-long-duration-energy-storage-but-scale-remains-challenge/>



Chinese VFB growth<sup>4</sup>

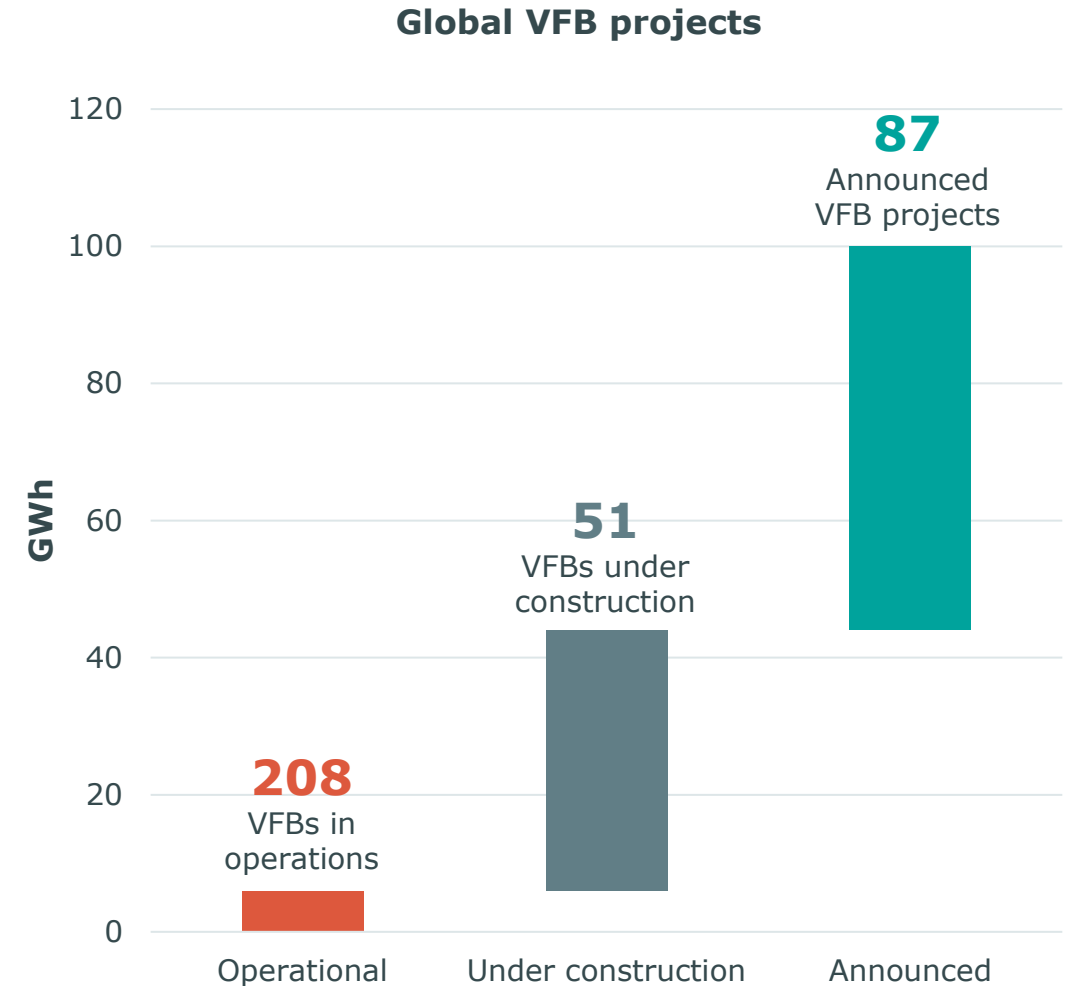


Source: 1: IDTechEx 2: Climate Energy Finance 3: <https://www.reuters.com/sustainability/climate-energy/numbers-behind-chinas-renewable-energy-boom-2023-11-15/>. Target is for 2030. 4: FerroAlloyNet 5. Pictured battery from Invinity Energy Systems

# Global VFB roll-out led by China – increasing in scale to GWh

VFB proven technology with over 200 operational batteries globally	At least 45 countries have VFBs operating or under construction
China accelerating roll out with over 52 VFBs under construction or approved	600MWh average battery size in Chinese VFB pipeline
China launching grid scale rollout with VFBs forecast to reach 15-20% of installed battery storage by 2025	Recent announcements from China indicate the potential for 180 GWh of VFB deployment by 2030, requiring 1.4 million tonnes of V <sub>2</sub> O <sub>5</sub>

Source: FerroAlloyNet



Source: Vanitec

# VFB gigafactories being built in China

## Manufacturing of VFBs and electrolyte at scale

- China is building gigawatt capacity in manufacture of VFBs and vanadium electrolyte
- Development of vanadium gigafactory industry in China to support roll out of VFB storage
- The strategy is similar to lithium-ion battery gigafactories in the early 2020s
- Gigafactory demand will drive demand for vanadium
- In 2023 over 25GWh per annum of manufacturing capacity was added, equating to 207,690t of annual vanadium demand
- AVL's project to deliver 11,200t per annum, roughly 5% of the gigafactory demand added in 2023

Date	Company	Gigafactory manufacturing capacity per year	Total tonnes of V <sub>2</sub> O <sub>5</sub> required per year
January 2023	Shanghai Electric Energy Storage Technology	1GWh	9,890t
February 2023	Beijing Xingchen New Energy	12GWh	118,680t
February 2023	Linyuan Group	4GWh	39,560t
March 2023	Chengde Xinxin Energy Storage Technology	1GWh	9,890t
April 2023	China Vanadium Energy Storage (Hubei) and Shanghai Electric	4GWh	39,560t
September 2023	CNC Huineng and CRRC Zhuzhou Electric	2GWh	19,780t
November 2023	Shaanxi Jutai	1GWh	9,890t
<b>Total</b>		<b>25GWh</b>	<b>207,690t</b>

Source: Vanitec



# Australian Vanadium Project

## Project Overview



Vanadium, titanium, magnetite orebody located on tenements wholly owned by AVL, providing a significant, scalable project



Simple open pit mining with standard magnetite concentrator process



Potential for processing plant close to major port, providing opportunity for lower cost energy, water, labour and services



Known processing technology capable of reducing project risk





## Optimised Feasibility Study focuses on realising economic benefits



**Concept:** The merger with TMT provides the opportunity to maximise project economics through access to high-grade areas of the orebody, which previously straddled the two projects

CapEx	OpEx
<ul style="list-style-type: none"> <li>• Potential for smaller concentrator and processing plant</li> <li>• Potential for lower infrastructure requirements</li> <li>• Opportunity to simplify concentrate flowsheet</li> </ul>	<ul style="list-style-type: none"> <li>• Mine schedule optimisation may reduce mining costs</li> <li>• Higher vanadium and lower silica grade in concentrate has potential to reduce operating costs</li> <li>• Opportunity to increase coproduct credit contributions from iron ore and ilmenite</li> </ul>



**Bankable Feasibility Study (BFS) metrics** (prior to merger and optimisation): AVL conducted a BFS in April 2022<sup>1</sup> with the below metrics. **The aim for the OFS is to improve on these metrics**

Annual Production  
**11,200t** V<sub>2</sub>O<sub>5</sub>

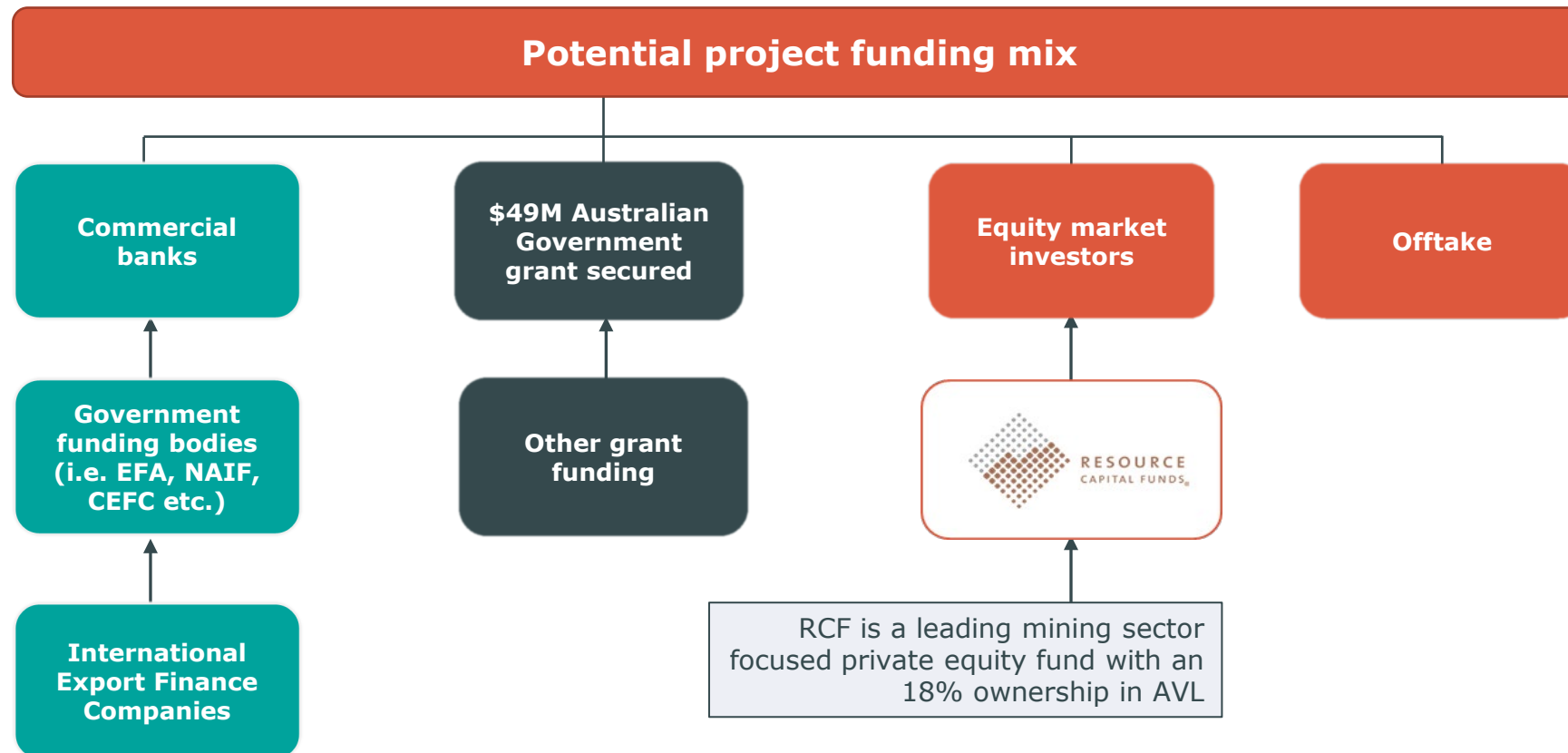
Pre-production CapEx  
**US\$435M**

C1 OpEx  
**US\$4.43/lb** V<sub>2</sub>O<sub>5</sub>

Mine life  
**25** years

1: Information within this slide as detailed in ASX Announcement "Bankable Feasibility Study for Australian Vanadium Project" dated 6 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

# Improved funding capability



# Progressing the project to production

## Delivered

- BFS completed (pre-merger basis)
- Mining Leases approved
- Completion of large-scale process plant pilot programs
- Board and management team established for project execution
- Australian government grant agreement for up to \$49 million executed
- 1.2GL pa water licence for proposed processing plant granted
- Merger to deliver project synergies

## Next steps

### Project Integration

- Combined Mineral Resource update (April target)
- Project development strategy update (CY24Q2 target)
- Publish integrated Optimised Feasibility Study (OFS)

### Approvals

- Progress approvals including EPA and Traditional Owner agreement
- Finalise permitting of proposed Tenindewa processing hub site

### Offtake

- Secure bankable vanadium offtake including option for project finance
- Secure iron titanium coproduct offtake agreements
- Secure ilmenite offtake agreements

### Finance

- Progress discussions with Government debt and export finance agencies
- Additional grant milestone payments
- Deliver final investment decision

# Investment thesis



## Australian Vanadium Project

Advanced project, 25+ year mine life with OFS to drive enhanced project economics



## Growing vanadium fundamentals

VFB demand growth accelerating to support increasing renewable energy generation



## Advancing funding strategies

Project proposed to be funded by debt, grants, equity and offtake, with discussions well progressed




## Long-term optionality

Vanadium electrolyte manufacturing capacity and VSUN Energy battery capabilities to leverage and support VFB market growth







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