The Gabanintha Vanadium Deposit

Vincent Algar
Managing Director

Disclaimer

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.

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COMPETENT PERSON REFERENCES

Competent Person Statement – Metallurgical Results

The information in this statement that relates to Metallurgical Results is based on information compiled by independent consulting metallurgist David Pass B.Sc (Hons), Mr Pass is a Member of The Australian Institute of Mining and Metallurgy. David Pass is employed by Battery Limits Pty Ltd Mr Pass 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. Pass consents to the inclusion in the report of the matters based on the information made available to him, in the form and context in which it appears".

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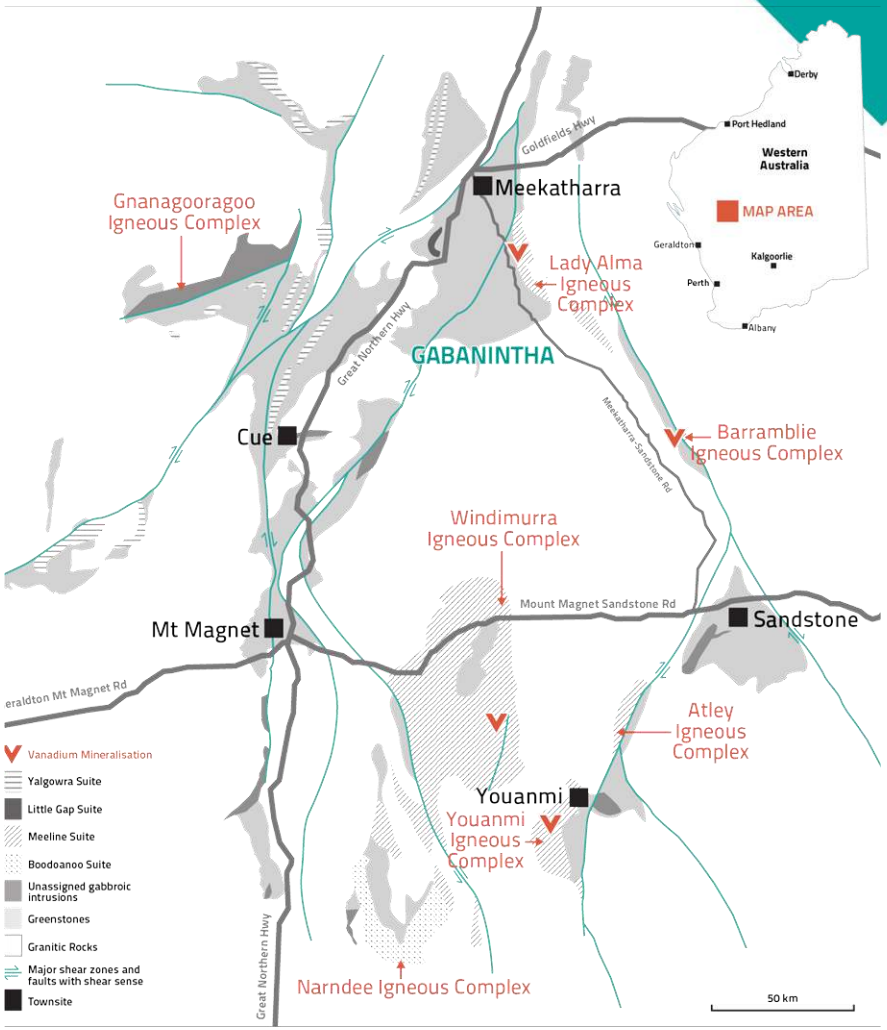
The information is extracted from the report entitled "Substantial high-grade vanadium resource highlights Gabanintha's world-class potential" released to ASX on 10 November 2015 and is available on the company website at www.australianvanadium.com.au. The company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resource 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.

Forward Looking Statements

This announcement 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 Companies 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.

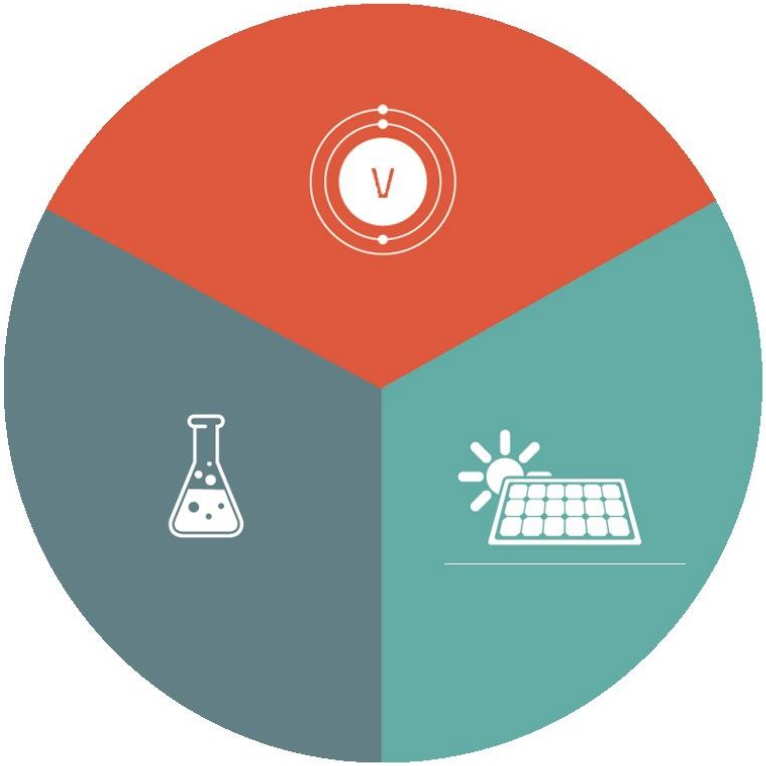
AVL is a vanadium focused company

- Vanadium focused ASX listed company
- Actively evaluating the magmatic titaniferous vanadium iron project at Gabanintha in Western Australia
- Significant project with high-grade Measured, Indicated and Inferred vanadium resources hosted in magnetite bearing rocks
- Traditional steel markets are seeking new sources of long term vanadium supply
- Vanadium use in emerging energy storage market will require increased global vanadium supply
- Energy subsidiary VSUN Energy actively developing Australian energy storage market
- AVL offers investors exposure to entire vanadium value chain
- Focus offers leverage to rising vanadium prices and new applications in energy storage



Integrated Strategy

Diversified Action to Maximise Opportunity



- Gabanintha Vanadium Project – Australia
- Electrolyte Plant Development
- VSUN Flow Battery Sales and Market Development

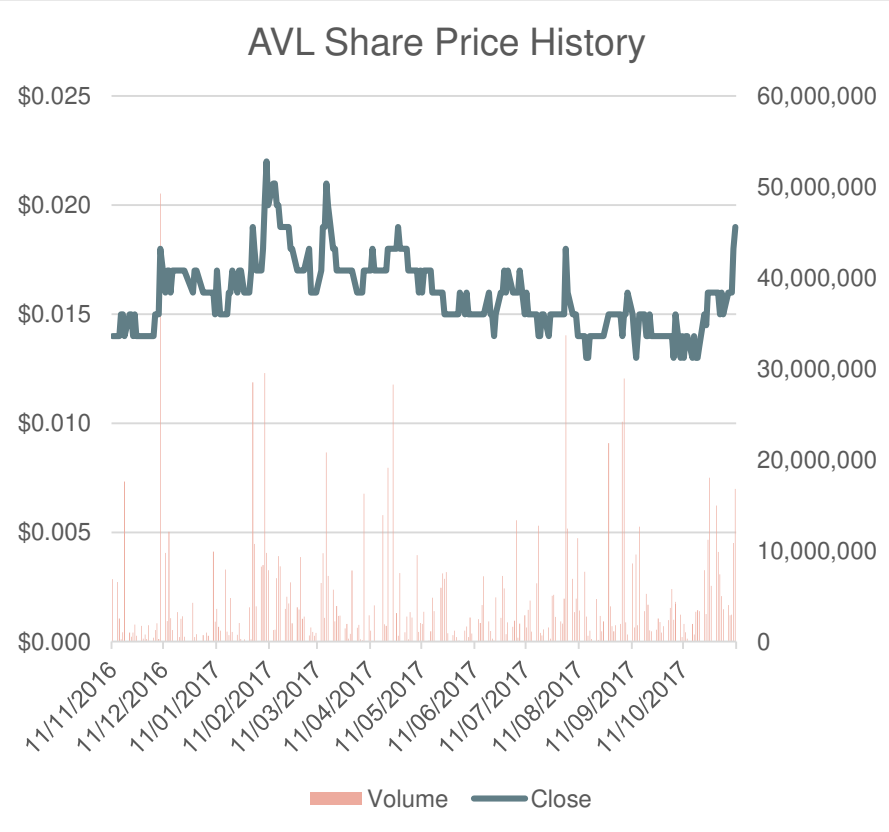
Corporate Snapshot (ASX:AVL)

Continuous Listing on ASX since February 2007

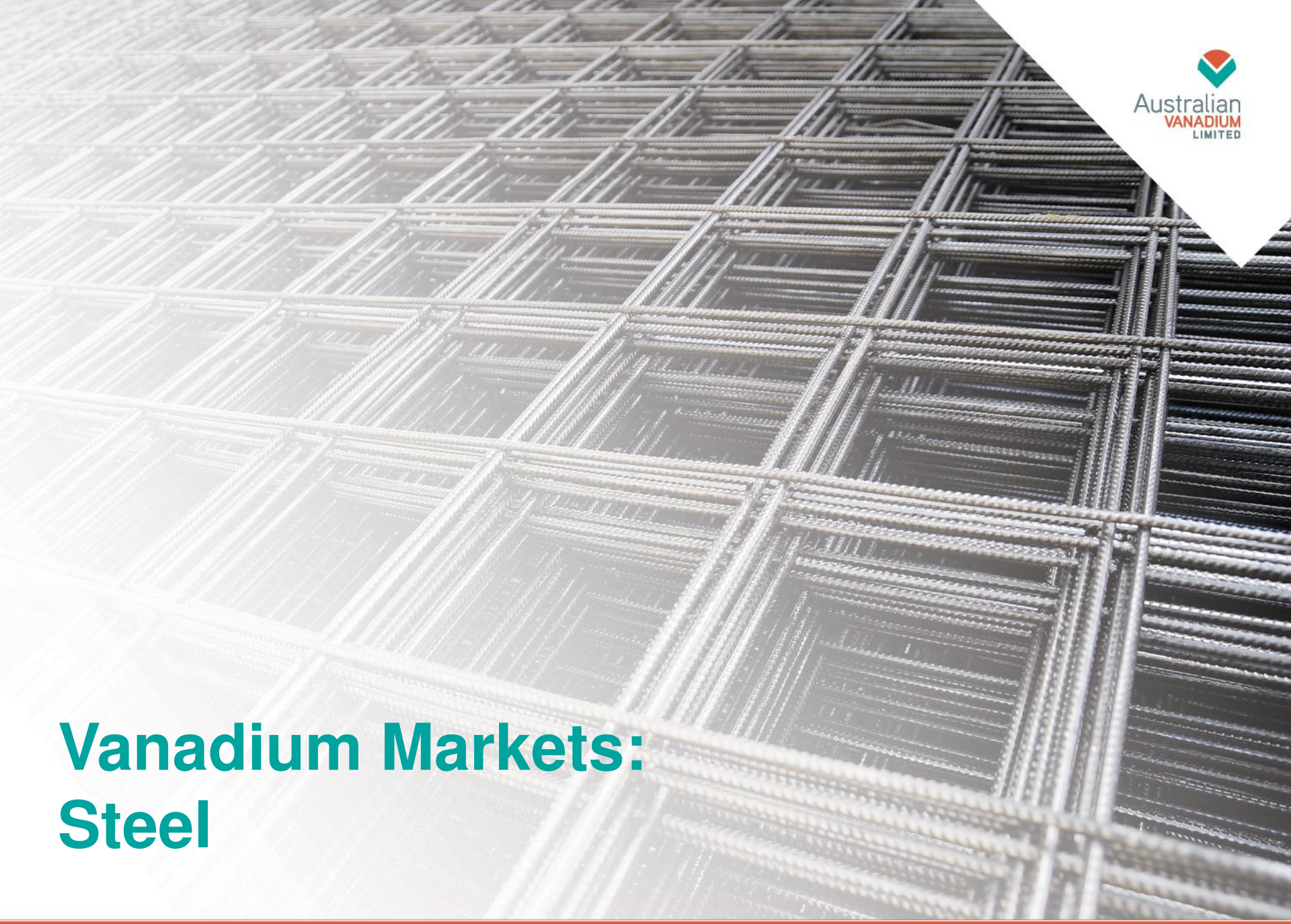
Key Statistics (as at 10-11-17)	
Ordinary shares on issue	1,383m
Options on issue (ex at 1.47c expire Dec 2017)	141.9m
Listed Options (ex at 2.c exp Dec 2018) AVLO	310.8m*
Share price	AUD $0.019
Market capitalisation (undiluted)	A$26.3 m (Cash ~A$3.1m)
Shareholders	3,804

Substantial Shareholders	% holding
Neale Parsons	2.3 %
Management	7 %

Board of Directors	Title
Vincent Algar Bsc(Hons) Geol, MAusImm	Managing Director
Leslie Ingraham	Executive Director
Brenton Lewis MBSc., BBSc.(Hons)	Non Executive Chairman
Daniel Harris BSc Chem Eng	Non Executive Director



Substantial Investments	13.4% holding in Bryah Resources (ASX:BYH)

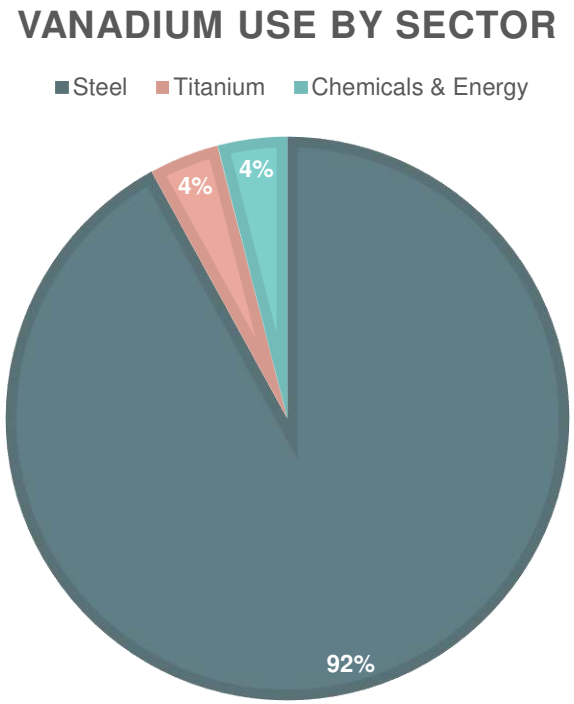


Vanadium Markets: Steel

Vanadium Applications

Uses, Production and Price

- **Steel Strengthening Alloys - V_{cont} 0.25%-1.5%**
  - Lighter weight & stronger cast
  - Re-bar: concrete tensile strength
  - Hand tools: Fe-Cr-V
- **Titanium Alloys - V_{cont} 4%**
  - Strength, corrosion resistance, weldable and light
  - Aerospace propeller & frame: Ti-6Al-4V
- **Chemicals Industry - V_{cont} 5% - 9%**
  - Catalyst for sulfuric acid - contact process
  - Vanadium flow battery - energy storage
- **Producers**
  - **Slag steel**
  - **Mines**
  - **Chemical by product (coals, crude oil, uranium)**
- **Global Production & Price**
  - **101,000 tonnes/yr** (TTP Squared 2017)
  - **USD 29/kg** – V_2O_5 eqv. (LME Sept.2017)
  - $/kg has doubled in last 6 months

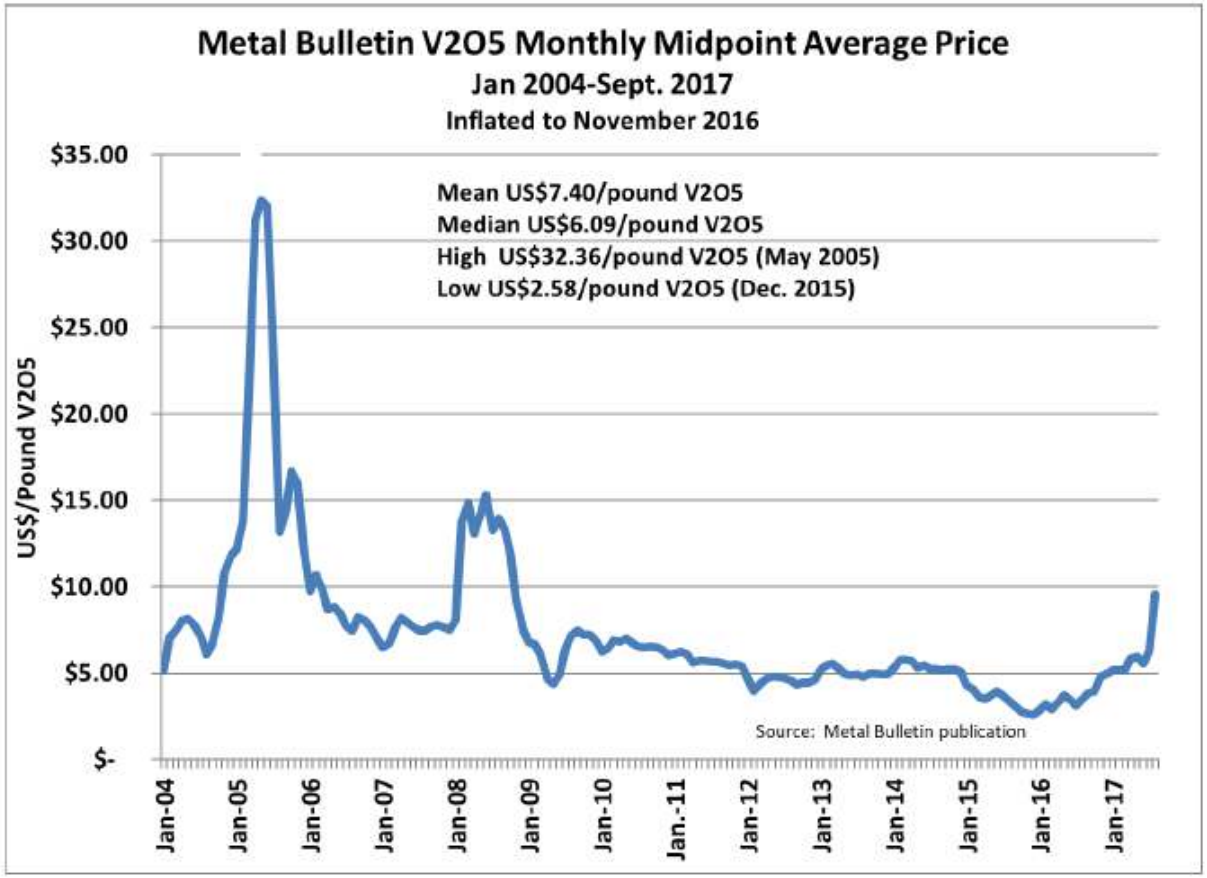


Courtesy: Largo Resources 2014

Vanadium Markets - Overview

Global inventory levels are decreasing as evidenced by rising prices over the past three years.

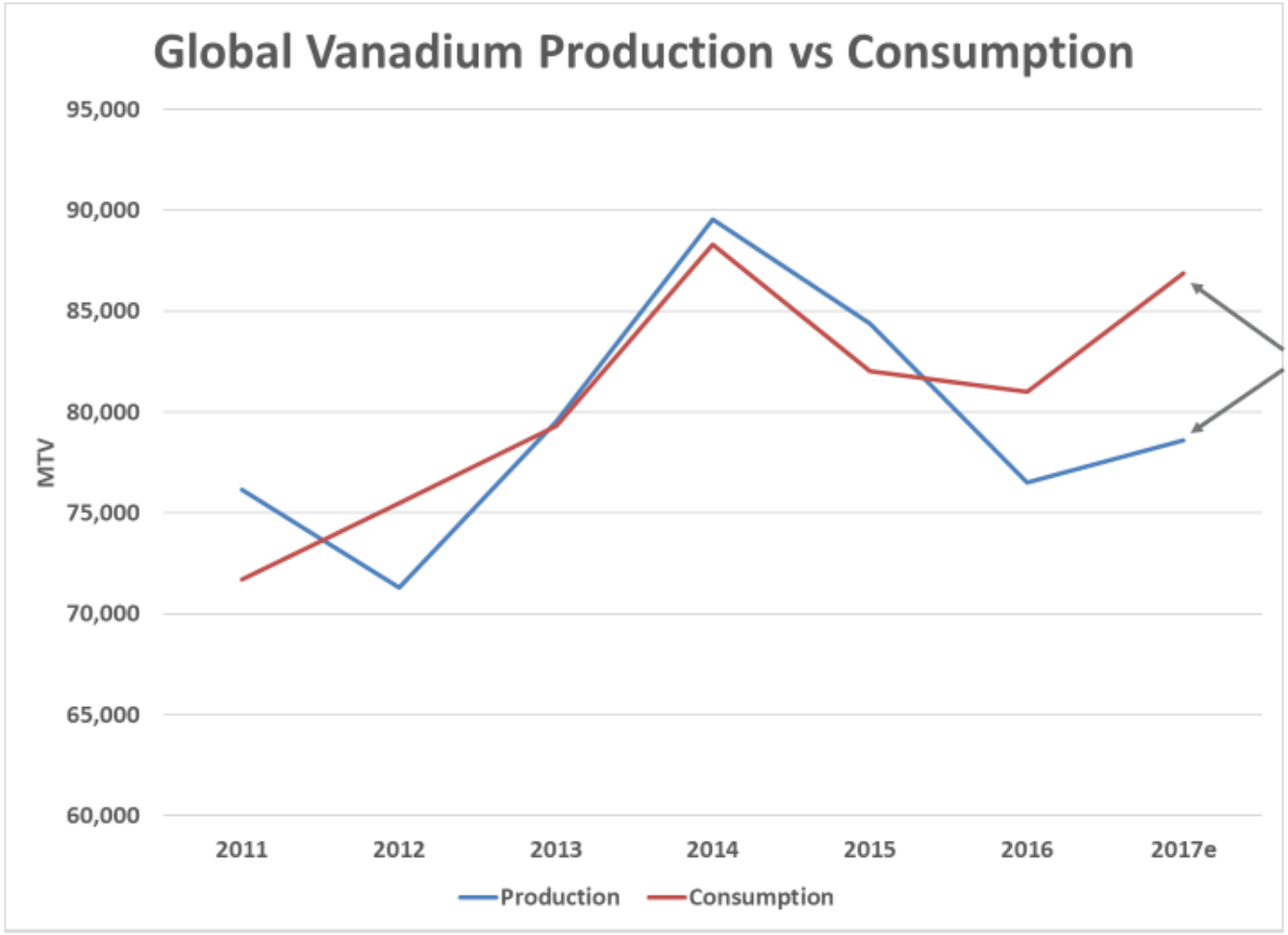
- Ferrovanadium prices in China have risen to about $60 per kilogram and to about $43 per kilogram in Europe
- Vanadium pentoxide prices have risen to $9.50[1]
- Vanadium prices are up 89% overall this year after doubling in 2016[2]
- Supply remains under pressure globally
- Vanadium electrolyte demand increasing
- Rising prices give immediate improvement to Gabanintha project economics due to its higher resource grades



[1]Roskill
[2]Metal Bulletin

Vanadium Markets - Overview

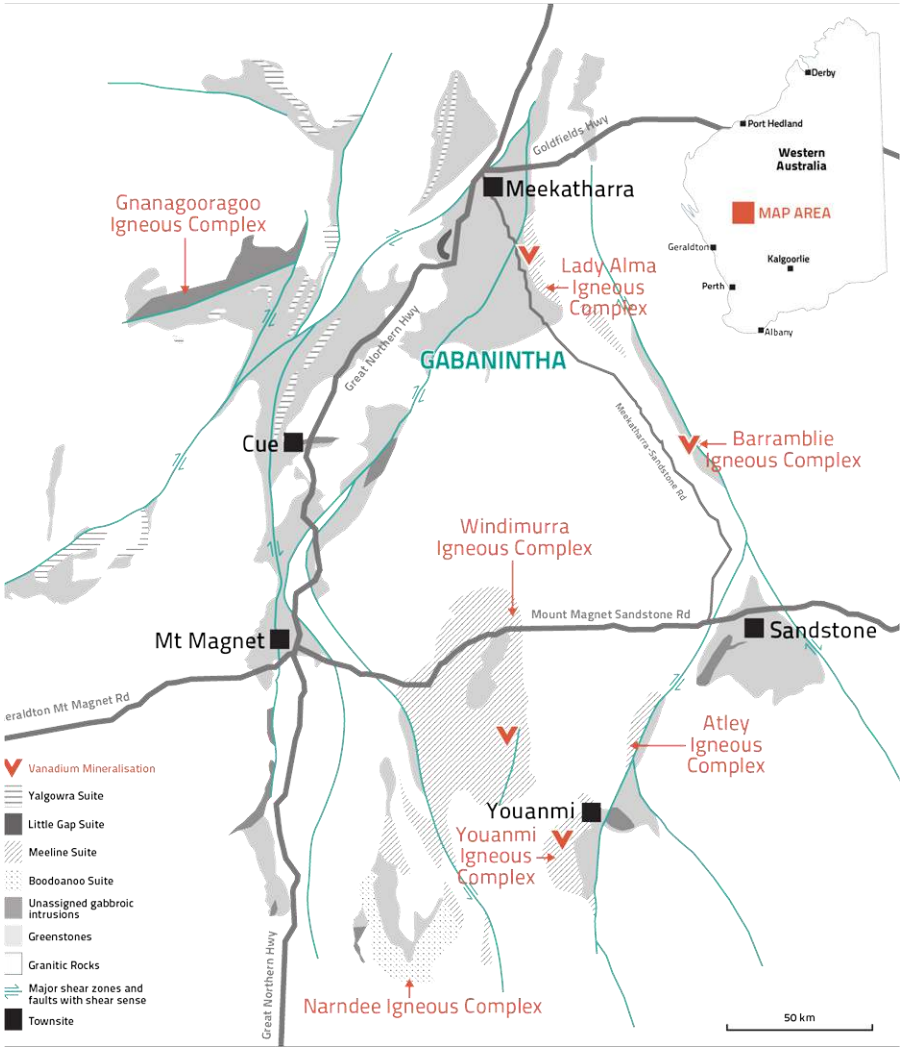
In 2017 (based on first half actual results annualized) vanadium consumption will exceed production by more than 8,000 MTV, or 10% of the market.



Globally Significant Project

Gabanintha Vanadium Project in Western Australia

Gabanintha Vanadium Project

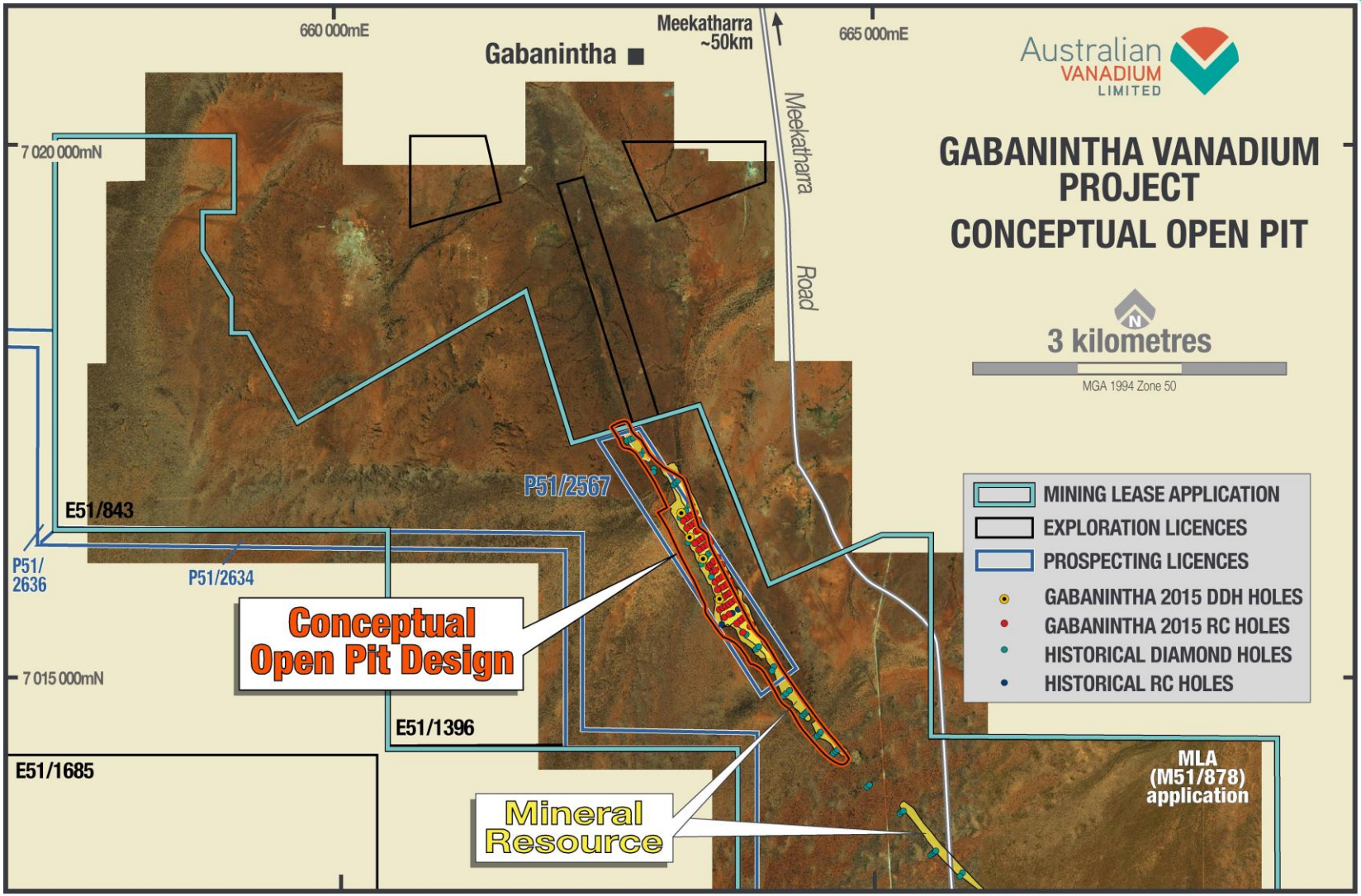


One of the mafic intrusions in the Vanadium triangle of Western Australia

A Bushveld Complex sized area hosting over 500 Million tons of vanadium resources

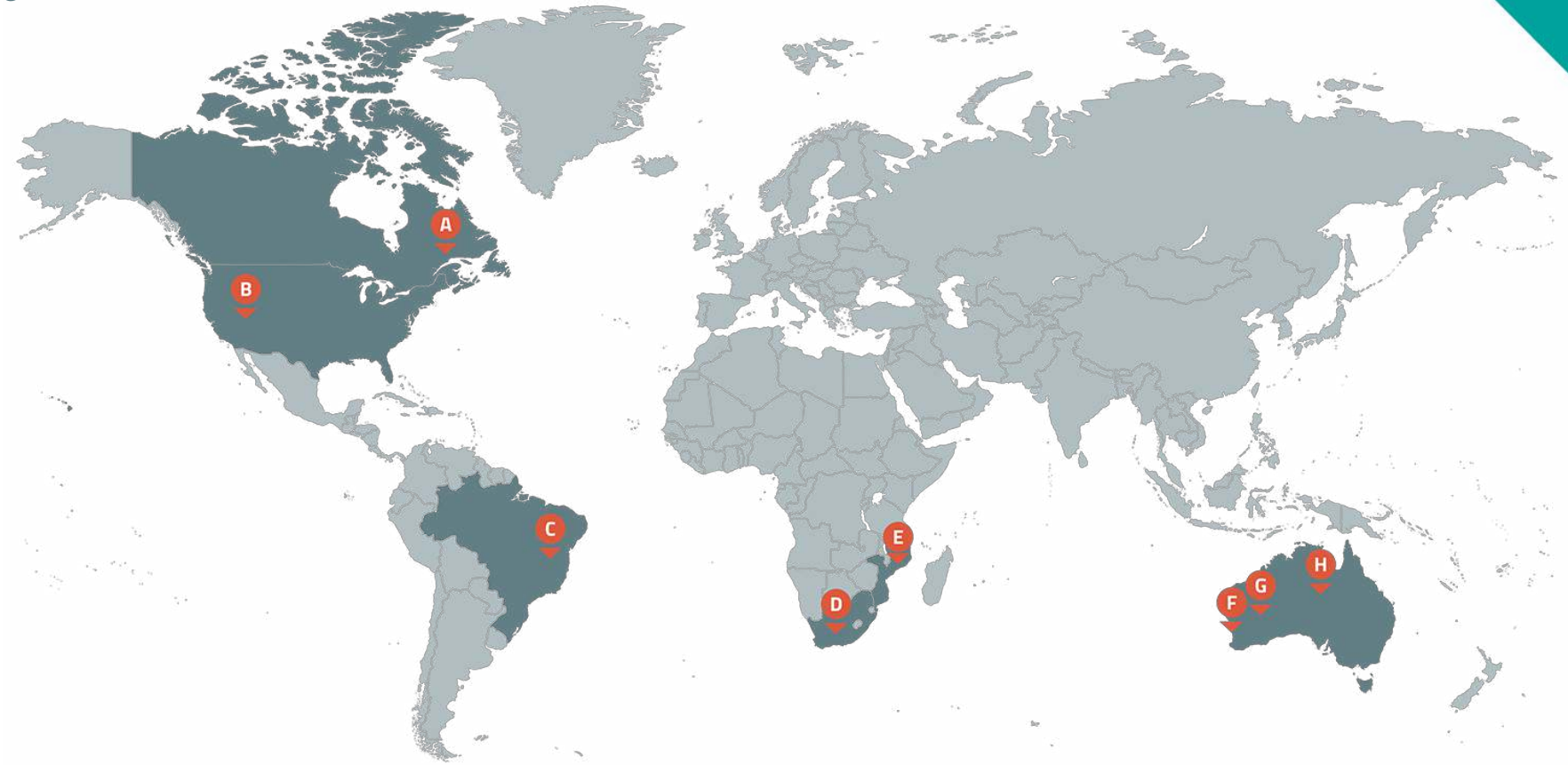
Gabanintha Vanadium Project

Deposit identified over 11km drilled strike length. Good access to infrastructure.



Global Player

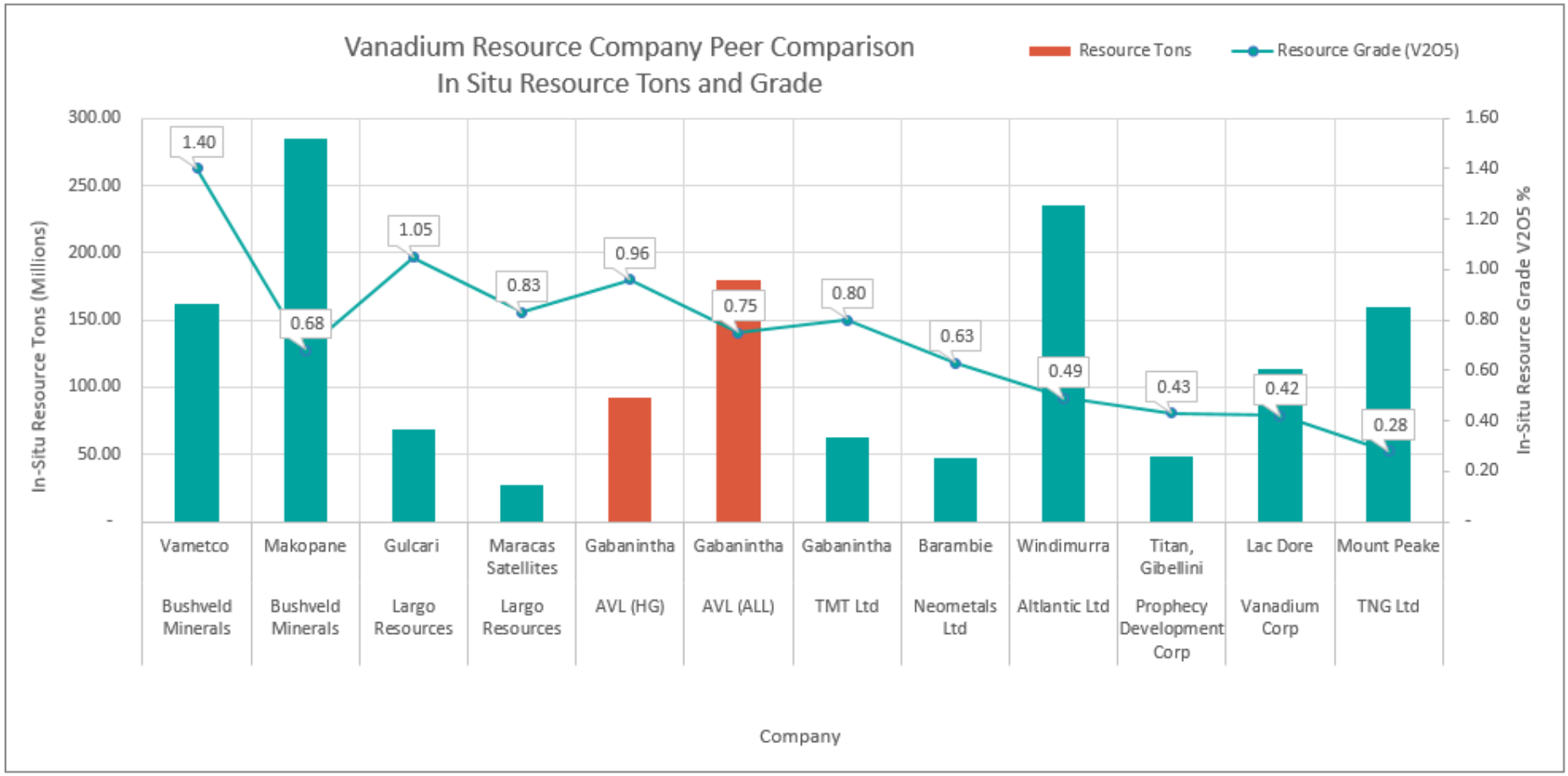
Gabanintha Project is significant development project on a global scale in grade and size



A Vanadium Corp
B American Vanadium
C Largo Resources
D Bushveld Minerals
E Syrah Resources
F Australian Vanadium
G Neometals
H TNG Limited

Vanadium Peer Comparison

Gabanintha a globally significant deposit on grade and tonnage basis



Gabanintha Vanadium Project

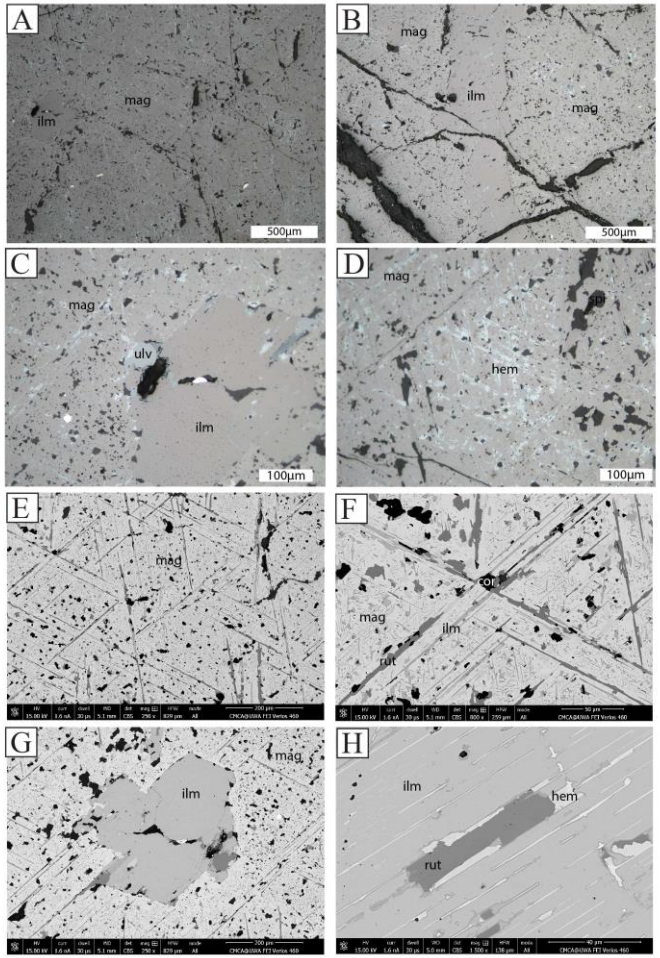
Unique resource in favourable mining jurisdiction - Murchison, Western Australia

- Lady Alma Complex (2821 Ma) is one of the structurally dismembered layered mafic intrusions in the Yilgarn Province
- Discordant features and geochemical fractionation trends indicate multiple pulses of magma in the intrusions
- Deposit type is layered mafic intrusion of gabbroic host rocks, forming layered sequence of varying lithologies up to 20m thickness.
- Strong similarities to rocks of the main zone of the Bushveld Igneous Complex
- Primary rocktypes (and their weathered equivalents) include;
  - Massive Magnetite (vanadiferous titanomagnetite)
  - Magnetite gabbro
  - Gabbro
  - Leucograbbro
  - Anorthosite
- Weathering surface highly variable (40-80m). Oxidising magnetite to martite, some heamatite and goethite
- Silicate minerals oxidized to range of clays and chloride minerals
- Deposit is at surface, suitable for open pit operation and open at depth

Vanadium Mineralisation

Strong similarities to Bushveld V- Magnetites

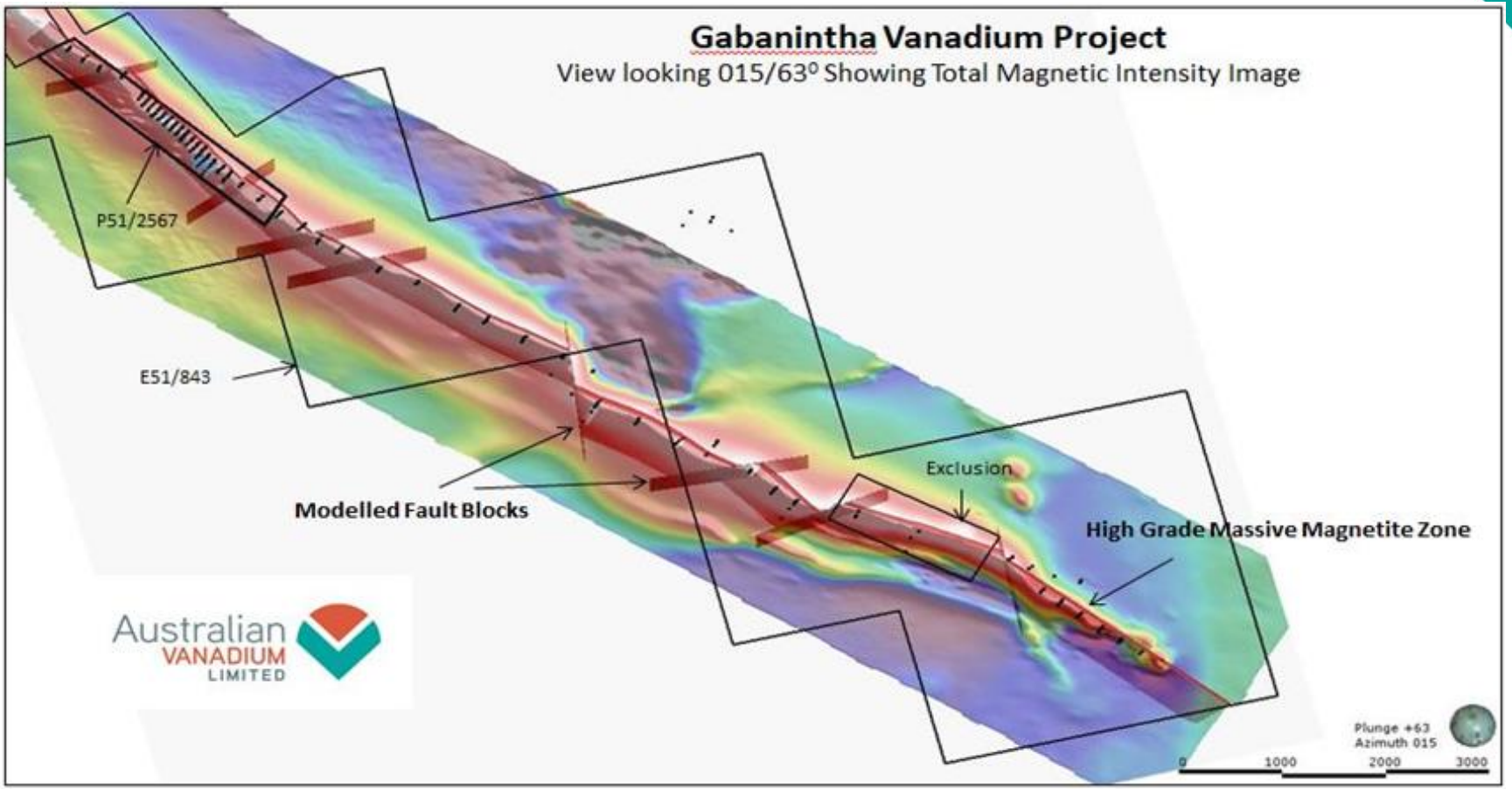
- Mineralisation in alternating layers of magnetite-rich gabbros with leuconorite or anorthosite . The sequence is everywhere underlain by a massive magnetite layer, containing over 1% V_2O_5, and containing corresponding high iron and titanium.
- Crystallisation conditions ideal for formation of layering of Ti-V-magnetite oxides (episodic high fO_2 by introduction of new magma or other material)
- Slow cooling has created exceptional crystal sizes (+1cm), particularly in massive horizon
- High grade horizon is “sealed” reducing weathering of grain interiors (to martite) and preserving magnetism (in titano-magnetite)
- Gabanintha has significant enrichment of V in titano-magnetite compared to V that has bound to rutile and ilmenite.
- Levels of V_2O_5 in titano-magnetite over 2% very encouraging for achieving high-grade vanadium concentrate grade.
- Basal high grade horizon strong similarities to Bushveld economic magnetites.



Sample 916-154.9: A, B and C: Titano-magnetite and ilmenite grains. D: trellis intergrowths in partially martitised titano-magnetite. E: SEM imaging of trellis works textures in titanomagnetite. F: SEM imaging of exsolutions in titano-magnetite. G: SEM imaging of ilmenite grain. H: SEM imaging of intergrowths in ilmenite grain.

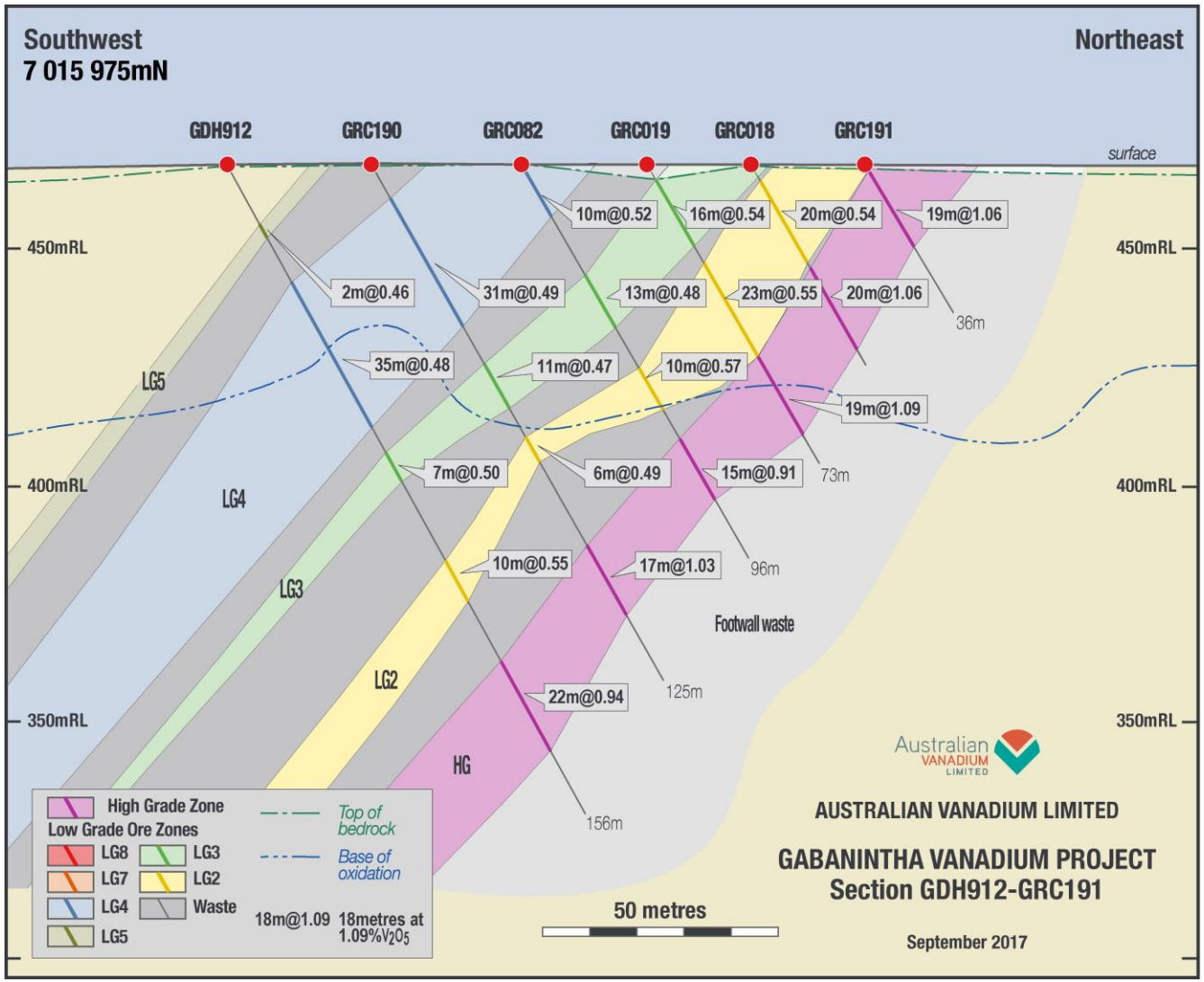
Gabanintha

Strong and consistent magnetic signature supported by drilling confirming strike orientation, continuity and fault structures. Enables high quality modelling



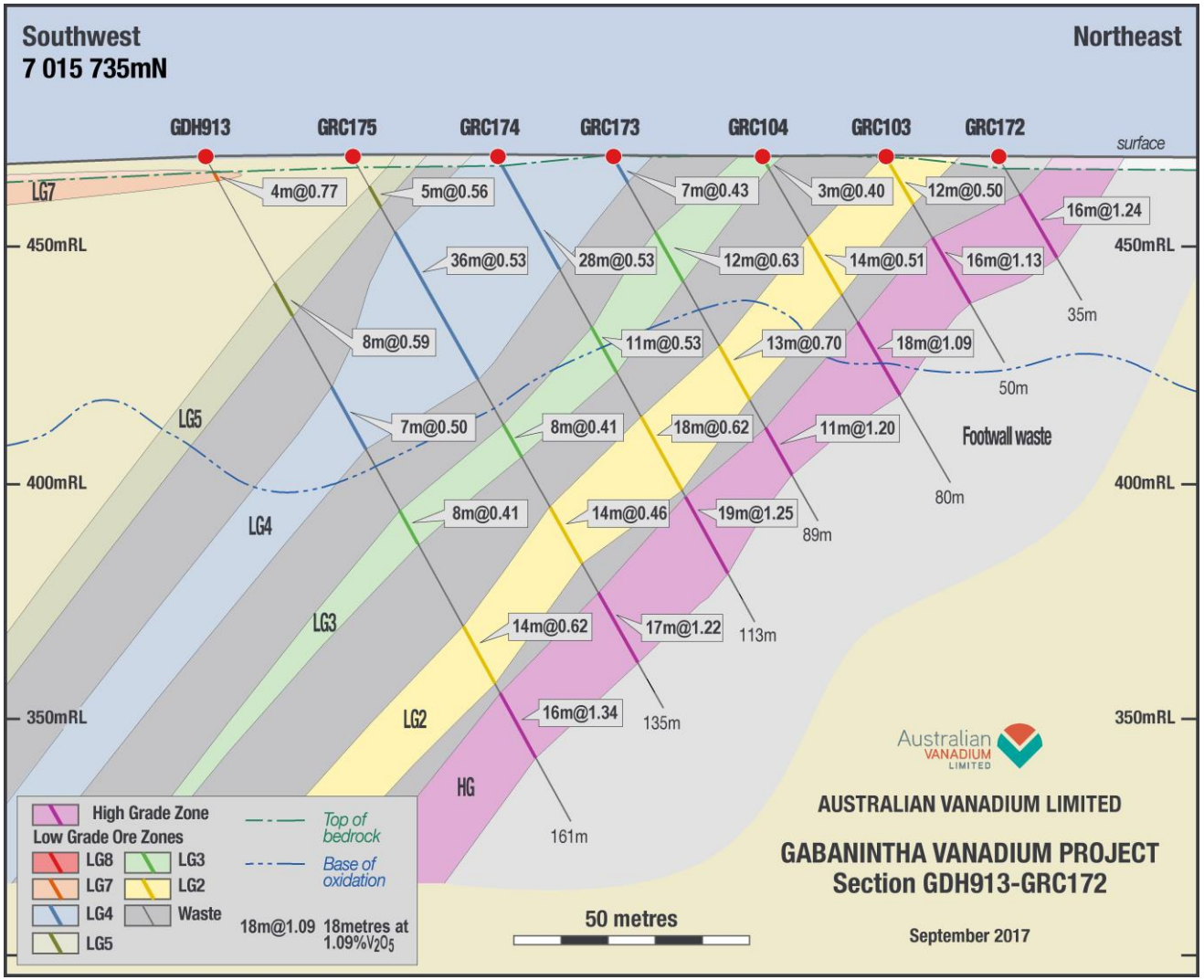
Gabanintha Vanadium Project

Discrete high-grade zone, simple geometry, suitable for open pit mining



Gabanintha Vanadium Project

Well developed minerlalised and unmineralised zones corresponding with lithology



Gabanintha outcropping massive magnetite horizon

Leapfrog Geo vein modelling tools used to create geological model.
24 fault Blocks and up to 9 horizons.
Grade estimation in Surpac.

Vanadium Resource

Large high-grade resource

Material	JORC Resource Class	Million Tonnes	V_2O_5 %	Fe%	TiO_2 %	SiO_2 %	Al_2O_3 %	LOI%
High grade	Measured	10.2	1.06	41.6	12.0	11.6	8.6	4.2
	Indicated	4.8	1.04	41.9	11.5	12.0	8.0	3.6
	Inferred	77.8	0.94	41.2	10.7	12.7	7.9	3.3
Subtotal High Grade		**92.8**	**0.96**	**41.3**	**10.9**	**12.6**	**8.0**	**3.4**
Low grade	Indicated	20.5	0.52	24.3	7.1	27.9	17.6	8.4
	Inferred	61.8	0.52	26.2	7.0	26.9	16.1	7.2
Subtotal Low grade		**82.4**	**0.51**	**25.7**	**7.0**	**27.2**	**16.5**	**7.5**
Subtotal Measured	Measured	10.2	1.06	41.6	12.0	11.6	8.6	4.2
Subtotal Indicated	Indicated	25.4	0.62	27.7	7.9	24.9	15.8	7.5
Subtotal inferred	Inferred	144.1	0.75	34.4	9.0	19.2	11.7	5.2
	TOTAL	**179.6**	**0.75**	**33.8**	**9.0**	**19.6**	**12.1**	**5.4**

Note: – Mineral Resource estimate by domain and resource classification using a nominal 0.4% V2O5 wireframed cutoff for low grade and nominal 0.7% V2O5 wireframed cut-off for high grade (total numbers may not add up due to rounding)

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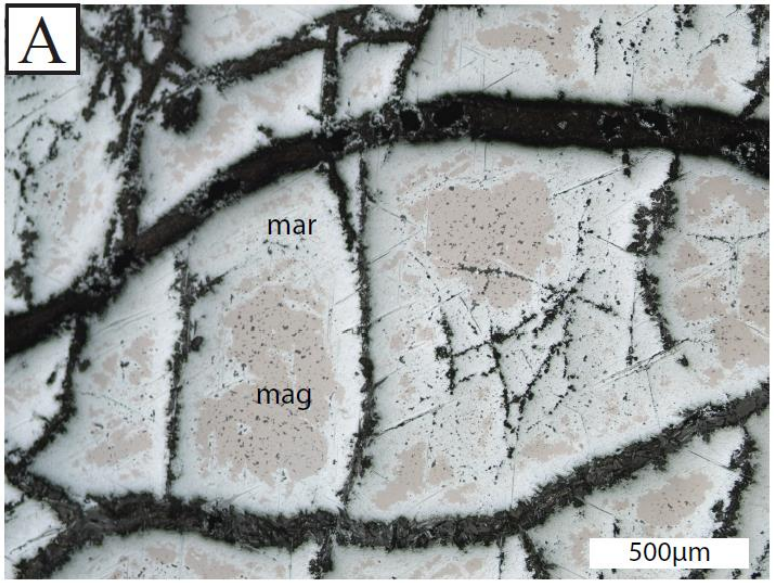
Metallurgical Test Work

Prior studies support further work

- High recovery rates from all ore types, including oxidised materials
- Strong recoveries achieved from coarse grind sizes, scope to maintain low operating costs
- Concentrate grades up to 1.5% V_2O_5 achieved from high grade ores
- High vanadium content (+2% V_2O_5) in magnetite identified in high and low grade ore types
- Opportunities to reduce silica content in concentrate, benefiting both capex and recovery.
- Titanium readily recovered to concentrates demonstrates potential for additional revenue options
- Detailed Mineralogy and Petrology analysis completed at CET , UWA. Findings complement Met studies



Weathered high-grade ore showing un-oxidised magnetite grain cores

Metallurgical work to focus on key drivers

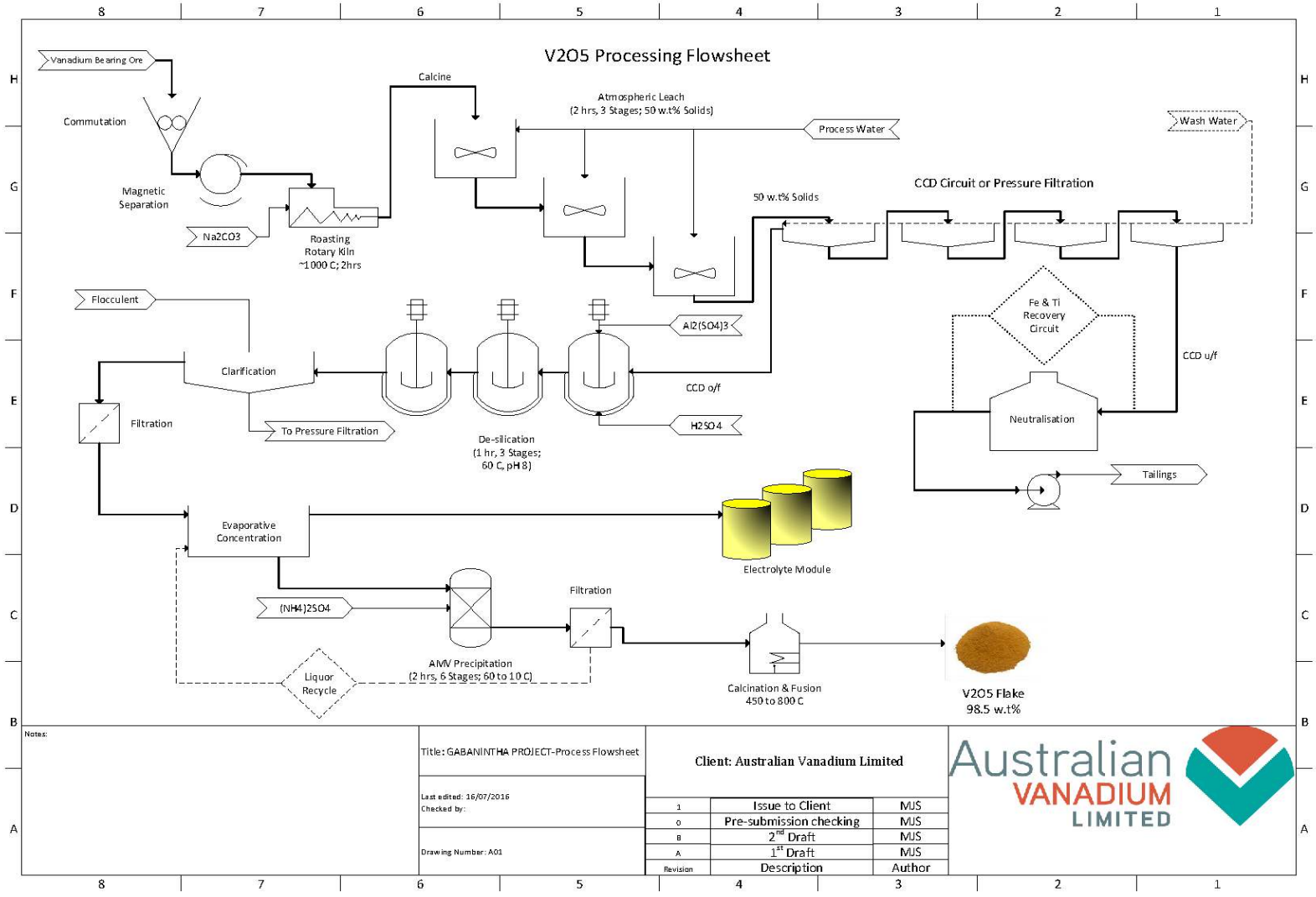
Definitive work underway to advance towards development decision

- Key drivers have been identified to ensure project success
  - Mining cost
  - Stripping ratio
  - Vanadium ore feed grade to CMB plant
  - Water availability, consumption and recovery
  - Mass yield of ore to concentrate
  - Concentrate vanadium grade (V in mag con)
  - Power cost
  - Cost and distance of transportation
  - Reagent costs

Geos and Mets should always be best friends

Gabanintha Concept Study

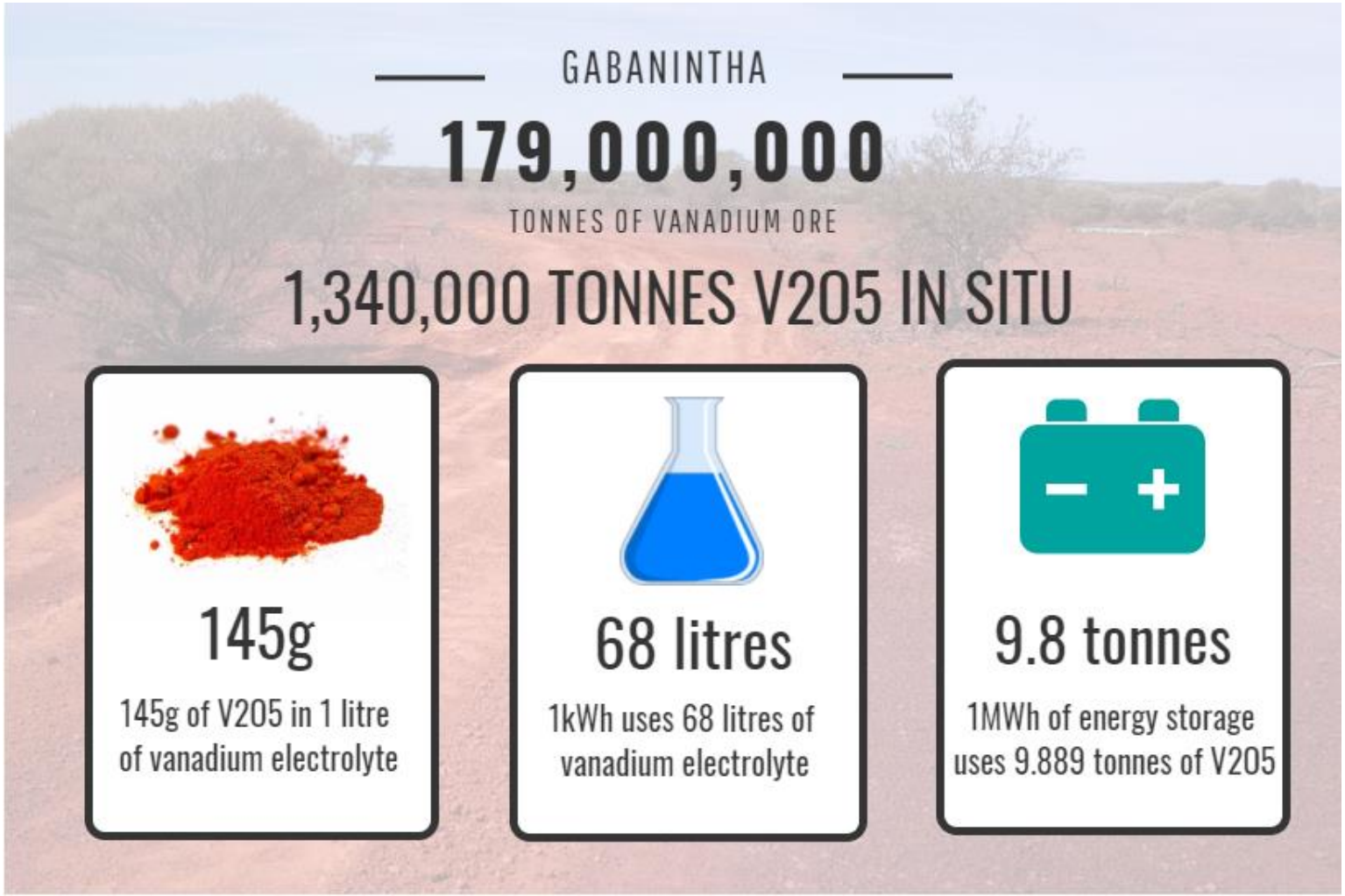
Proposed Process Flowsheet



Vanadium Markets: Energy Storage

Vanadium Consumption in VRFB

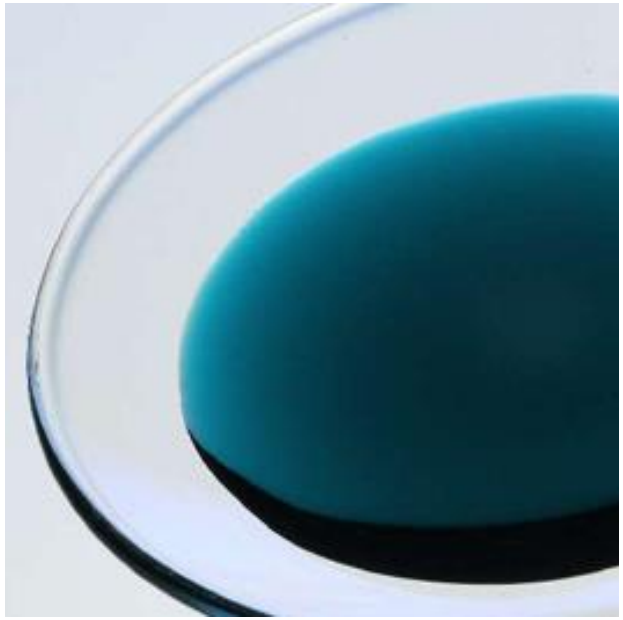
Vanadium consumption in Energy Storage creates potential market shift



V-electrolyte & VRFBs

VRFBs designed around the electrolyte

- 1970s first flow battery Fe-Cr
- 1980s vanadium redox flow battery (VRFB): One-element only many benefits
  - **V able to maintain 4 oxidation states in solution**
  - **No impurities – ore/process dependent**
- Vanadium electrolyte = energy store = battery "fuel"
- Acidic solution of **equimolar** V(III) & V(IV) sulphates
  - [V] = 1.6 M $[H_2SO_4]$ = 4.4 M
  - 145g V_2O_5/L



- Advantages and Limitations
  - ☑ **1 metal element – no cross-contamination (Zn-Br)**
  - ☑ **All liquid - no electroplating (lead sulphate)**
  - ☑ **Indefinite chemical lifetime – a reversible reaction**
  - ☑ **Thermally stable**
  - ☑ **No heavy metals**
  - ☑ **Separate power (kW) from energy (kWh)**

  - ☒ **Low energy density – lots of liquid required**
  - ☒ **Low cell voltage 1.26V**
  - ☒ **H_2 evolution – H2O Electrolysis 1.23V**

Redox

Equations Governing VRFB

Two Liquid phase reversible reactions:

$$V^{2+} \leftrightarrow V^{3+} + e^- \qquad E^o = 0.26\,V$$

$$(VO_2)^+ + 2H^+ + e^- \leftrightarrow (VO)^{2+} + H_2O \qquad E^o = 1\,V$$

Adding anolyte & catholyte voltages gives OCV

- Open Cell Voltage (OCV) for VRB is 0.26V + 1V = **1.26V**

Lithium Ion:

$$Li_{(s)} \leftrightarrow Li^+ + e^- \qquad E^o = 3.04\,V$$

Hydrolysis of Water:

$$H_2O \leftrightarrow H_2 + \frac{1}{2}O_2 \quad E^o = -1.23\,V$$

(can occur in overpotential situation and high SOC)

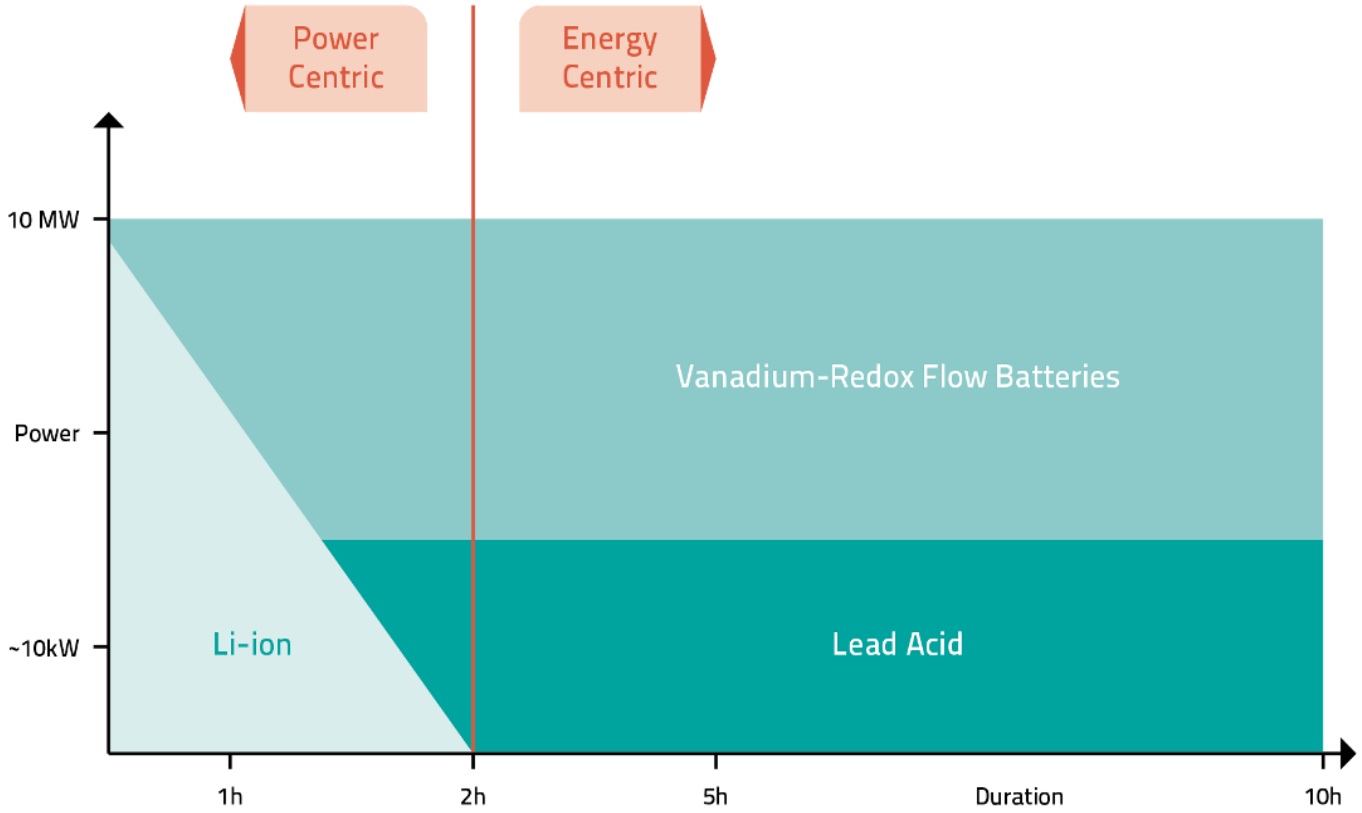
Flow Battery Installation Completed

Rural site benefitting from Solar PV plus CellCube to shift to 90% renewable energy self consumption. First opening into large Australian market.

Vanadium in Energy Storage

Defining the space for flow battery technology

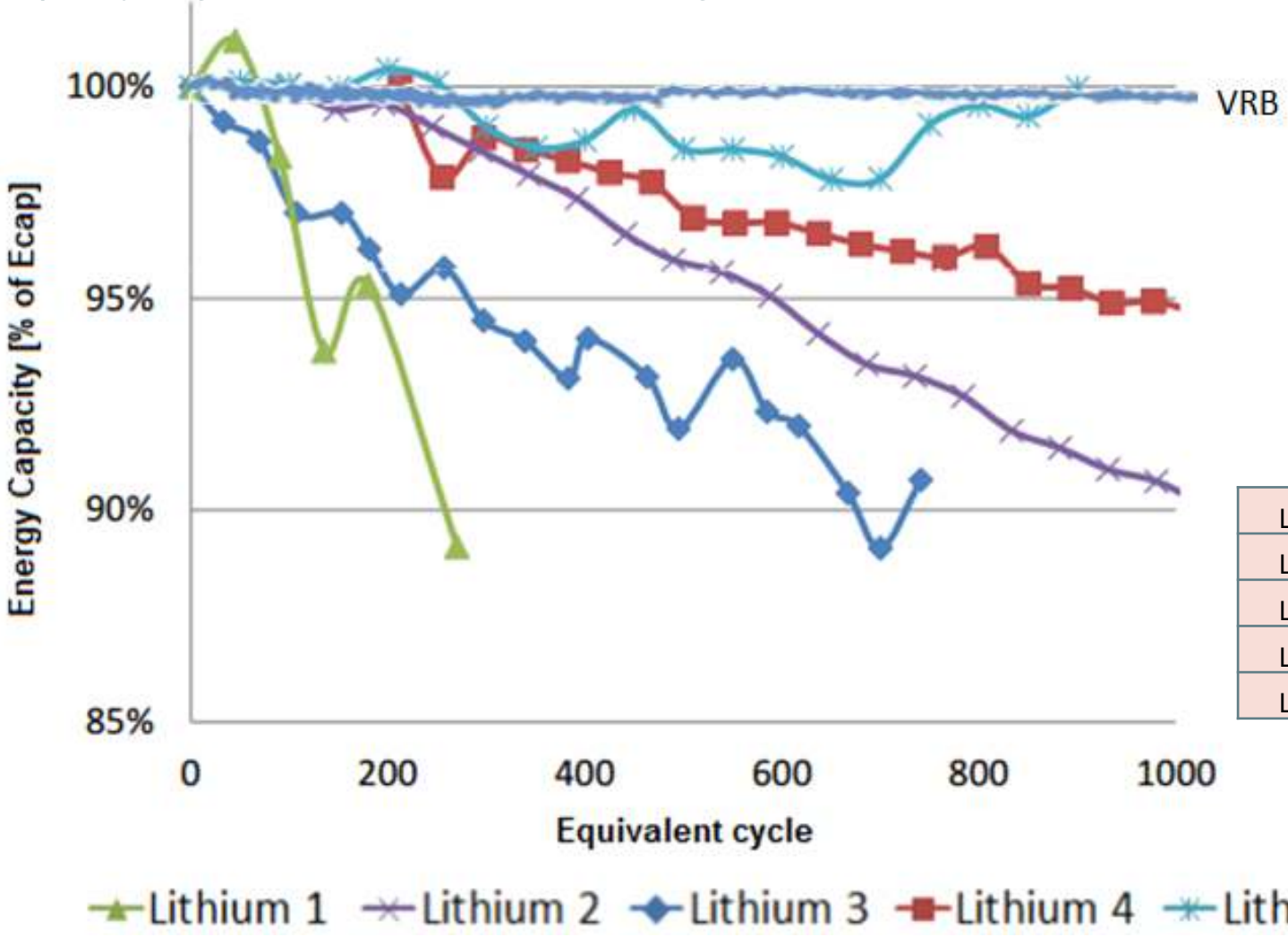
» Vanadium Redox Flow Batteries provide a unique ability to significantly time-shift very large amounts of previously generated energy (ideal for renewable energy capture and despatch).



Source: GILDEMEISTER Energy Storage

Comparison: Li-ion & VRFB

Capacity degradation as a function of usage



Li 1	NCA	NiCoAl
Li 2	NCM	NiCoMn
Li 3	LFP	LiFeP
Li 4	LMO	LiMnOx
Li 5	LTO	LiTiOx

Vanadium vs Lithium: Key Comparisons

THE SUPPLY SOLUTION FOR GRID STORAGE

	VANADIUM Redox Batteries (VRB)	LITHIUM Batteries
Number of Cycles (Lifespan)	Indefinite	~6,000 Max (3-5 yrs)
Suitable for Grid Scale Storage & Load Leveling	✓	✗
Efficient Storage for Solar & Wind Power	✓	✓
No Risk of Fire or Explosion Due to Overheating	✓	✗
Scalable to Meet Unlimited Range of Storage Capacity	✓	✗
Charges & Discharges Simultaneously	✓	✗
Battery Solution Can be Used & Re-Used Indefinitely	✓	✗
Thermal Runaway	✗	✓
Can Release Energy Instantaneously	✓	✓
Storage Ability Does Not Degrade Over Time	✓	✗
Reduced Cell Management/Monitoring With Increasing Scale	✓	✗
Low Environmental Footprint	✓	✗
High Energy Density & Short Life	✗	✓
Ability to Meet the Energy Storage Requirements Anticipated in the Future	✓	✗

Redox Battery Market Beckons in Australia

Can the VRFB be the ultimate grid energy storage solution for Australia?

- Rising power costs: VRFBs can reduce power bills by peak/off-peak shifting and demand management
- Australia has world's most extended networks: many fringe-of-grid and off-grid opportunities exist
- Battery storage strongly on political agenda: efforts to reduce power price rises and carbon dependency
- VRFB rollout can assist with Australian networks primary goal – capital cost deferment
- Australian storage market expected to grow to 3000MWh by 2030 (CEC Report 2012).
- VSUN Energy actively identifying multiple residential and commercial storage opportunities, ranging from 5kW of power with 15kWh of energy storage to 40MW of power with 160MWh of energy storage.

vsun energy

Australian Vanadium:

An active company advancing a unique integration strategy focused on vanadium

Highlights

- High quality, high tonnage Gabanintha resource moving towards project development.
- Previous concept engineering studies support project advancement. Key processing studies underway.
- Targeting vanadium steel producers and battery manufacturers for offtake and project involvement.
- Technical, Environmental and Heritage activity underway to advance project toward feasibility study in 2018
- Significant interest and demand identified for commercial scale solar and vanadium battery storage solutions in Australian urban and rural environments.

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