



Australian
VANADIUM
LIMITED

Investing in a vanadium future with Australian Vanadium

Investor Presentation October 2016

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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.

Comment

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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”.

Competent Person Statement – Mineral Resource Estimation

The information relating to the Gabanintha Project 2015 Mineral Resource estimate reported in this announcement is based on information compiled by Mr John Tyrrell. Mr Tyrrell is a Member of The Australian Institute of Mining and Metallurgy (AusIMM) and a full time employee of AMC (AMC Consultants Pty Ltd). Mr Tyrrell has more than 25 years' experience in the field of Mineral Resource Estimation. He has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and in resource model development 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'.

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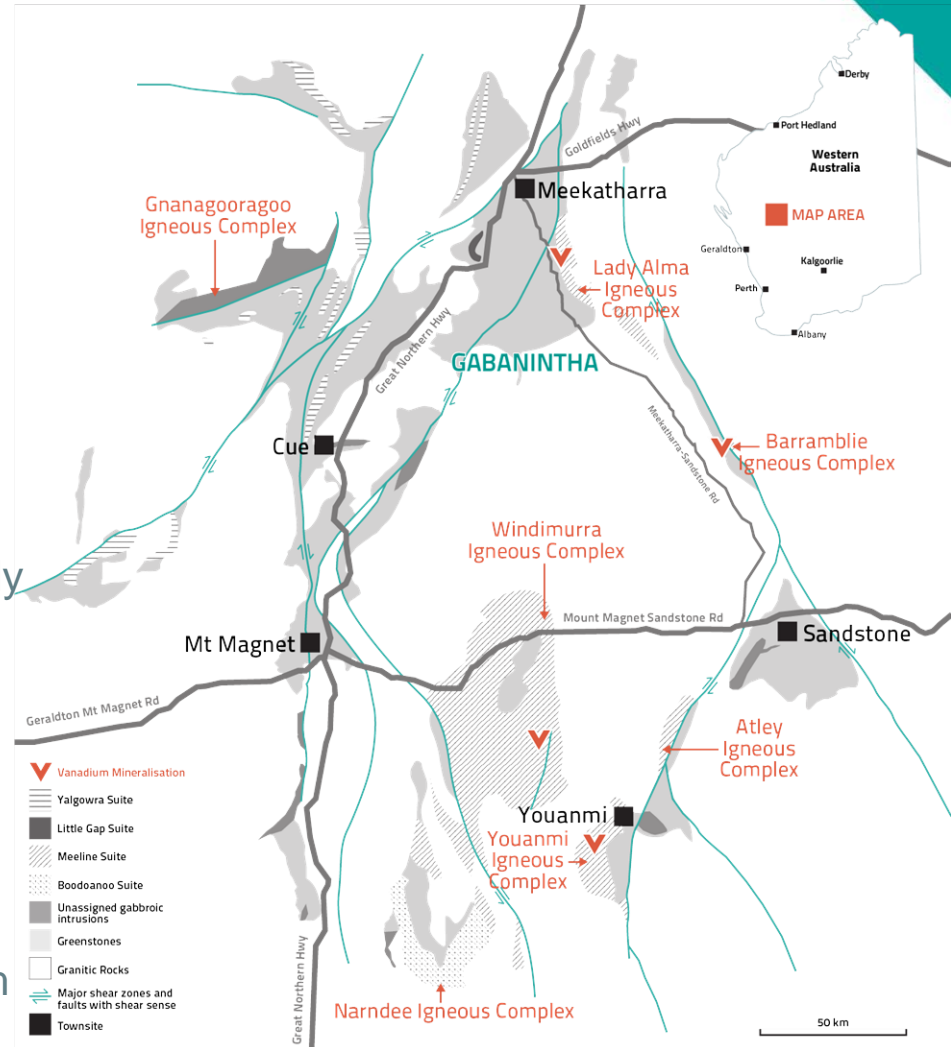
The information is extracted from the report entitled “Substantial high-grade vanadium resource highlights Gabanintha’s world-class potential” released to ASX on 10 November 2015 and is available on the company website at www.australianvanadium.com.au. The company confirms that it is not aware of any 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.

Who is AVL ?

- Vanadium focused ASX listed company
- Active evaluation of a new, long-life vanadium Project (Gabanintha) in Western Australia
- Significant project with large, high-grade Measured, Indicated and Inferred resources
- Vanadium energy storage market will disrupt traditional global vanadium supply
- Key agreements with battery suppliers and renewable energy installers to develop local market
- AVL offers investors exposure to entire vanadium energy storage value chain
- Focus offers leverage to rising vanadium prices and new applications in energy storage



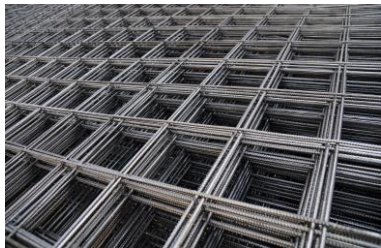
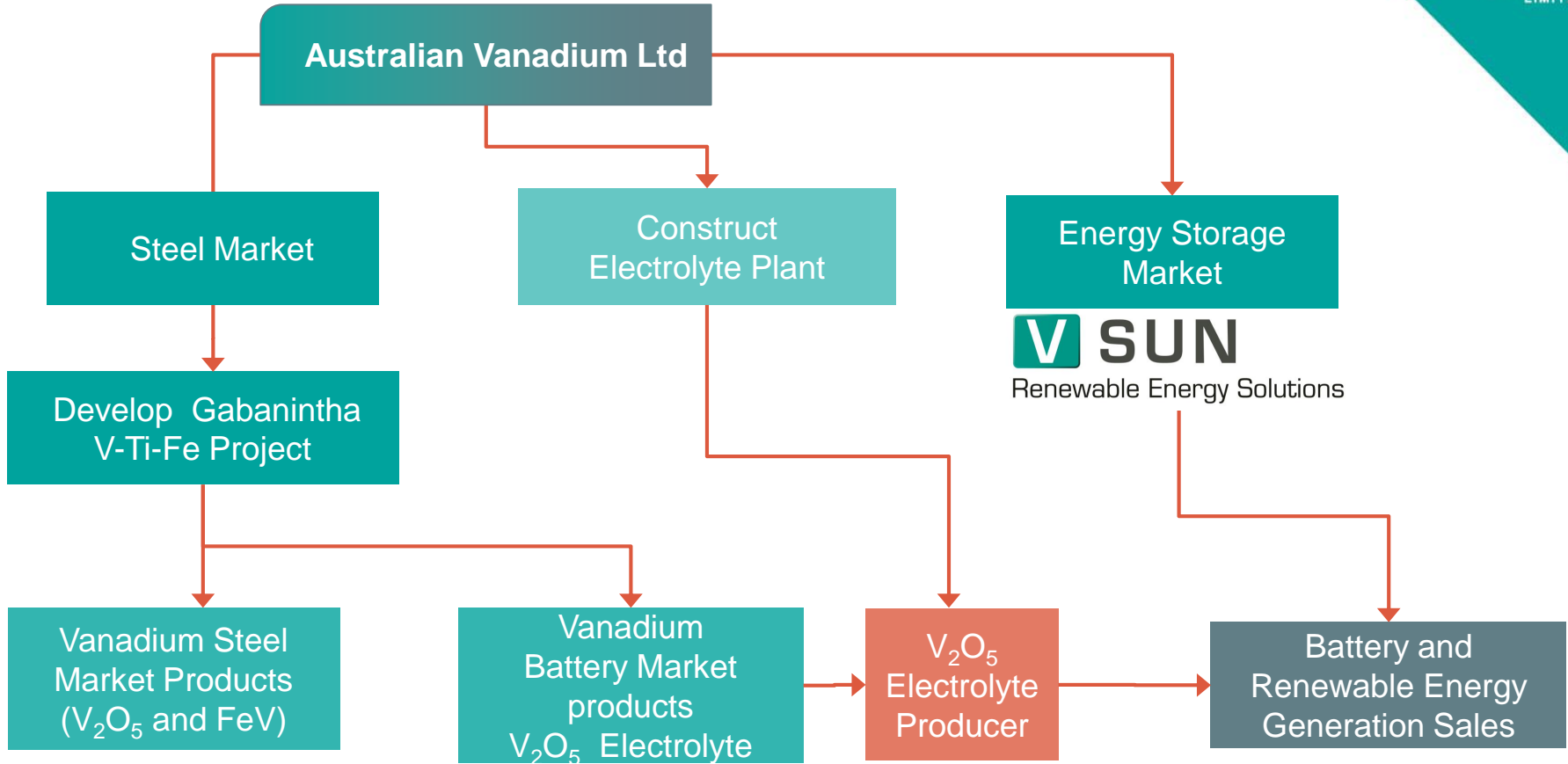
Corporate Snapshot (ASX:AVL)

Capital structure and major shareholders

Key Statistics (as at 9/10/16)	
Ordinary shares on issue	1,100m
Options on issue (ex at 1.47c expire Dec 2017)	176.1m
Listed Options (ex at 2.c exp Dec 2018) AVLO	235.8m
Share price	AUD \$0.017
Market capitalisation (undiluted)	A\$18.7m (Cash ~A\$3.5)
Shareholders	2,165
Substantial Shareholders	
	% holding
Mr Neale Parsons	4 %
Management	7 %
Board of Directors	
	Title
Vincent Algar Bsc(Hons) Geol, MAusImm	Managing Director
Leslie Ingraham	Executive Director
Brenton Lewis MBSc., BBSec.(Hons)	Non Executive Chairman



AVL Vertical Integration Strategy





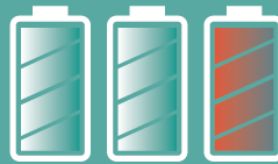
Vanadium Markets Steel and Energy Storage

Vanadium in Energy Storage

“Energy storage has the potential to transform our entire energy system.”– Clean Energy Australia



Battery storage capacity expected to grow to 185 Gwh in the next few years



62 Gwh (30%) of this market demand expected to be taken up by Vanadium Redox Batteries



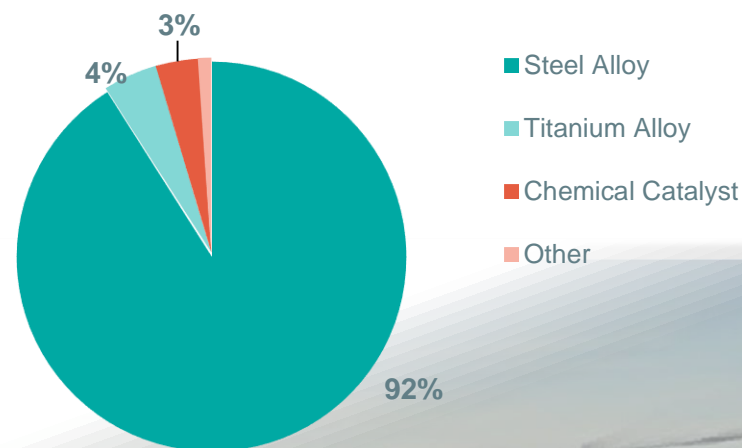
Results in 300,000 tonnes of new demand for vanadium

 **SUN**
Renewable Energy Solutions

Vanadium Markets - Steel

Despite reduced rate of steel production, demand for vanadium continues to grow. Steel remains a price driver for vanadium

- Steel is primary market (92% of vanadium consumption)
- Addition of 0.2% vanadium increases steel strength up to 100% and reduces weight up to 30%
- Demand for use in rebar continues to increase at 6% annually (TTP Squared)
- New markets in steel will increase demand such as;
 - Materials for automotive, aviation and aerospace
 - Power lines and power pylons
 - High-strength steel structures



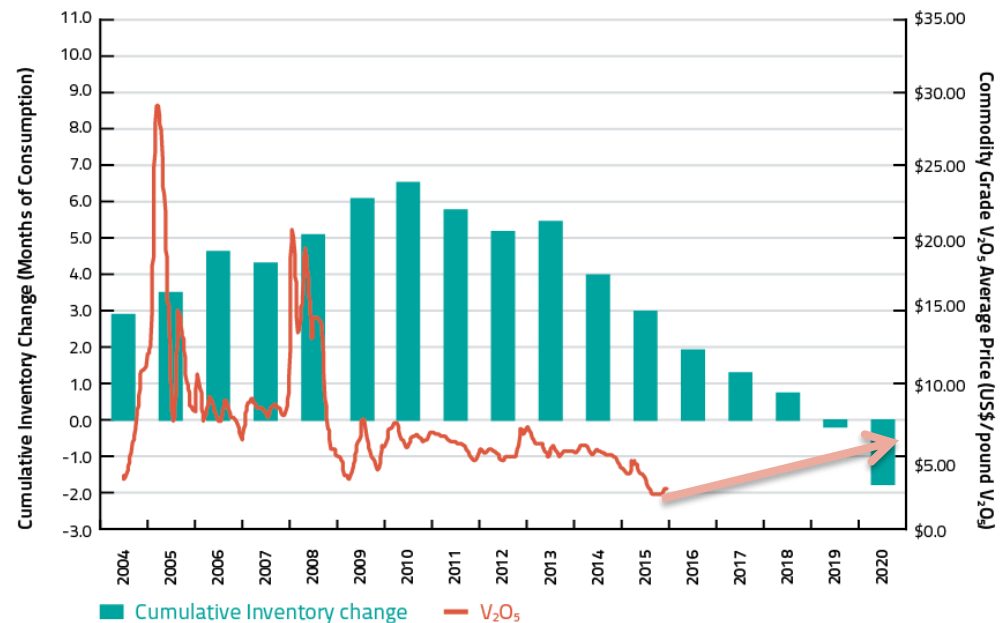
Vanadium Markets - Overview

Supply and demand outlook offers compelling opportunity for early involvement – particularly with interest from Energy Storage

- Upward price signals are clear from very recent data
- FeV prices up between 36% and 41% in early 2016
- V₂O₅ prices up 18% in early 2016 with indications of deals up to 55% higher.
- Supply under pressure with Highveld Steel (RSA) closed
- Chinese FeV capacity constrained at present due to low demand in 2014/5
- Rising prices have immediate improvement of Gabanintha Project economics due to its higher resource grades

(RN and MB via TTP Squared analysis)

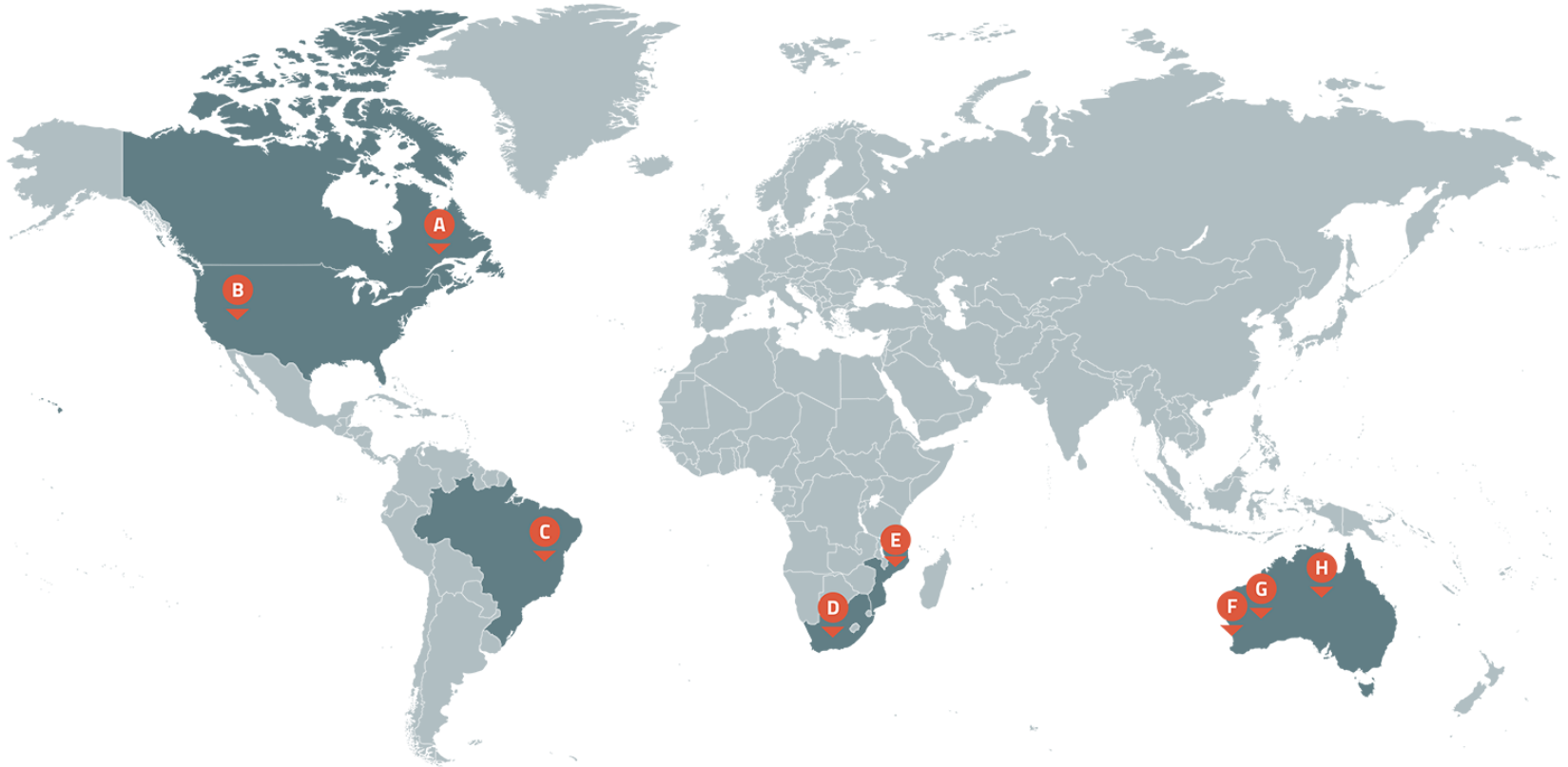
Global Vanadium Inventory Change vs V₂O₅ Price



Globally Significant Project

Global Player

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



A Vanadium Corp
E Syrah Resources

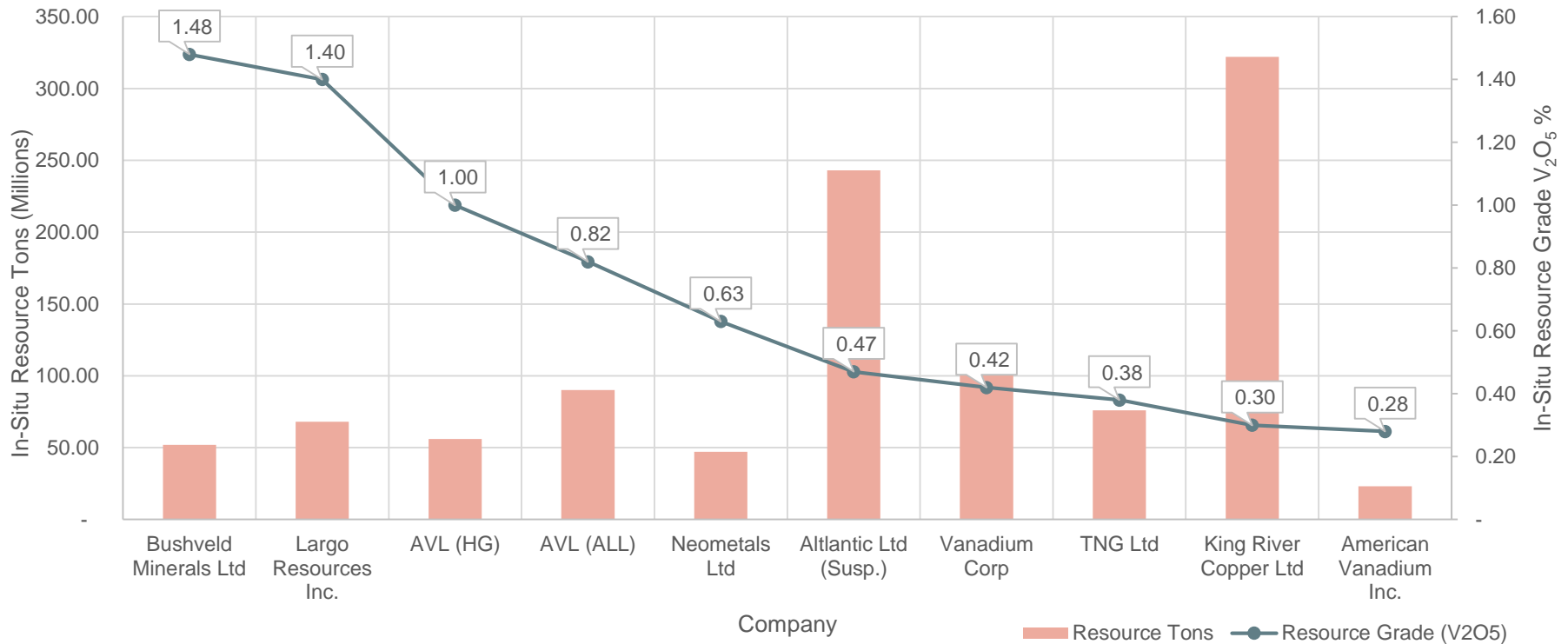
B American Vanadium
F Australian Vanadium

C Largo Resources
G Neometals

D Bushveld Minerals
H TNG Limited

Vanadium Peer Comparison

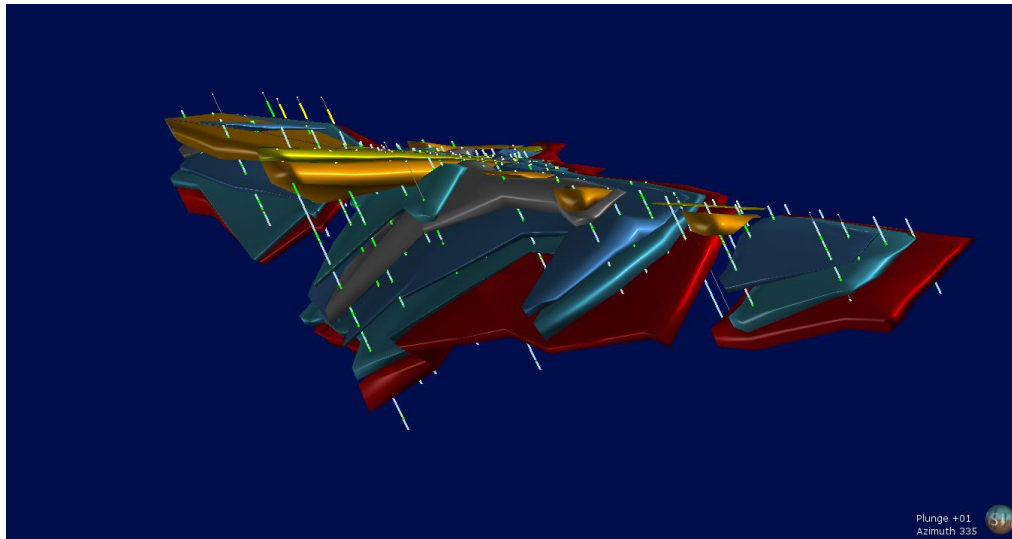
- Gabanintha a globally significant deposit. Vanadium energy storage a factor
- AVL Market Cap of \$18m compares to TNG Market Cap of \$108M and BMN \$17M



Gabanintha Vanadium Project

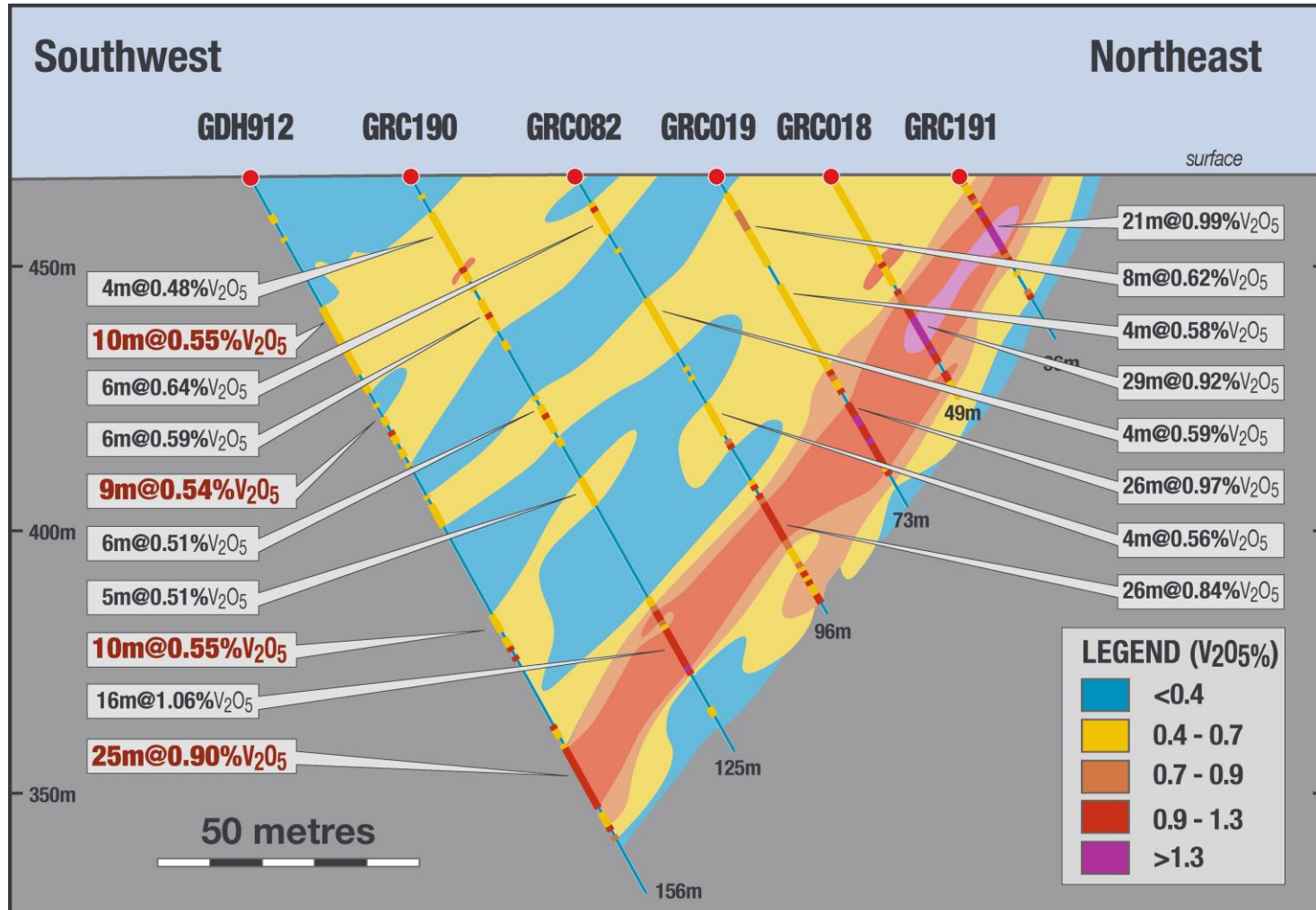
High grade resource in favourable mining jurisdiction in Murchison of WA

- One of the highest-grade vanadium deposits currently being advanced globally;
- JORC 2012 compliant Total Resource of 91.4Mt @ 0.82% V_2O_5 , 10% TiO_2 and 35% Fe
- Separate high-grade Measured Indicated & Inferred Resource of 56.8Mt @ 1.0% V_2O_5 , 11% TiO_2 and 42% Fe
- Deposit is at surface suitable for open pit operation and open at depth



Gabanintha Vanadium Project

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



Vanadium Resource

Large high-grade resource

Material	JORC Resource Class	Million Tonnes	In situ bulk density	V ₂ O ₅ %	Fe%	TiO ₂ %	SiO ₂ %	Al ₂ O ₃ %	LOI%
High grade	Measured	7	3.73	1.09	43	12	10	8	3.4
	Indicated	4.3	3.29	1.07	41	12	12	9	4.6
	Inferred	45.5	3.67	0.97	42	11	12	8	2.8
Subtotal High Grade		56.8	3.65	1.0	42	11	12	8	3.0
Low grade	Indicated	13.4	2.39	0.55	24	7	27	19	8.7
	Inferred	21.1	2.48	0.53	25	7	27	17	7
Subtotal Low grade		34.6	2.45	0.53	25	7	27	18	7.6
Subtotal Measured	Measured	7.0	3.73	1.09	43	12	10	8	3.4
Subtotal Indicated	Indicated	17.8	2.61	0.68	28	8	23	16	7.7
Subtotal inferred	Inferred	66.7	3.29	0.83	37	10	17	11	4.1
	TOTAL	91.4	3.19	0.82	35	10	18	11	4.8

Note: density values quoted here are weighted average values. The Mineral Resource was estimated as a block model within constraining wireframes based upon logged geological boundaries and grade cut-offs of 0.30% V₂O₅ for Low Grade (LG) and 0.70% V₂O₅ for High Grade (HG). Tonnages have been rounded to reflect that this is an estimate.

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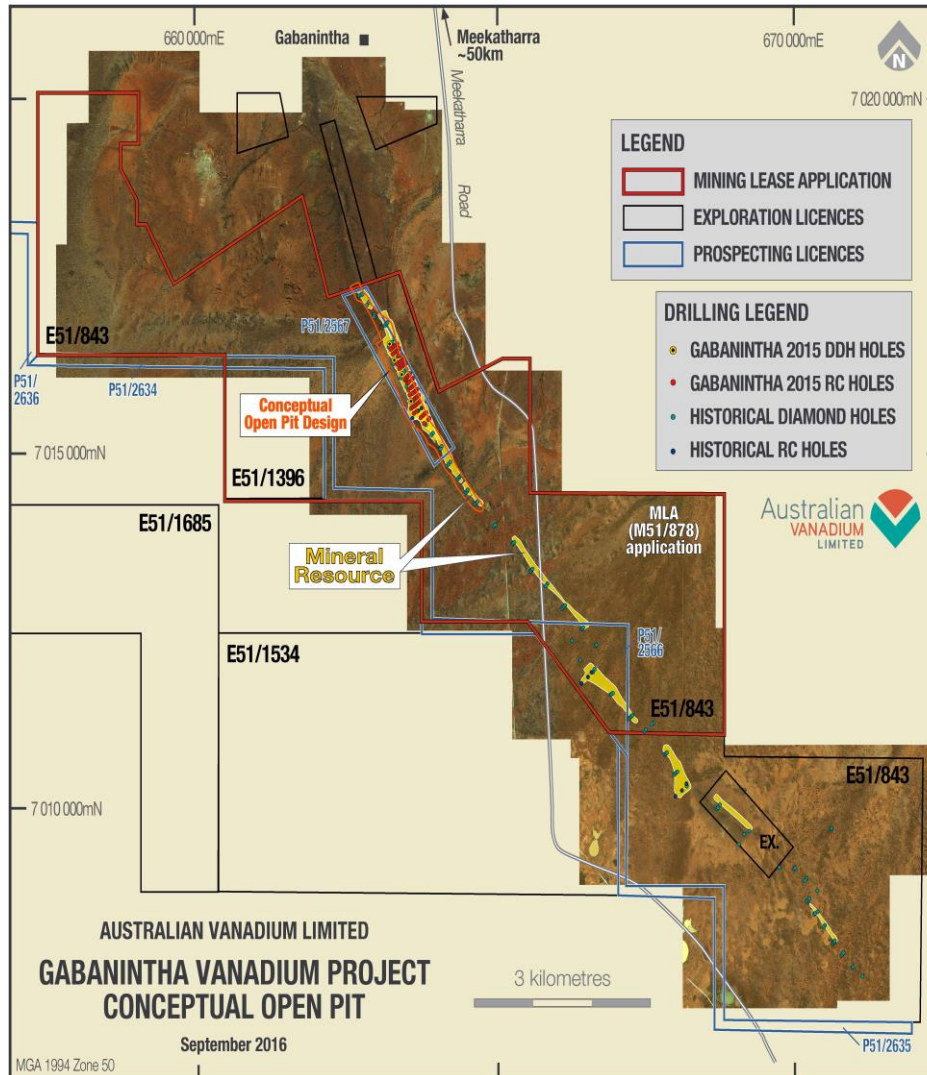
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Gabanintha Vanadium Project

First pass internal optimisation shows significant potential



Gabanintha Vanadium Project

Updated Concept Engineering Study

CONCEPT STUDY PARAMETERS – CAUTIONARY STATEMENT

The Concept Study in this presentation (nominal +/- 50% accuracy) is based on low-level technical and economic assessments, and is insufficient to support estimation of Ore Reserves or to provide assurance of an economic development case at this stage, or to provide certainty that the current conclusions of the Concept Study will be realised. While there is a high level of geological confidence associated with Measured and Indicated Mineral Resources, there is no certainty that further exploration and development work will result in the estimation of Ore Reserves.

The Company advises the Concept Study results reflected in this presentation are highly preliminary in nature as conclusions are drawn from the average grade of Measured, Indicated and Inferred Resources. A generic mining cost per tonne of material moved and an average resource grade has been used to determine overall mining and processing costs as opposed to a detailed mining block model evaluation to produce a detailed mining schedule.

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Gabanintha Concept Study

Updated Concept Engineering Study supports move forward

- Results of study have satisfied the Board to advance the Project with further key studies.
- Studies to include roast-leach metallurgical work, resource update, detailed mining study, hydrology study, environmental studies and permitting work.
- A detailed review of the commercial production of vanadium electrolyte will be undertaken.
- Pit optimisation modelling undertaken for management purposes using internally generated inputs. Modelling recorded very positive results
 - Modelled pit shell : 4,300 metres long, up to 350m wide ,up to 160m deep
 - Contains 45.3 Mt mineralised material for processing and 86.8 Mt of waste material.
 - Shell contains 45.3Mt @ 0.80% V_2O_5 . representing 49.6% of the total 2015 Mineral Resource Estimate (100% of the Measured and 99% of the Indicated)
 - Represent 54% of the total Mineral Resource material within the pit shell

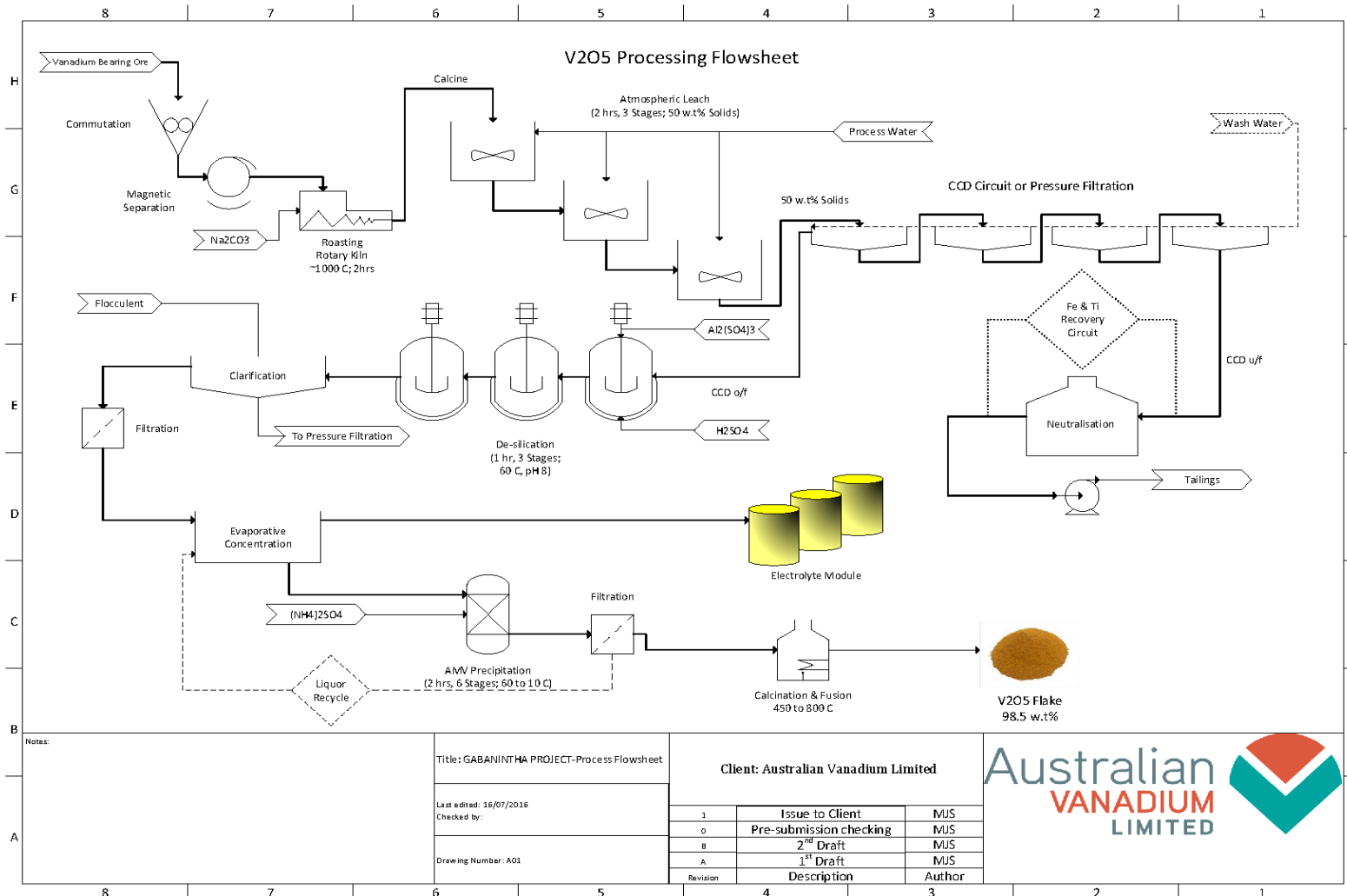
Gabanintha Concept Study: Outcomes

Updated Concept Engineering Study supports move forward

- Production cases considered were potentially economically viable while treating feed material containing up to 50% oxide and low grades (0.5% V_2O_5) with beneficiation pre-treatment.
- Considered the effects of lower (0.92 % V_2O_5) and higher feed grades (1.1% V_2O_5)
- Electrolyte plant facility considered to have strong economics based on the assumptions and warrants future inclusion in design work for Gabanintha and as a stand-alone study.
- Key operational assumptions including roasting time, leaching, reagent consumption and recovery require validation through additional testwork.
- Potential to significantly increase recovery in the roast leach step and reduce reagent consumption.
- Tailings residue contains high Ti and Fe values and has the potential to be reprocessed to produce saleable titanium oxide and iron oxide products.
- The use of second-hand equipment, particularly from the nearby ferro-vanadium Windimurra project has the potential to reduce capital cost.

Gabanintha Concept Study

Proposed Process Flowsheet



Notes:

Title: GABANINTHA PROJECT-Process Flowsheet		Client: Australian Vanadium Limited	
Last edited: 16/07/2016		1	Issue to Client
Checked by:		0	Pre-submission checking
Drawing Number: A01		B	2 nd Draft
		A	1 st Draft
		Revision	Description
			Author



Value Addition in V-electrolyte

Vanadium Electrolyte Production at the source de-risks and adds options

- Vanadium electrolyte is battery “fuel”
- Mild acid solution of V_2O_5 with all oxidation states available for electron transfer.
- Can be produced in stand-alone plant or as part of mine process.
- Offers unique opportunity to value-add at source location for low cost
- Local production leads to all-important reduction of battery TCO
- Benefits target market by having local “supply” for imported battery units.
- High re-cycle potential for vanadium units
- Company advancing to stand alone commercial plant specification and development in 2017
- Pilot plant due for commissioning in Perth in November 2016



Gabanintha Concept Study

Updated Concept Engineering Study supports move forward

PROJECT DESCRIPTION	MONTH										
	Oct 16	Nov 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	
Resource Upgrade		■	■	■							
Mine Design				■	■	■					
Metallurgical Test Program			■	■	■	■					
Water Supply & Hydrology Studies						■	■	■			
Environmental Studies		■	■	■	■	■	■	■	■		
Environmental & Permitting Review							■	■	■		
Marketing and Offtake negotiations	■	■	■	■	■	■	■	■	■	■	

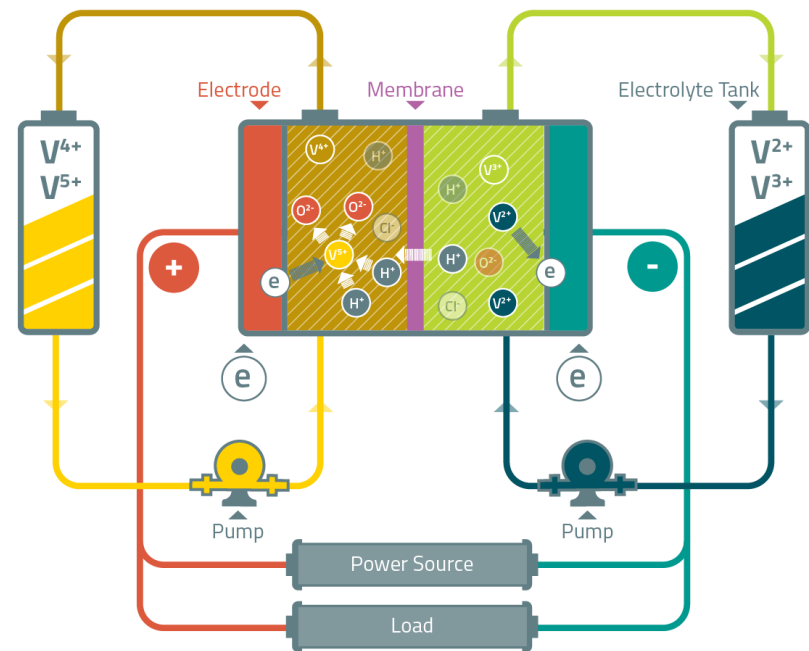
“The body of work that support’s AVL’s positive view on the Gabanintha vanadium/iron/titanium deposit continues to grow. The Company will now concentrate on key studies that reduce the risks for the project ahead of detailed feasibility studies. Water and environment are such areas. Along with the positive metallurgical test outcomes, the mining studies will assist us in marketing and offtake discussions which are essential for project development.”

Vanadium in Energy Storage

Vanadium in Energy Storage

Unique characteristics of Vanadium Redox Batteries (VRBs)

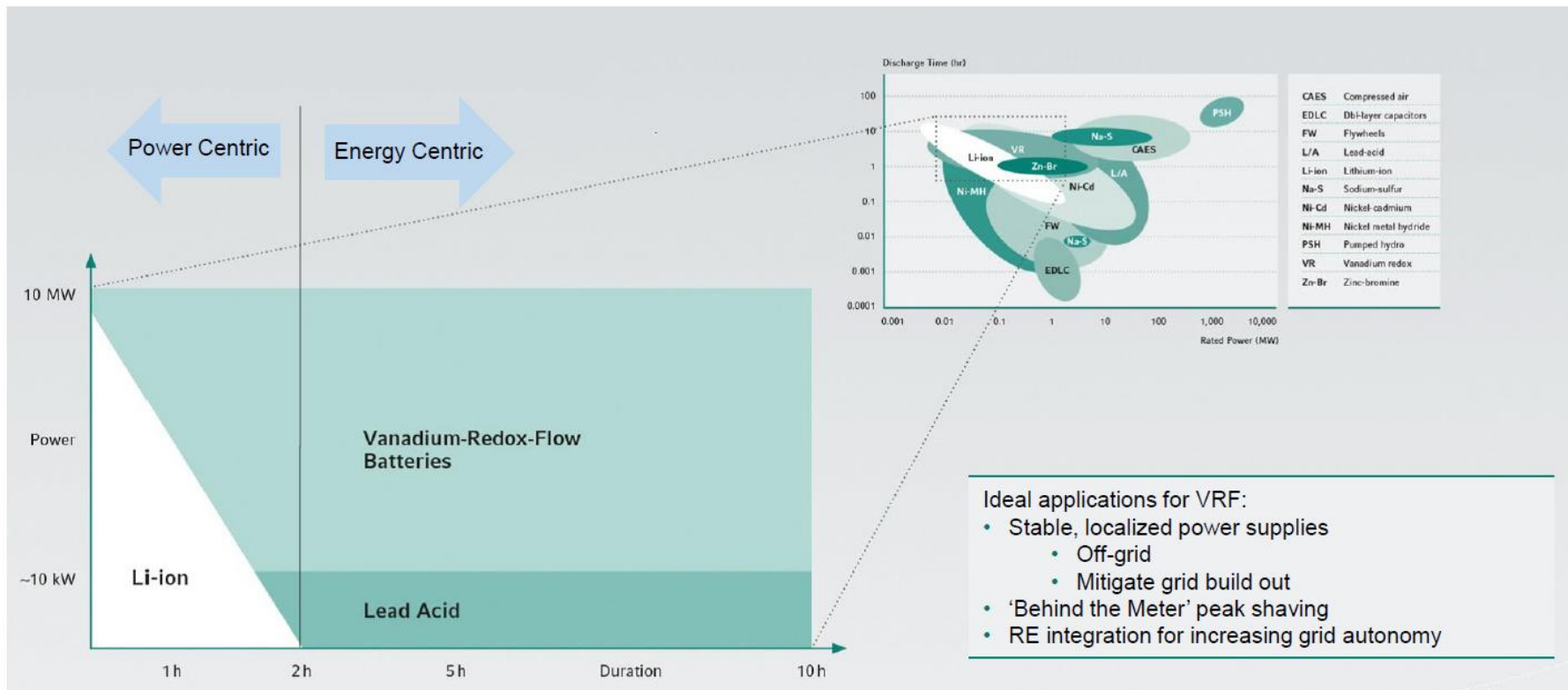
- Flow battery technology well established and at commercial deployment status
- VRBs provide a way to store and re-supply renewable energy. Their very high capacity is ideal for large-scale energy storage applications, unlocking the full potential of renewables while maintaining grid security.
- VRBs have unique advantages over other batteries;
 - Easily scaled into large MW scale solutions
 - Lifespan of 20 years with very high cycle life and no capacity loss over time
 - A key feature of using only one element in electrolyte, V_2O_5 which can be re-cycled
 - Immediate and rapid energy release
 - Excellent charge retention (up to 1 year)
 - Suitable for grid connection
 - Can discharge 100% with no damage
 - Improved safety and low replacement rate compared to Li-ion (lower lifetime LCOE)



Vanadium in Energy Storage

Defining the space for flow battery technology

Vanadium Flow Batteries are Energy Batteries that provide a unique ability to significantly time-shift very large amounts of previously generated energy.



Source: GILDEMEISTER Energy Storage

Vanadium vs Lithium : Key Comparisons

Vanadium Flow Battery	Lithium (Li-ion)
Energy Battery – Store large amounts of energy for later use	Power Battery – ideal for shorter term high power application
Energy stored in electrolyte tanks	All energy stored in cell
Stable – non-flammable	Flammable (prone to thermal runaway)
Long lifespan (20 years) due to very high cycle life. No degradation during cycling. (20,000 cycles)	Short lifespan (5-10 years) due to physical changes induced in charge discharge cycle (6000 cycles)
Vanadium electrolyte can be re-used, does not degrade (30% residual value)	Recycling difficult due to multiple components (no residual value)
Scalability – as modules or by introduction of larger tanks – fewer control systems	Multiple small batteries required – Complexity of control increases
100% depth of discharge with no lifetime capacity loss	Limited to 80% depth but with increasing capacity loss in high cycle environment

Redox Battery Market Beckons in Australia

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

- Rising power costs: VRB 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
- VRB rollout can assist with Australian networks primary goal – capital cost deferment
- Australian storage market expected to grow to 3000MWh by 2030.
- VSUN actively identifying multiple large (+10kW to 200kW) commercial storage opportunities being and in qualifying stages.



V SUN
Renewable Energy Solutions

First CellCube Installation Completed

Rural Site to benefit from Solar PV plus CellCube to shift to 90% renewable energy self consumption. First Opening into large Australian Market



 **SUN**
Renewable Energy Solutions

Key Partnerships in Place to Grow Strategy

AVL is on track to achieving vanadium storage market objectives with excellent market and technology companies



- GILDEMEISTER energy storage GmbH developed the CellCube, the world's most commercially advanced Vanadium Flow Battery, based on 15 years of development with over 100 installations worldwide.
- MOU is in place for future co-operation in developing the Australian vanadium flow battery market .
- Signed Distribution Agreement for distribution of CellCube energy storage systems.

- Sun Connect is an Australia-wide commercial solar solution company, an appropriate partner for AVL in the installation of integrated solar and VRB solutions.
- Collaboration on VRB opportunities with installations throughout Australia.
- AVL and Sun Connect are actively evaluating several potential integrated solar and VRB installations throughout Australia.

- C-Tech Innovation is a UK research and technology company supply technology for electrochemical applications
- MOU is in place to collaborate on VRB opportunities installations throughout Australia.
- AVL and C-Tech will collaborate on building Vanadium Electrolyte plant capacity in Australia
- C-Tech will assist in the integration of electrolyte production capacity into the Gabanintha Project design.



Australian Vanadium:

An active company advancing a unique integration strategy for vanadium

Highlights

- Quality, grade and tonnage of Gabanintha resource moving towards project development.
- Detailed concept engineering study shows outstanding results to support project advancement. Key studies to commence immediately.
- Targeting vanadium steel producers and battery manufacturers for offtake and project involvement.
- A commercial scale vanadium electrolyte plant is being considered for 2017 construction. Pilot plant to be commissioned in November 2016.
- Sales agreement executed with global leader in Vanadium Battery Manufacture – GILDEMEISTER Energy Storage GmbH.
- Collaboration with a leading Australian commercial solar installer.
- 1:3 Rights Issue successfully completed, raising A\$3m for project and battery market activities. Over A\$1.2m raised from unlisted option exercise since raising.
- Significant interest and demand identified for commercial scale solar and vanadium battery storage solutions in Australian urban and rural environments.

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