

## Quarterly Activities Report for period ending March 31<sup>st</sup> 2016

### Highlights:

- » Corporate strategy outlined for involvement in growing use of vanadium in energy storage solutions
- » 100% Subsidiary VSUN Pty Ltd identified as primary sales and marketing entity to drive market growth for Vanadium Redox Flow Batteries (VRB) in Australia
- » AVL signs MOU with leading German vanadium battery manufacturer GILDEMEISTER Energy Storage GmbH for market development and sales of CellCubes in Australia
- » AVL signs MOU with Australian commercial solar and battery installation company Sun Connect Pty Ltd to collaborate on flow battery opportunities
- » Gabanintha engineering concept study expanded for additional mining and processing scenarios including concentrate-only and co-production of vanadium battery electrolyte opportunities
- » A non-renounceable Rights Issue was announced on 4<sup>th</sup> March to raise up to \$3.32 million to fund vanadium battery market development, vanadium electrolyte plant and ongoing Gabanintha Project evaluation.
- » AVL offered one new share for every 3 existing shares held for an offer price of \$0.013 and a listed option exercisable at \$0.02, expiring 31 December 2018
- » The Rights Issue was being partially underwritten by CPS Capital Group to \$500,000

### Australian Vanadium's vertical integration strategy

Australian Vanadium has recognised the potential for involvement in the energy storage market and explored the growth of demand for vanadium redox flow batteries or VRB. It is on this basis that the Company launched its vertical integration strategy in 2015, alongside its progression of the high-grade Gabanintha Vanadium Project in Western Australia. The strategy involved the establishment of a subsidiary company VSUN Pty Ltd, which is focused on selling vanadium batteries and assessing the commercial viability of establishing an electrolyte plant in Australia.

The Gabanintha Project will allow Australian Vanadium to supply high-quality vanadium products to electrolyte producers worldwide, as well as its own plant planned for Australia.

28.04.2016

### ASX ANNOUNCEMENT

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#### Projects:

Gabanintha Vanadium  
Gabanintha Gold, Copper



The vertical integration strategy offers shareholders exposure to the potential of early cash flows coming from the expected sales of vanadium batteries. These batteries will be imported by Australian Vanadium and its subsidiary, VSUN Pty Ltd.

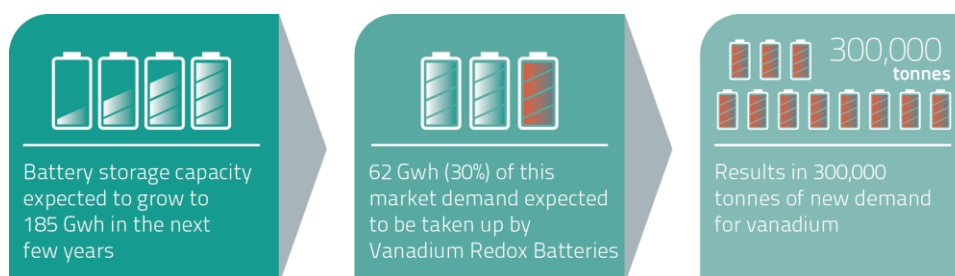
Australia is reliant on non-renewable resources to sustain its society. The increasing use of renewable energy in everyday lives represents a shift towards more energy efficient behavior by individuals, businesses, utilities and governments. Storage technologies such as VRB present Australian Vanadium with an opportunity to participate in this shift, while improving its bottom line. Businesses and networks need storage assets that are long term, durable and perform over the lifetime of the project.

### Vanadium Market – Battery Market Driving new Vanadium demand.

The inconsistent nature of renewable energy generation such as solar and wind power is driving demand for energy storage solutions. Vanadium battery solutions are an option for consumers having favourable characteristics such as a long life cycle, high charge retention and scalability. In Australia the amount of renewable energy generated needs to more than double if the country is to meet the Government's mandated 23 per cent renewable energy target by 2020. (Australian Government, Department of the Environment, RET)

It is a worldwide trend; according to the REN21 Renewables 2015 Global Status Report renewables represented approximately 58.5 per cent of net additions to global power capacity in 2014. By early 2015, 164 countries had defined renewable energy targets. Alongside this growth, energy storage is also set to increase, with capacity reaching 185 Gwh in the next few years (Lux Research; Grid Storage and TTP Squared Inc) with vanadium batteries having potential to account for around 30 per cent of this future capacity growth – equating to capacity of 62 Gwh of storage. The 62 Gwh capacity growth over the next few years alone equates to new demand of 300,000 tonnes on vanadium – more than three times what is currently produced (TTP Squared Inc).

Australian Vanadium is well positioned to take advantage of this opportunity having recently entered into key agreements for future co-operation in developing the Australian vanadium flow battery technology and installations



### Memoranda of Understanding (MOU)

Australian Vanadium Limited (AVL) and its subsidiary VSUN Pty Ltd signed two important MOU's during the March 2016 Quarter. These agreements, with GILDEMEISTER Energy Storage GMBH of Germany, one of the world's foremost Vanadium Redox Flow Battery (VRB) manufacturers and with Sun Connect Pty Ltd, an Australian-based commercial renewable energy, solar power and battery installer are key actions in the implementation of AVL's overall vertical integration strategy for vanadium.

### GILDEMEISTER Energy Storage GmbH

On 23 February 2016, AVL announced the signing of an MOU with GILDEMEISTER energy storage GmbH (GILDEMEISTER), to collaborate on future Vanadium Redox Flow Battery (VRB) installations and electrolyte production in Australia.

GILDEMEISTER manufactures the CellCube vanadium flow energy storage system. The company has put over 15 years of research and development into its battery systems which have been commercially available for seven years. GILDEMEISTER has installed more than 100 systems – establishing itself as the provider of the world's most commercially advanced flow battery.

The MOU will allow the companies to collaborate on a number of key strategic initiatives in Australia including;

- The completion of a Dealership Agreement for distribution of CellCube energy storage systems in Australia. **(This dealership agreement was signed on April 11 2016, subsequent to the end of the quarter)**
- Collaborating on and finalisation of sales leads.

- Joint marketing of vanadium flow battery technologies and CellCube products as the preferred solution to large-scale grid-energy storage across the energy consumer market.
- Securing long-term local vanadium electrolyte supply for the Australian market through the development of AVL's high-grade Gabanintha Vanadium Project in Western Australia.

The MOU represents AVL's continuing commitment to advancing vanadium flow battery technology and the wider uses of vanadium in energy storage. Working with GILDEMEISTER forms a key part of AVL's vertical integration strategy which involves the production of high-purity vanadium electrolyte – a core component of flow batteries. The Company will focus on bringing this development into its progression of the Gabanintha Vanadium Project.

### Sun Connect Pty Ltd

On 24 February 2016 AVL announced it had signed an MOU with Australian commercial solar company, Sun Connect Pty Ltd. The MoU underpins collaboration on market opportunities for VRB throughout Australia.

Sun Connect is a well-established and respected national company which has been providing renewable energy solutions for Australia's commercial and residential sectors since 2008. Through its offices in most of Australia's capital cities, Sun Connect has implemented more than 3,000 solar systems nationwide ranging from households and large industrial sites, to government departments and schools. Sun Connect is currently one of the 5 largest installers of commercial solar in Australia and have completed over 9Mw of commercial solar installations.

Sun Connect and AVL have entered into an MOU to underpin the companies' commitment and determination to facilitate the growth of renewable energy solutions which integrate VRB. VRB's are unique commercial energy storage devices particularly suited to commercial on-grid and off-grid implementation due to their scalability, long asset lives and deep and very high cycling capability. Their low risk operation makes them particularly suitable for commercial operations where safety is of paramount importance.

Sun Connect and AVL are working closely on exploring opportunities to provide the entire range of CellCube VRB systems produced by GILDEMEISTER Energy Storage GmbH out of Austria and Germany.

The MOU offers a framework for strategic alliance, including cooperation and development of opportunities involving the marketing and sale of VRB products in the Australian region. Key points include:

- Collaboration on storage leads.
- Investigation and implementation of Power Purchase Agreements (PPA's)
- Joint marketing opportunities
- Sun Connect to collaborate with AVL on the specification of the renewable component of power requirements for the Gabanintha Project as part of the ongoing feasibility studies.

AVL will operate its VRB activity through its wholly owned subsidiary company VSUN Pty Ltd.

### Engineering Concept Study Update

Work is ongoing to evaluate and update the Gabanintha Project mining and development studies. Input of an updated Measured Resource wireframe from the latest resource estimation was applied to a conceptual pit shell. This allowed AVL to better model mining, development and processing costs. In addition options for electrolyte processing circuits and a separate electrolyte plant development are being assessed. The Company had previously advised it would report the finding of the revised study by the end of March 2016. As a result of the preliminary findings from the update, the consultants were requested to conduct additional scenarios relating to the following new opportunities;

- A concentrate-only option: This will consider the production of a magnetic concentrate only. This would involve considering the mining of a high grade starter pit ( $V_2O_5$  head grade >1.1%) and processing this through a crushing, grinding and magnetic separation circuit. A concentrate product could then be considered for transportation to a nearby facility or export sale. This scenario is being modelled to determine capital cost and potential economic outcomes.
- Inclusion of a direct production capacity for vanadium battery electrolyte: Under this scenario, normal ore preparation would take place using standard preparation (crush, grind, magnetic separation), followed by standard roast and leach processes used in the preparation of vanadium ores. A portion of the vanadium in solution from the leach phase will be taken aside and processed for production of high purity vanadium electrolyte. The balance of the leach solution will be taken through to the production of steel market quality  $V_2O_5$ . This scenario is being modelled to determine capital cost and potential economic outcomes.

- Optimising capital cost by the selection of appropriate throughput rate at startup: Since capital cost for a new plant is relatively high, the consultant is currently considering various production throughput options and associated capital costs for high cost-long lead time items such as the roaster and power plant.
- Review of power cost reduction opportunities for the project by considering the use of long term solar heating and PV technology and associated potential government grants (such as ARENA grants) in the processing plant design.

As a result of these additional considerations, the Company has extended the expected date for reporting the Concept Study update to the end of the June Quarter.

## Corporate

A Non-Renounceable Rights Issue was announced on 4<sup>th</sup> March to raise up to \$3.32 million to fund vanadium battery market development as well as a feasibility study on an Electrolyte Plant and ongoing Gabanintha Project evaluation.

The Rights Issue is being partially underwritten by CPS Capital Group to \$500,000. AVL offered one new share for every 3 existing shares held for an offer price of \$0.013. Each new share would receive a free listed attaching option exercisable at \$0.02 on or before 31 December 2018.

The Offer closed on 8 April and the Directors were pleased with the level of take-up in the current market environment and, in accordance with the ASX Listing Rules, may place the Shortfall on the same terms as the new shares offered pursuant to the Prospectus within 3 months of the closing date.

On 15<sup>th</sup> April the Company issued 131,104,656 shares and options raising a total of \$1,704,360.54 less costs. The offer for the placement of the balance of the shortfall remained open at the time of this report.

## Tenement Schedule

Tenement Information as Required by Listing Rule 5.3.3 For the Quarter Ended 31 March 2016					
Project	Location	Tenements	Economic Interest	Notes	Change in Quarter %
Western Australia	Gabanintha	EL51/1534	100% Granted		0
		E51/1576	100% Granted		0
		EL51/843	100% Granted		0
		E51/1396	100% Granted		0
		P51/2634	100% Granted		0
		P51/2635	100% Granted		0
		P51/2636	100% Granted		0
		P51/2566	100% Granted		0
		P51/2567	100% Granted		0
		MLA51/878		100% On application	0
		E51/1685		100% On Application	0
Western Australia	Nowthanna	MLA51/771		100% On application	0
Western Australia	Peak Hill	E52/3349	100% Granted		0

For further information, please contact:

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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".*

*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](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, 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 persons findings are presented has not been materially modified from the original market announcement.*

<http://www.australianvanadium.com.au/wp-content/uploads/2015/02/Gabanintha-Resource-Update-2015-10-Nov-Final.pdf>