

## Technology Metals Australia (TMT)

An Emerging Vanadium Company

30 May 2017

Andrew Shearer  
ashearer@pacpartners.com.au  
+61 3 8633 9862

### KEY POINTS

- Technology Metals Australia Limited (ASX:TMT) is a junior exploration company targeting vanadium mineralisation at their Gabanintha Project (Western Australia).
- TMT has completed a maiden round of drilling and reported a number of high grade vanadium mineralised intervals. The results will be incorporated into a maiden resource, expected to be released in mid-June.
- The vanadium market has historically been tied to the global steel market, with vanadium used as a hardening alloy compound. The emergence of Vanadium Redox Batteries opens up the potential for increased demand for vanadium, at a time when global supply is restricted.

### Rapidly Heading Towards Resource Definition

**New listing hits the ground running:** In only 6 months since listing, TMT is on the verge of announcing a maiden vanadium resource. Recent drilling undertaken over 4km of prospective strike length reported massive magnetite and associated vanadium mineralisation on each of the 11 traverses.

**New discovery:** The discovery of a new high grade zone, with widths of 21-36m (downhole), at the northern end of the project has added to the growing story. The northern zone is now a priority for follow up and infill drilling as it has the scope to deliver significant near surface tonnages of high grade vanadium mineralisation which could have a material impact on potential project economics.

**Exploration Resource Target:** TMT has released an estimated Exploration Target of 80–100mt at 0.8-1.0% V<sub>2</sub>O<sub>5</sub> for the Gabanintha Vanadium Project. Whilst this target is conceptual in nature the recently completed maiden drilling program has supported the validity of the Exploration Target. We expect the maiden resource to be modest and a step towards the Exploration Target

**Leveraged to vanadium market:** TMT is ideally positioned to take advantage of the increasing price environment with a high grade vanadium project located in a very favourable mining district with outstanding infrastructure.

**Beyond Vanadium:** TMT has expanded their footprint in the area by applying for new exploration ground to the north of their high grade hits. The ground includes a number of reported base metal and gold occurrences.

### Catalysts

- Maiden JORC Resource due mid-June 2017
- Preliminary metallurgical test results expected late June 2017
- Resource infill and extension drilling commencing in June/July 2017
- Exploration drilling on southern tenement July/August 2017

### RECOMMENDATION

**Speculative Buy**

Previous Recommendation	NA
Risk Rating	Very High
Current Share Price	\$0.20
Shares on Issue (m)	25.1
Options (m)	15
Performance Shares (m)	20 (2 x 10m)
12 Month High/Low (A\$/sh)	\$0.36/\$0.18
Market capitalisation	\$5m
Cash (A\$m) 30 March 2017	\$3.3m

### Investment Summary

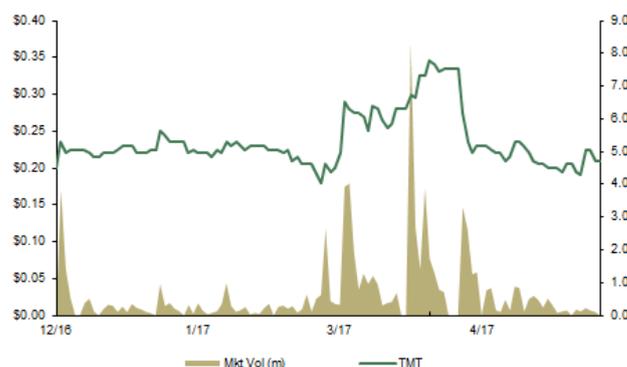
TMT is leveraged to exploration success and an improving vanadium price. By virtue that their main project is along strike from a known vanadium resource (Australian Vanadium – AVL) and that first pass drilling undertaken by TMT has reported promising results, the foundation is being laid for TMT to grow.

Defining a resource and then progressively expanding the resource in addition to commencing economic studies on the project will be key milestones for TMT.

Given that TMT does not have a defined resource and as such is many years from potential production the company will require additional funding. Funding risk and risks associated with early stage mining ventures make an investment in TMT speculative in nature.

**Disclosure:** PAC Partners acted as Lead Manager for TMT's listing on the ASX, and received fees on commercial terms for its services as per prospectus.

### TMT Share price performance



Source: Iress

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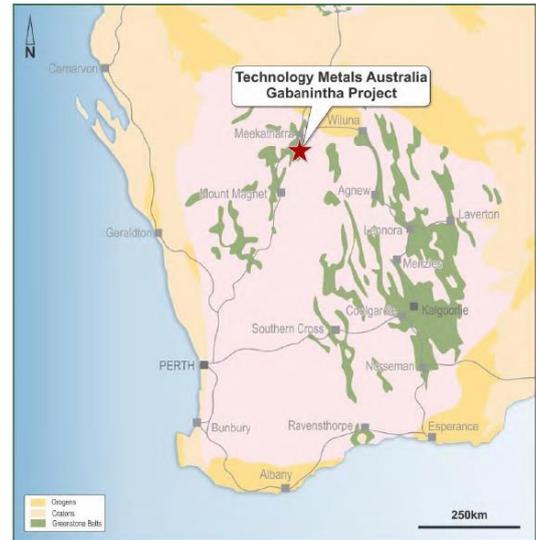
## Overview

Technology Metals Australia Ltd (TMT) main asset is the Gabanintha Project, located in the northern Murchison region of Western Australia.

The primary tenements are positioned north of and along strike from Australian Vanadium’s (ASX:AVL) existing vanadium resource (91.4Mt at 0.82% V<sub>2</sub>O<sub>5</sub>). The TMT and AVL projects are located on the same geological sequence

TMT is seeking to prove that the mineralisation extends onto their ground and also test the model that the vanadium grades increase to the north.

Vanadium mineralisation at Gabanintha is hosted by a layered mafic igneous unit with a distinct magnetic signature which contains a consistent high grade massive vanadium-titanium-magnetite basal unit, delivering a higher overall V<sub>2</sub>O<sub>5</sub> grade when compared to a number of similar style of deposits globally.



### Significant Milestones Achieved

Since listing in December 2016 (raising A\$4m) TMT has successfully completed the following:

- Detailed magnetic airborne survey completed in January 2017 defining target zones for the drilling program.
- Maiden drilling program of 36 holes.
- Reported drilling results that intersected massive magnetite zones on all traverses with assay results delivering good widths and high grade zones of vanadium mineralisation, including;
  - 36m at 0.95% V<sub>2</sub>O<sub>5</sub> from surface, and
  - 12m at 1.33% V<sub>2</sub>O<sub>5</sub> from 68m

Cross Section through recent drilling



Source: Company Report

### Exploration Target Resource

TMT has released an estimated Exploration Target of 80–100mt at 0.8-1.0% V<sub>2</sub>O<sub>5</sub> for the Gabanintha Vanadium Project. Whilst this target is conceptual in nature the recently completed maiden drilling program has supported the validity of the Exploration Target.

The Exploration Target also includes the southern tenement therefore the maiden resource is likely to be a smaller component of this number

### Maiden resource likely to be first step towards the Exploration Target

Given that the maiden resource is to be based on drilling undertaken on a limited strike length of the target area we expect that the maiden resource will be the first step towards the Exploration Target.

### Exploration Potential

At this early stage in the project, the thickening in the Northern Zone demonstrated in TMT’s drilling appears to have the scope to deliver significant near surface tonnages of high grade vanadium mineralisation which would be expected to have a materially positive impact on the estimated economics of any potential development.

### Timeline of Project Milestones Since Listing on ASX and Indicative Timetable



Source Company Report

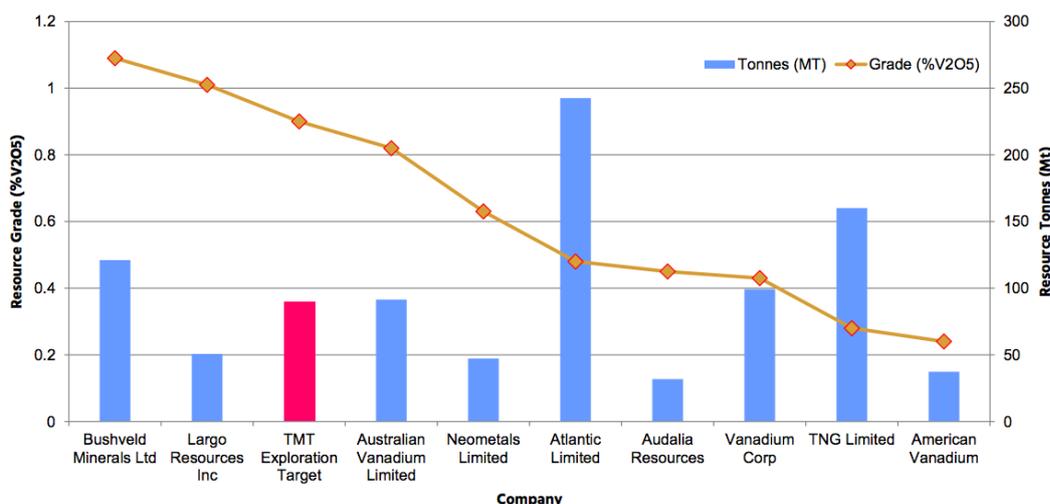
### Peer Comparison

Grade is key

Based on the Exploration Target released by TMT the estimated range of grade is 0.8 to 1.0% V<sub>2</sub>O<sub>5</sub> which compares very favourably with global vanadium deposits, such as Bushveld Minerals Limited's (AIM: BMN) Bushveld Vanadium project, Largo Resources Limited's (TSX: LGO) Maracas Menchen deposit and Australian Vanadium Limited's Gabanintha Vanadium project as shown in the figure below comparing tonnage and grade of global vanadium projects.

#### Global Deposit Comparison

TMT has estimated a Exploration Target of: 80-100Mt @ 0.8 to 1.0% V<sub>2</sub>O<sub>5</sub>  
 This would put TMT's Gabanintha Project at the upper end of peer projects on a grade basis.



Source: Company Report

### ASX Peer Comparison

Company	Tonnes (Mt)	Grade V <sub>2</sub> O <sub>5</sub> (%)	Enterprise Value (A\$m)	Comments
TNG Limited (TNG)	160	0.3	\$108	TNG is progressing the development of the lower grade Mount Peake vanadium-titanium-magnetite in the Northern Territory (160Mt at 0.28% V <sub>2</sub> O <sub>5</sub> , 5.3%TiO <sub>2</sub> and 23% Fe)
Australian Vanadium (AVL)	91.4	0.82	\$19	AVL has completed metallurgical test work and a concept study on its project
Technology Metals (TMT)	80-100**	.8-1.0**	\$4.4*	The opportunity for TMT is to define a maiden resource and then look to increase that with extensional drilling.

Source: PAC Partners estimates and Company Reports

\* \* (assumes issue of tranche 1 performance shares).

\*\* Exploration Target

## VANADIUM SUPPLY AND DEMAND OUTLOOK

**New and emerging market for vanadium**

Approximately 91% of global vanadium is used in the steel industry, typically as a strengthening agent in alloys. The addition of just 0.2% vanadium to steel increases the strength by up to 100% and reduces the weight by up to 30%. Therefore the vanadium price is largely tied to steel output levels, especially out of China. More recently there has been interest generated in the use of vanadium in energy storage (batteries).

**Supply dynamics remain tied to Chinese steel production.**

Vanadium is sourced from three main areas:

- Primary: from mined vanadium ores (18%)
- Co-product: produced as a co-product as part of the production of steel from iron ore (71%).
- Secondary: produced in the refining of oil and also burning of oil in power plants (11%).

Global vanadium supply is dominated by China (56%), South Africa (12%) and Russia (10%). Therefore the recent curtailment of production from Chinese magnetite fed steel mills, which have historically been a major source of vanadium has led to some supply constraints.

**Vanadium pricing typically tied to steel output levels.**

The combination of increasing demand and curtailment of supply has led to dramatic movement in the vanadium pentoxide price, with the price for Ferro Vanadium increasing from US\$15.00/kg to over US\$21.00/kg over the past 9 months.



Source: Infomine.com

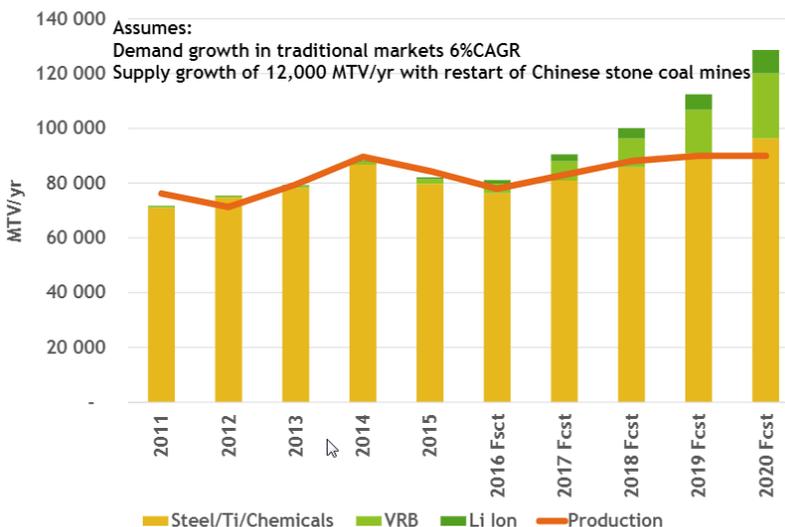
**Demand forecast to increase ~45% in next decade**

Global Vanadium consumption is currently about 90,000tpa with market forecasters expecting demand to increase to 131,000tpa by 2025 (source: Roskill), excluding significant growth in the battery sector.

### Vanadium demand forecast

**Demand from energy storage to increase overall demand for vanadium**

### Vanadium Production & Consumption



**Given continuing tightness in supply and the reported drawdown of stockpiles of vanadium it is expected that this positive price movement will continue for some time to come.**

Source: Vanadium Corp presentation ([https://www.dropbox.com/s/kixp7iq8srh9kn6/S16-01\\_Perles\\_an.pdf?dl=0](https://www.dropbox.com/s/kixp7iq8srh9kn6/S16-01_Perles_an.pdf?dl=0)) accessed 26/05/2017

## VANADIUM USE IN RENEWABLE BATTERY STORAGE

Outside of demand for vanadium from traditional markets, such as the steel industry a potential significant new area for demand is in the energy storage (battery) sector. The energy storage sector is expected to grow to >US\$350bn by 2030. With Vanadium Redox Batteries (VRB's) forecast to take up a significant share of the stationary storage market. The implication for the vanadium market is that there is potential for an additional demand for vanadium by 10,000–20,000tpa by 2025.

VRB's are an electrochemical storage system which stores energy in two solutions consisting of different oxidation states of vanadium. The liquids are held in separate tanks and when required pumped into a central reactor where the two solutions flow adjacent to each other, separated by a membrane and generate a charge by moving electrons back and forth during charging and discharging.

Given the physical size of the batteries (shipping container size) and large storage capacity, VRB's are better suited to static storage situations, such as augmenting power grids.

The advantage of this style of battery is that it can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks. It can be left completely discharged for long periods, with no ill effects, making maintenance simpler than other batteries. They are also fully containerised, non-flammable, compact, re-usable over semi-infinite cycles, discharge 100% of the stored energy and do not degrade for more than 20 years.

The new flow batteries reduce storage cost to about USD 5c/Kw. These batteries are best suited to industrial and utility scale applications. Compared to Li-ion they are safer, more scalable, longer lasting and cheaper (approx. half the cost per kWh).

### Vanadium Reflow Vs Lithium Ion Batteries

	Vanadium	LiOn (Lithium)
Capacity	Double	Half
Weight	Heavy	Light
Life	Long (up to 20yrs)	5 to 7 years
Cycles	20,000	2000
Grid Scale	Ideal	Not ideal
Mobile	No	Yes
End of Life	Easy to recycle	Hard to recycle

Source: PAC Partners estimates

## LARGEST VANADIUM FLOW PROPOSAL IN THE WORLD

UniEnergy Technologies and Rongke Power announced in mid-2016 that they planned to deploy one of the biggest energy storage facilities, an 800MWh flow battery, in the Dalian peninsula in northern China. The VRB will provide additional power capacity during peak times and provide grid stability.

**With estimates that for every 1,000MWh of installed VRB the demand for vanadium equates to ~5% of global vanadium supply.**

## Capital Structure

Fully paid ordinary (tradeable)	21.3m	
Fully paid ordinary (escrowed)	3.8m	1.3m restricted to 21/9/2017 & 2.5m restricted to 21/12/2018
Options (unquoted, escrowed)	15.0m	1.3m restricted to 21/9/2017 & 13.7m restricted to 21/12/2018. \$0.25 exercise, 31/12/2019 expiry
Class A Performance Shares	10.0m	Convert upon achievement of an inferred resource of 30Mt greater than 0.8% V <sub>2</sub> O <sub>5</sub> on or before 31 December 2019. Restricted till 21/12/2018. Upon conversion will trigger issue of Class B Performance Shares.
Class B Performance Shares	10.0m	Convert upon achievement of an indicated resource of 20Mt greater than 0.8% V <sub>2</sub> O <sub>5</sub> on or before 31/12/2019. All Performance Shares and any fully paid ordinary shares issued on conversion of the Performance Shares are subject to restriction until 21/12/2018

## Board and Management

### Ian Prentice Executive Director

Mr Prentice is a geologist that has served as a Director for a number of ASX-listed resource companies, with activities ranging from exploration and project acquisition in Asia and Africa through to gold production in Australia.

### Michael Fry Non-Executive Chairman

Michael Fry holds a Bachelor of Commerce degree and has extensive corporate and commercial experience, financial and capital market knowledge and a background in corporate treasury management.

### Sonu Cheema Non-Executive Director

Mr Cheema holds a Bachelor of Commerce majoring in Accounting, is a CPA Member and has over 10 years' experience working with public and private companies in Australia and abroad. Mr Cheema is Company Secretary for TMT.

## Risks

### Geological Variability

Whilst the nature of the mineralisation at Gabanintha is relatively uncomplicated, the unknown nature of geology presents a risk.

### Commodity Pricing

As a commodities company TMT are exposed to movements in the underlying commodity prices and also the prevailing exchange rate.

### Legislative Changes and Permitting

TMT has a number of exploration licences and provided the project economics warrant progressing to mining stage a number of permits and approvals will be required.

### Resource Definition and expansion

TMT is leveraged to exploration success and defining an economic resource. Additional drilling will be required to expand from the planned maiden resource. The project economics remain unknown at this early stage.

### Access to capital

TMT is an exploration company and does not have sufficient cash to commence mining. As such additional capital will be required.

## CONTACT INFORMATION

CORPORATE FINANCE	RESEARCH	DEALING
<b>CRAIG STRANGER</b> Managing Director <i>cstranger@pacpartners.com.au</i> 03 8633 9832	<b>PAUL JENSZ</b> Director, Senior Industrial Analyst <i>pjensz@pacpartners.com.au</i> 03 8633 9864	<b>BRENDAN FOGARTY</b> Corporate Sales – Melbourne <i>bfogarty@pacpartners.com.au</i> 03 8633 9866
<b>SEAN KENNEDY</b> Corporate Finance <i>skennedy@pacpartners.com.au</i> 03 8633 9836	<b>ANDREW SHEARER</b> Senior Analyst <i>ashearer@pacpartners.com.au</i> 03 8633 9862	<b>PHIL CAWOOD</b> Institutional Sales – Sydney <i>pcawood@pacpartners.com.au</i> 02 9994 5552
<b>ANTHONY STANI</b> Corporate Finance <i>astani@pacpartners.com.au</i> 03 8633 8251	<b>MICHAEL NOLAN</b> Senior Analyst <i>mnolan@pacpartners.com.au</i> 03 8633 9861	<b>SEBASTIAN JURD</b> Senior advisor – Sydney <i>sjurd@pacpartners.com.au</i> 02 9994 5553
<b>BROOKE PICKEN</b> Equity Capital Markets <i>bpicken@pacpartners.com.au</i> 03 8633 9831	<b>LAWRENCE GRECH</b> Analyst <i>lgrech@pacpartners.com.au</i> 0404 052 913	<b>RYAN GALE</b> Advisor – Melbourne <i>rgale@pacpartners.com.au</i> 03 8633 9833
<b>ROGER CHEN</b> Analyst <i>rchen@pacpartners.com.au</i> 03 8633 9868	<b>ALEX SMITH</b> Junior Analyst <i>asmith@pacpartners.com.au</i> 03 8633 9865	<b>TOM FAIRCHILD</b> Corporate Sales – Melbourne <i>tfairchild@pacpartners.com.au</i> 03 8633 9867
		<b>IAN LEETE</b> Corporate Sales – Sydney <i>ileete@pacpartners.com.au</i> 02 9994 5551
		<b>DANIEL GADALLA</b> Desk Assistance – Melbourne <i>dgadalla@pacpartners.com.au</i> 03 8633 9834
		<b>SOL JONES</b> Desk Assistant – Sydney <i>sjones@pacpartners.com.au</i> 02 9994 5554

MELBOURNE (Head Office)  
 Level 10, 330 Collins Street, Melbourne VIC 3000  
 +61 3 8633 9831

SYDNEY  
 Level 9, 56 Pitt Street, Sydney NSW 2000  
 +61 2 9233 9600

## RECOMMENDATION CRITERIA

### Investment View

PAC Partners Investment View is based on an absolute 1-year total return equal to capital appreciation plus yield.

A Speculative recommendation is when a company has limited experience from which to derive a fundamental investment view.

Buy	Hold	Sell
>20%	20% – 5%	<5%

### Risk Rating

PAC Partners has a four tier Risk Rating System consisting of: Very High, High, Medium and Low. The Risk Rating is a subjective rating based on: Management Track Record, Forecasting Risk, Industry Risk and Financial Risk including cash flow analysis.

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