# TANDO SPD VANADIUM PROJECT RESOURCES Feb 2019 Indaba / 121 Presentation

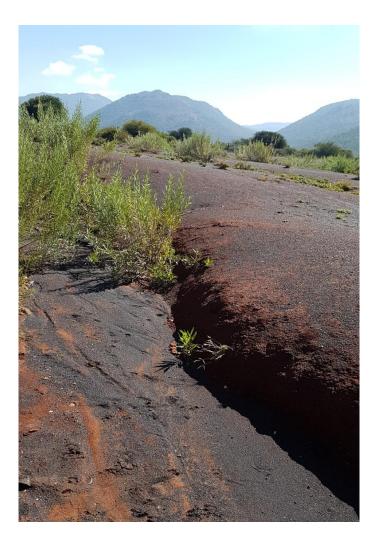




#### DEVELOPING A GLOBALLY SIGNIFICANT VANADIUM PROJECT

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- The SPD Project is one of the world's highest grade vanadium deposits
- High-grade maiden JORC Resource of 588Mt at 0.78% V2O5 (whole rock / unprocessed) meaning potential for long life operation
- Resource includes extremely high-grade surface component of 87Mt at 1.07% V2O5
- Quality vanadium concentrate with +2% V2O5 and low silica / alumina
- Located in established vanadium production hub of South Africa
- The Company is fast tracking a near-term, low capex operation with the aim of initial production later in 2019
- Processing involves simple beneficiation processes including magnetic separation
- Strong economic outlook underpinned by large, shallow, high-grade deposit with low capital cost and proximity to infrastructure
- Studies planned on larger project including downstream processing to produce V2O5
- Ideally placed to capitalise on strong demand from steel making as well as encouraging outlook for vanadium batteries, used to store renewable energy on a commercial scale



#### CORPORATE OVERVIEW





Capital Structure	
Current Shares	193,587,086
Listed Options	52,237,043
Unlisted Options	23,100,000
Vendor Options	41,580,001
Mkt Cap at 12c	~\$23,000,000
Cash at Bank	~\$2,000,000

- Tando has the right to earn 73.95% of the SPD Project
- Staged acquisition via project milestone completion, refer Appendix 2
- Tando is funded to completion of resource, mining and metallurgical studies
- Balance sheet flexibility no debt, no encumberances over the project

#### **GLOBALLY SIGNIFICANT PROJECT**

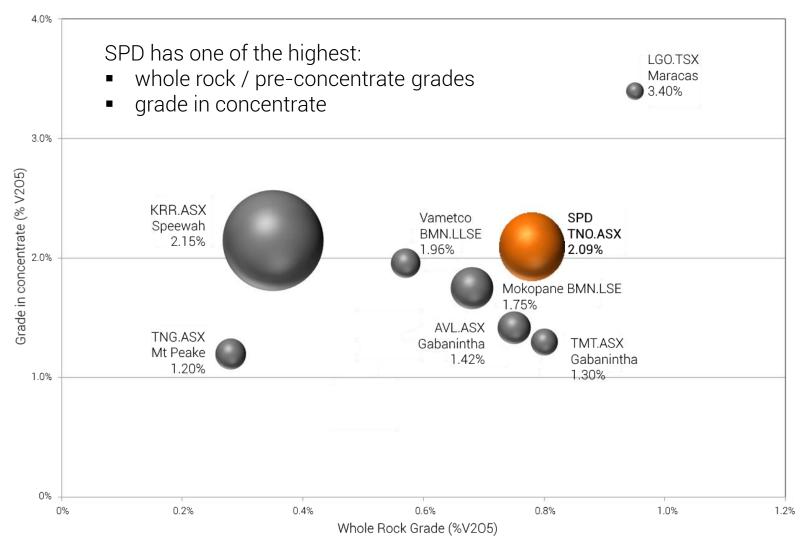


Chart compares resources reported under different codes and companies at different stages of development as detailed in slide 29.

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RESOURCES

#### AGGRESSIVE DEVELOPMENT STRATEGY

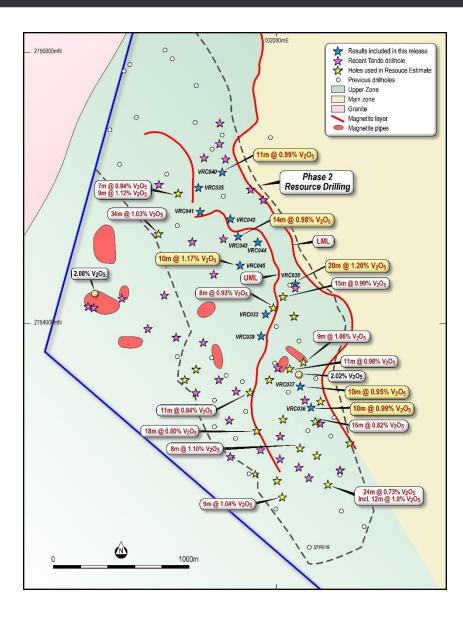


- Over 6,000m of drilling from September 2018 (51 RC holes and 32 DD holes)
- Maiden Inferred Mineral Resource estimated in December 2018
- Phase 2 Results to be used to update and upgrade Mineral Resource during Q1 2019
- Engineering and metallurgical studies progressing rapidly, to be fed into Scoping Study at end Q1 2019
- Exploration on high grade pipe targets continuing through Q1 2019
- The Company will continue and expand VanRes' community engagement programme





#### SIMPLE GEOLOGICAL SETTING

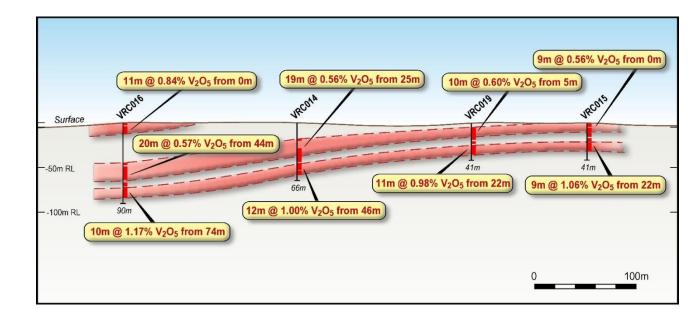


- Three magnetite units averaging approximately 20m thick
  - Upper Magnetite Layer (UML)
  - Intermediate Magnetite Layer (IML)
  - Lower Magnetite Layer (LML)
- Both units outcrop in project area
- Both massive (high grade) and disseminated mineralisation present
- Located at base of Upper Zone of Bushveld Complex, a well studied and understood geological system
- 42 historical RC & DD holes drilled for 2398.6m prior to TNO acquisition

# HIGH GRADE DRILL RESULTS

- 20m at 1.20% V<sub>2</sub>O<sub>5</sub> from 86m includes 7m at 1.48% V<sub>2</sub>O<sub>5</sub> (VRC038)
- 12m at 1.08% V<sub>2</sub>O<sub>5</sub> from 79m (VRC043)
   incl. 5m at 1.29% V<sub>2</sub>O<sub>5</sub> from 86m
- 11m at 1.07% V<sub>2</sub>O<sub>5</sub> from 59m (VRC042)
   incl. 3m at 1.55% V<sub>2</sub>O<sub>5</sub> from 67m
- 12m at 1.00% V<sub>2</sub>O<sub>5</sub> from 46m (VRC014) incl. 9m at 1.13% V<sub>2</sub>O<sub>5</sub> from 49m incl. 2m at 1.74% V<sub>2</sub>O<sub>5</sub> from 56m
- 10m at 1.01% V<sub>2</sub>O<sub>5</sub> from 121m (VRC046)
   incl. 2m at 1.72% V<sub>2</sub>O<sub>5</sub> from 129m
- 9m at 1.04% V<sub>2</sub>O<sub>5</sub> from 49m (VRC003)
- 8m at 1.10% V<sub>2</sub>O<sub>5</sub> from 46m incl. 2m at 1.56% V<sub>2</sub>O<sub>5</sub> (VRC005)
- 7m at 1.15% V<sub>2</sub>O<sub>5</sub> from 44m & 4m at 0.95% V<sub>2</sub>O<sub>5</sub> from 59m (VRC010)
- 15m at 0.99% V<sub>2</sub>O<sub>5</sub> from 94m (VRC022)
  - incl. 8m at 1.11%  $V_2O_5$  from 95m

Refer ASX Announcements 12 Oct 2018, 25 Oct 2018, 28 Nov 2018 & 16 Jan 2019

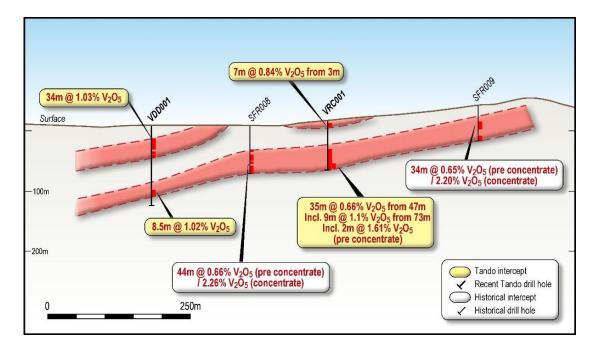




## MINERALISATION AT SURFACE



- Mineral Resource includes 87Mt at 1.07% V205 from surface to 100m depth
- Consistent high grade drill results from surface (RHS)
- Amenable to open pit mining



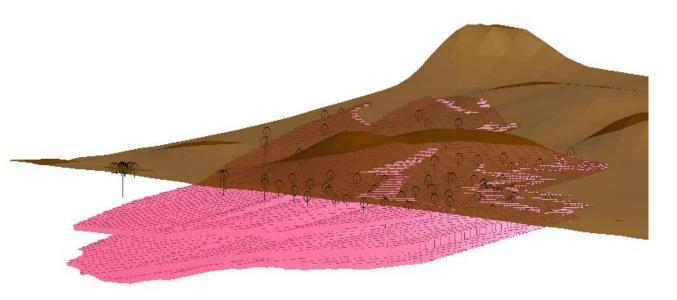
- 18m at 0.80%  $V_2O_5$  from 0m (VRC017) incl. 4m at 1.16%  $V_2O_5$
- 14m at 0.98%  $V_2O_5$  from 0m / surface (VRC043)
- 34m at 1.03%V<sub>2</sub>O<sub>5</sub> from 22m (VDD001)
- 12m at 1.00%  $V_2O_5$  from 12m (VRC002) incl. 2m at 1.72%  $V_2O_5$
- 10m at 1.17% V<sub>2</sub>O<sub>5</sub> from 35m (VRC045)
- 9m at 1.06%  $V_2O_5$  from 22m (VRC015) incl. 3m at 1.45%  $V_2O_5$
- 11m at 0.99% V<sub>2</sub>O<sub>5</sub> from 17m (VRC040) incl. 2m at 1.67% V<sub>2</sub>O<sub>5</sub>
- 11m at 0.98% V<sub>2</sub>O<sub>5</sub> from 24m (VRC019)
   incl. 8m at 1.15% V<sub>2</sub>O<sub>5</sub> from 27m
   incl. 2m at 1.65% V<sub>2</sub>O<sub>5</sub> from 33m
- 10m at 0.99% V<sub>2</sub>O<sub>5</sub> from 9m (VRC036)
- 10m at 0.95% V<sub>2</sub>O<sub>5</sub> from 17m (VRC037)
   incl. 2m at 1.59% V<sub>2</sub>O<sub>5</sub> from 6m

Refer ASX Announcements 12 Oct 2018, 25 Oct 2018, 28 Nov 2018 & 16 Jan 2019

#### MASSIVE MAIDEN JORC RESOURCE

- Global SPD Mineral Resource of 588Mt at a whole rock / unprocessed grade of 0.78% V<sub>2</sub>O<sub>5</sub>
- Entire Mineral Resource classified as Inferred, infill drilling completed aimed at upgrading classification
- Significant increase in size of Resource and improved delineation of high grade zones compared with historic SAMREC resource
- Resource includes high grade, surface component 87 Mt at 1.07% V<sub>2</sub>O<sub>5</sub>
- Full details in Appendix 1,

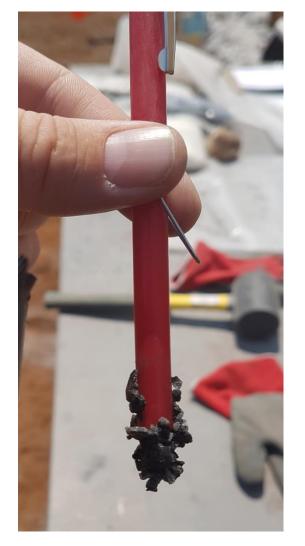
ASX Announcement 18 December 2018



#### OUTSTANDING CONCENTRATE RESULTS

Assays of magnetic concentrate return:

- 7m at 2.17% V<sub>2</sub>O<sub>5</sub> from 3m (VRC001)
   Mass recovery 36%, whole rock 0.84% V<sub>2</sub>O<sub>5</sub>
- 35m at 2.11% V<sub>2</sub>O<sub>5</sub> from 47m (VRC001)
   Mass recovery 28%, whole rock 0.66% V<sub>2</sub>O<sub>5</sub>
  - incl. 9m at 2.19% V<sub>2</sub>O<sub>5</sub> from 73m
     *Mass recovery 47%, whole rock 1.11% V<sub>2</sub>O<sub>5</sub>*
  - incl. 2m at 2.24% V<sub>2</sub>O<sub>5</sub> from 80m
     *Mass recovery 68%, whole rock 1.61% V<sub>2</sub>O<sub>5</sub>*
- 24m at 2.16% V<sub>2</sub>O<sub>5</sub> from 0m / surface (VRC002)
   Mass recovery 29%, whole rock 0.73% V<sub>2</sub>O<sub>5</sub>
  - incl. 12m at 2.15% V<sub>2</sub>O<sub>5</sub> from 12m
     Mass recovery 41%, whole rock 1.00% V<sub>2</sub>O<sub>5</sub>
  - incl. 2m at 2.20% V<sub>2</sub>O<sub>5</sub> from 22m
     Mass recovery 74%, whole rock 1.72% V<sub>2</sub>O<sub>5</sub>
- 25m at 2.42% V<sub>2</sub>O<sub>5</sub> from 23m (VRC008)
   Mass recovery 23%, whole rock 0.68% V<sub>2</sub>O<sub>5</sub>
  - including 8m at 2.32% V<sub>2</sub>O<sub>5</sub> from 40m
     Mass recovery 41%, whole rock 1.03% V<sub>2</sub>O<sub>5</sub>
- 34m at 2.32% V<sub>2</sub>O<sub>5</sub> from 21m (VDD001)
   Mass recovery 41%, whole rock 1.03% V<sub>2</sub>O<sub>5</sub>



- Excellent mass recovery across mineralised intervals, increasing to +40% in higher grade zones (+1.0% V205)
- Concentrate analysis is very consistent in vanadium and titanium content throughout the mineralised intervals, with low levels of silica and alumina
- Concentrate samples, along with specifications, have been provided to potential offtake partners for their review

#### NEAR TERM PRODUCTION POTENTIAL

Investigating rapid, low CAPEX production start up

Crush & Screen

- Takes advantage of high grade nature of resource along with pipes
- 2% V2O5 concentrate can be produced using simple beneficiation processes



Magnetic Separation

Source: Multotec ZA

Source: Mets ZA (Pty) Ltd

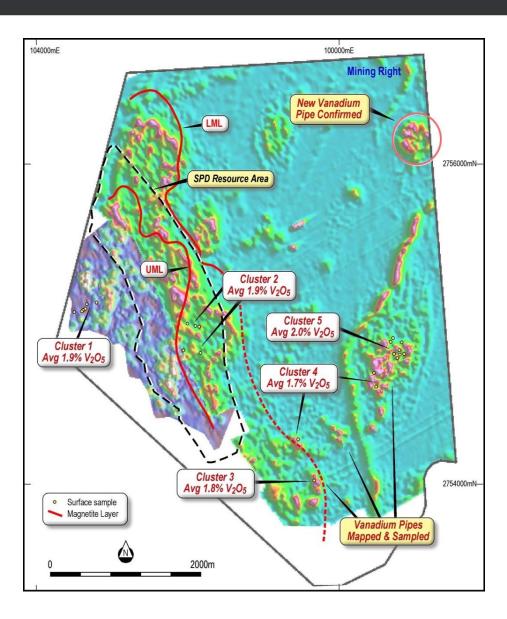




2019						
Q1	Q2	Q3	Q4			
Complete Scoping Study	Secure offtake agreements & development funding	Construction & first production				
2020		2021				
Complete PFS into dow global resources	nstream processing of	Complete DFS into downstre obtain project finance	am processing option			

Utilise cashflow and offtake partners to advance larger project

### HIGH GRADE VANADIUM PIPES



- 6 clusters of pipes have been mapped and sampled on the SPD Project
- Average of 20 samples =  $1.87\% V_2O_5$
- 7 samples above 2% V<sub>2</sub>O<sub>5</sub>
- High resolution magnetic survey delineates scale:
  - Cluster 5 600m x 600m
  - New target 400m x

400m

Drill testing in progress

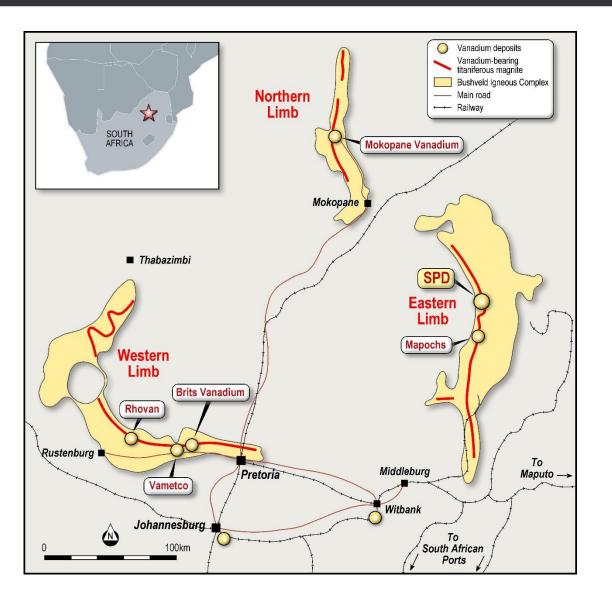
Refer ASX Announcements 5 Jul 2018, 2 Aug 2018 & 13 Aug 2018



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#### ESTABLISHED PRODUCTION HUB



- Active vanadium mining and processing operations:
  - Rhovan (Glencore)
  - Vametco (Bushveld)
- SPD Project adjacent to dormant Mapochs vanadium operation (formerly Evraz, now private)



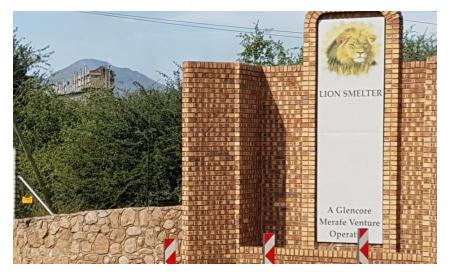
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#### **INFRASTRUCTURE RICH REGION**





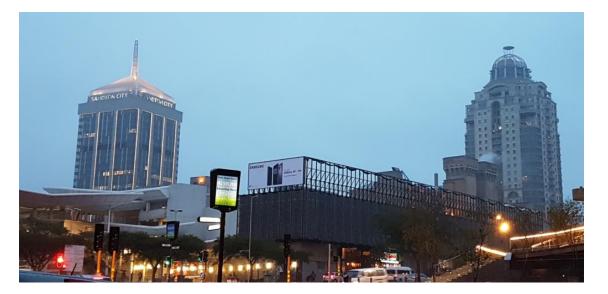




#### SOUTH AFRICA

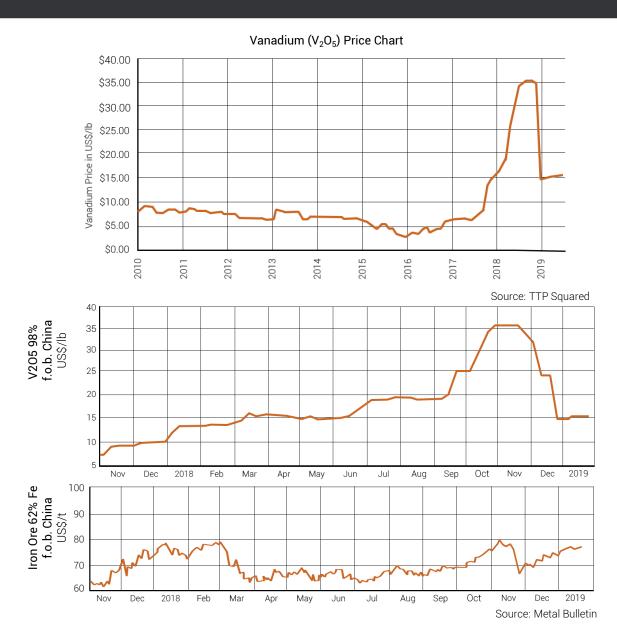


- Current government actively seeking investment in South Africa, with mining a sector of interest
- New Mining Charter announced in September
   2018 aimed to address industry concerns while
   continuing to promote stakeholder interests
- Provides greater certainty and clarity for investment in mining in RSA
- Tando has applied to join the Minerals Council, the advocacy body representing >75% of active mining companies in RSA
- As a new operation SPD is well-positioned to avoid legacy issues faced by older mines



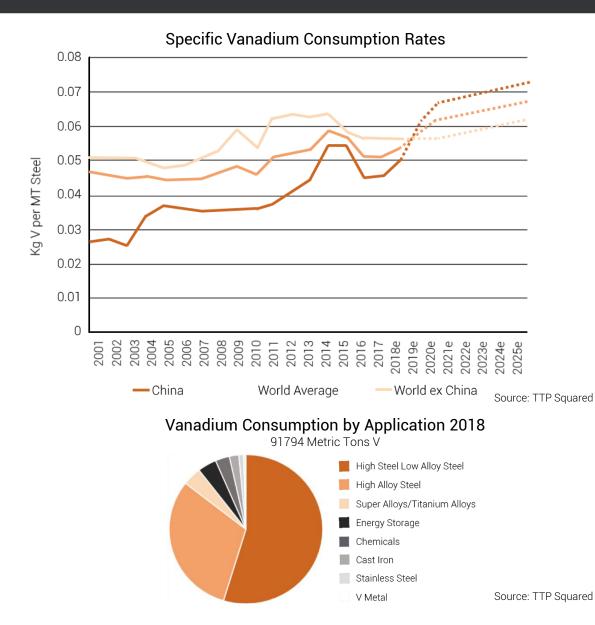


#### VANADIUM MARKET / PRICE



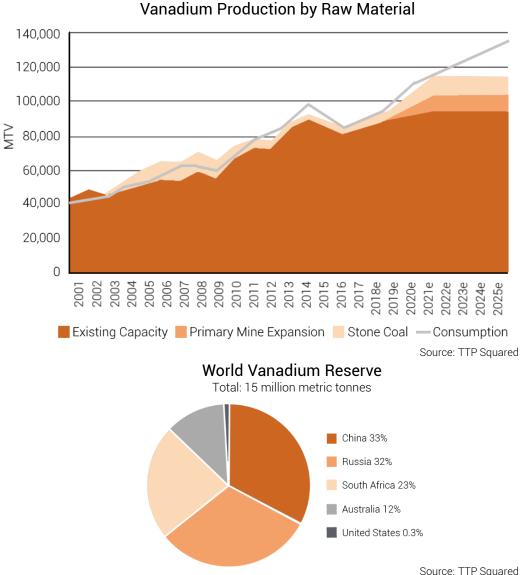
- Vanadium prices have stabilised above US\$15/lb after surge during 2018
- Prices in uptrend since Jan 2016
- For the first time vanadium price has decoupled from iron ore price as a result of :
  - Changes in vanadium content of steel
  - Usage of vanadium in Vanadium Redox Flow Batteries (VRFBs)
- Price decreases improve economics of VRFBs
- Price increases reflect demand in steel making
- Marks a structural change in the sector

### DEMAND FROM STEEL



- Over 90% of the current demand for vanadium arises from its use to strengthen steel.
- Demand increasing due to more stringent regulations in China for rebar and other steel products used in construction.
- New Chinese standards forecast to increase vanadium consumption in rebar by 20%.
- Strengthened steel also used in EVs and other applications where weight of steel needs to be decreased.
- Actual demand for steel is steady, so demand for vanadium is not being fed by increased iron ore production ("co-production").

#### VANADIUM SUPPLY

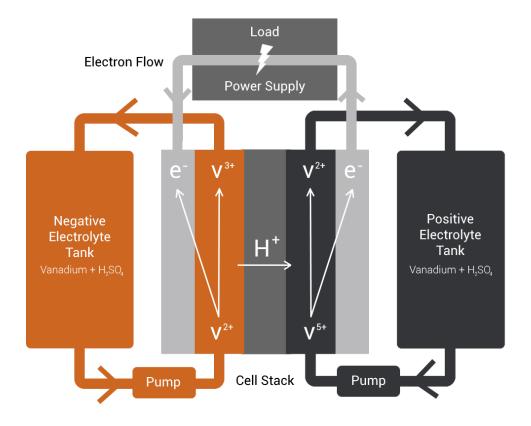


- - Over 85% of the worlds vanadium is produced from China, **Russia and South Africa**
  - Production from primary sources (i.e. new mines such as SPD) increasing due to environmental issues with production from stone coal and slag
  - Primary deposit types:
    - Titaniferous magnetite predominant style being mined globally
    - Phosphate rock used for production of fertilizers and produces vanadium as a by product. Not a major source of commercial vanadium
    - Uraniferous sandstones / siltstones no current commercial production



## DEMAND FROM ENERGY STORAGE



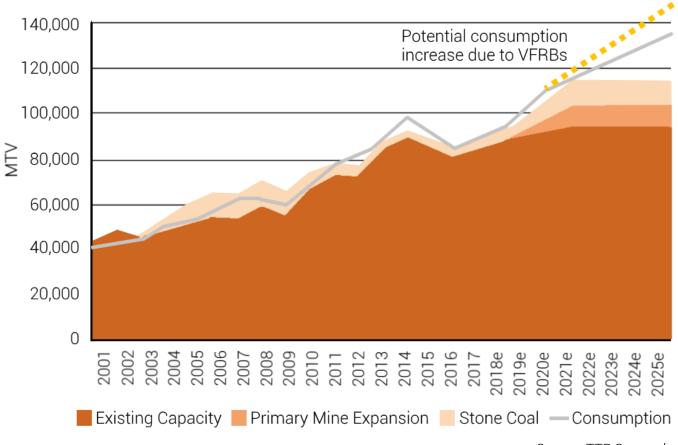


#### Vanadium Redox Flow Batteries

- Energy storage is key factor in global change to renewable energy
  - "the wind doesn't always blow, the sun doesn't always shine"
  - "you might have an electronic vehicle but you'll be charging it from a coal fired power station"
- VRFBs have characteristics key to providing grid scale energy storage solutions:
  - substantially longer lifespan than most batteries (up to 20 years)
  - able to hold charge for a significant time (up to 12 months)
  - able to discharge 100% charge without damage
  - scalability allowing large scale facilities to be constructed
  - greater chemical stability as only a single element is present in the electrolyte (ie safer)
- Requires high purity product >  $98\% V_2O_5$

### VRFBs AND ENERGY STORAGE

- Forecasters expect over 1,200GW
   of battery capacity to be added
   between today and 2050, with
   approx 600GW before 2025 <sup>1</sup>
- VRFBs forecast to represent between
   15 and 25 % of battery capacity
- Could add up to 10,000mtV of demand into an already undersupplied market <sup>2</sup>



Source: TTP Squared

- 1. BloombergNEF, New Energy Outlook 2018, International Energy Agency, World Energy Outlook 2018
- 2. Noack et. al, 2016. *Techno-economic modelling of RFB Systems* (Energies 2016, 9, 627) *Vanadium Flow Batteries: An In Depth Analysis.* EPRI, Palo Alto, CA: 2007.1014836

#### PEER COMPARISON



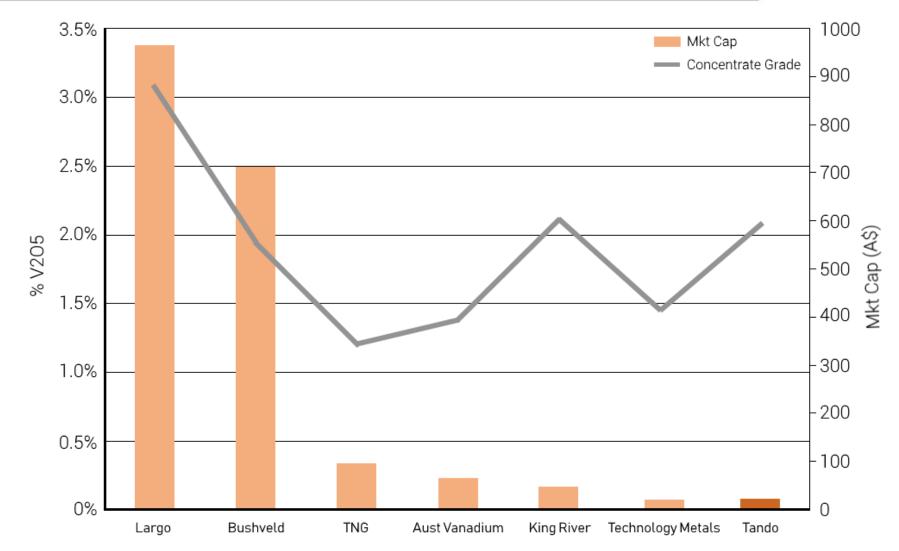


Chart compares resources reported under different codes and companies at different stages of development as detailed in slide 29.

#### MANAGEMENT TEAM



Bill Oliver Managing Director	<ul> <li>Geologist with over 20 years wide ranging exploration experience in a range of commodities and jurisdictions.</li> <li>Enviable track record in project identification and evaluation.</li> </ul>
<b>Jeremy King</b> Non-Executive Chairman	<ul> <li>Corporate advisor with over 15 years' experience in domestic and international legal, financial and corporate matters.</li> <li>Extensive corporate experience and substantial global network.</li> </ul>
Pat Burke Non-Executive Director	<ul> <li>Lawyer with extensive legal, commercial and corporate advisory experience for ASX listed companies.</li> <li>Has acted as a director for a number of ASX and AIM listed small to mid-cap resources companies over the past 10 years.</li> </ul>



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#### COMPETENT PERSON STATEMENT

- The information in this announcement that relates to Exploration Results and other technical information relating to drilling, sampling and the geological interpretation derived from the Exploration Results complies with the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) and has been compiled and assessed under the supervision of Mr Bill Oliver, the Managing Director of Tando Resources Ltd. Mr Oliver is a Member of the Australasian Institute of Mining and Metallurgy and the Australasian Institute of Geoscientists. He has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the JORC Code. Mr Oliver consents to the inclusion in this announcement of the matters based on his information in the form and context in which it appears. The Exploration Results are based on standard industry practises for drilling, logging, sampling, assay methods including quality assurance and quality control measures as detailed in the ASX Announcements referred to in the text.
- The information in this announcement that relates to Mineral Resources complies with the JORC Code and that has been compiled, assessed and created under the supervision of Mr Kell Nielsen BSc.(Geology), MSc.(Mineral Econ.) and a Member of the Australasian Institute of Mining and Metallurgy and the Principal of Mannika Resources Group Pty Ltd a consultant to the Company. Mr Nielsen has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Persons as defined in the JORC Code. Mr Nielsen is the competent person for the estimation and has relied on provided information and data from the Company, including but not limited to the geological model, database and expertise gained from site visits. Mr Nielsen consents to the inclusion in this announcement of matters based on his information in the form and context in which it appears. The Mineral Resource is based on standard industry practises for drilling, logging, sampling, assay methods including quality assurance and quality control measures as detailed in the ASX Announcements referred to in the text.

#### **APPENDIX 1: MINERAL RESOURCE**



#### **Global Mineral Resource - Inferred**

Layer	SG	Tonnes (Mt)	Whole Rock V <sub>2</sub> O <sub>5</sub> %
Upper Layer	3.5	211	0.84
Intermediate Layer	3.1	188	0.55
Lower Layer (disseminated)	3.5	137	0.77
Lower Layer (massive)	3.5	52	1.37
Total		588	0.78

#### Mineral Resource to 100m depth (0.9% V2O5 cut-off)

Layer	SG	Tonnes (Mt)	Whole Rock V <sub>2</sub> O <sub>5</sub> %
Upper Layer	3.5	55	1.00
Lower Layer (disseminated)	3.5	7	0.95
Lower Layer (massive)	3.5	24	1.30
Total		87	1.07

- Global Mineral Resource is quoted above a 0.45% V2O5 cut-off to 200m depth and classified as Inferred
- Refer to ASX Announcement 18
   December 2018 for full details including information prescribed by the JORC Code
- The Company is not aware of any new information that materially affects the information in that announcement. Phase 2 Drill Results will be used to update the Mineral Resource

#### **APPENDIX 2: TERMS OF ACQUISITION**



Further shares to be issued to enable Tando to earn up to 73.95% of the SPD Project.					
On delineation of a Measured Resources	28.528M shares				
On completion of a Scoping Study	19.635M shares				
On successful completion of a Pre-Feasibility Study	4.460M shares & 32.340M options				
On successful completion of a Feasibility Study	30.261M shares & 20.559M options				

#### **APPENDIX 3: PEER COMPARISON INFORMATION**



Company	Code	Project	Stage	Resource Category	Resource Tonnes	Resource Grade	Concentrat e Grade	Information Source
Largo	LGO.TSX	Maracas	Production	Measured, Indicated & Inferred (43-101)	49.25	0.99	3.10	43-101 Technical Report dated 26/10/2017 <u>largoresources.com/operations/maracas-</u> <u>menchen-mine</u>
Bushveld	Bushveld BMN.LSE	Vametco	Production	Indicated & Inferred	142	0.57	1.96	bushveldminerals.com/bushveld-vametco/ www.bushveldminerals.com/presentations/
		Mokopane	Development	Indicated & Inferred	285	0.68	1.75	Mokopane PFS Study Report Jan 2016 bushveldminerals.com/technical-reports/
TNG	TNG.ASX	Mt Peake	Development	Measured, Indicated & Inferred	160	0.28	1.20	ASX Announcement 26/03/2013
King River	KRR.ASX	Speewah	Development	Measured, Indicated & Inferred	4,712	0.30	2.11	ASX Announcement 02/11/2018 21/03/2018
Aust Vanadium	AVL.ASX	Gabanintha	Development	Measured, Indicated & Inferred	176	0.77	1.39	ASX Announcement 26/09/2018
Technology Metals	TMT.ASX	Gabaninth	Development	Indicated & Inferred	120	0.8	1.39 – 1.53	ASX Announcement 21/06/2018 21/06/2018