31 October 2023

Tivan and Larrakia sign renewable energy agreement to supply Vanadium Electrolyte Facility at Middle Arm

- **Tivan signs Letter of Intent with Larrakia Energy for the supply of up to 30 MW of renewable energy from 2026 at the Middle Arm Sustainable Development Precinct.**
- **Tivan announces plans to develop a Vanadium Electrolyte Facility at MASDP to facilitate a renewable value chain for long duration energy storage across northern Australia.**
- **Larrakia Development Corporation is an Aboriginal organisation representing the Larrakia people, the Traditional Owners of the lands and waters in and surrounding Darwin.**
- **Larrakia Energy, majority owned by Larrakia Development Corporation, is planning the development of a 300 MW solar farm to provide renewable energy to MASDP in joint venture with Australian and international partners.**
- **Tivan's proposed VE Facility is based on planned production of high-purity vanadium at the Speewah Project in Western Australia, and is the largest planned facility outside of China.**
- **Tivan's mission is to contribute to the global energy transition via large-scale, full-cycle deployment of Vanadium Redox Flow Batteries.**
- **Agreement between Larrakia and Tivan based on a shared vision of harnessing the power of renewables to lessen impacts on country and to create sustainable economic opportunities.**

The Board of Tivan Limited (ASX: TVN) ("Tivan" or the "Company") is pleased to advise that it has signed a non-binding letter of intent ("Letter of Intent") with Larrakia Energy for the supply of renewable energy to support a Vanadium Electrolyte Facility ("VE Facility") at the Middle Arm Sustainable Development Precinct ("MASDP") in Darwin.

Background

Larrakia Development Corporation ("LDC") is an Aboriginal organisation based in Darwin that provides employment and business opportunities for the Larrakia people, the Traditional Owners of the lands and waters in and surrounding Darwin.

Larrakia Energy is a joint venture, majority owned by LDC, that is progressing the development of a 300 MW solar farm to be located on Larrakia Country near Bladin Point (see media release of 16 November 2022). In support, Larrakia Energy and Korea Midland Power Co. recently signed a Memorandum of Understanding with the Northern Territory Government (see media release of 2 August 2023).

Larrakia Energy's project is expected to support the provision of transmission and network capability for renewable energy at MASDP, and to create local employment and business opportunities.

Tivan is developing the Speewah Project ("Speewah") in the East Kimberley region of Western Australia to produce vanadium, a critical mineral, in large scale. Vanadium is used, as vanadium electrolyte, to store energy for long duration in Vanadium Redox Flow Batteries ("VRFB"). Tivan is pursuing an expedited project development pathway at Speewah, in parallel to its long-term vision of commercialising the TIVAN+ critical mineral processing technology in Australia (see ASX announcement of 23 August 2023).

Tivan aims to lead the deployment of VRFB in Australia as part of delivering a large-scale sovereign capability that contributes meaningfully to the energy transition. The emergence of the VRFB sector requires a reliable, sustainable and cost-effective supply of vanadium electrolyte. Tivan views MASDP as a strategically important location for the development of a VE Facility (see further below). Concurrently, Tivan is in negotiations with leading global manufacturers of VRFB, including in Japan, for deployment in Australia, to complete the local renewable value chain.

Letter of Intent

The Letter of Intent with Larrakia Energy reflects Tivan's ongoing commitment to building enduring relationships with Traditional Owners, and to emphasising principles of early inclusion and genuine participation, thereby fostering an environment where a durable alignment of interests may be achieved (Figure 1). Tivan and Larrakia share a vision of harnessing the power of renewables to lessen impacts on country and to create sustainable economic opportunities.

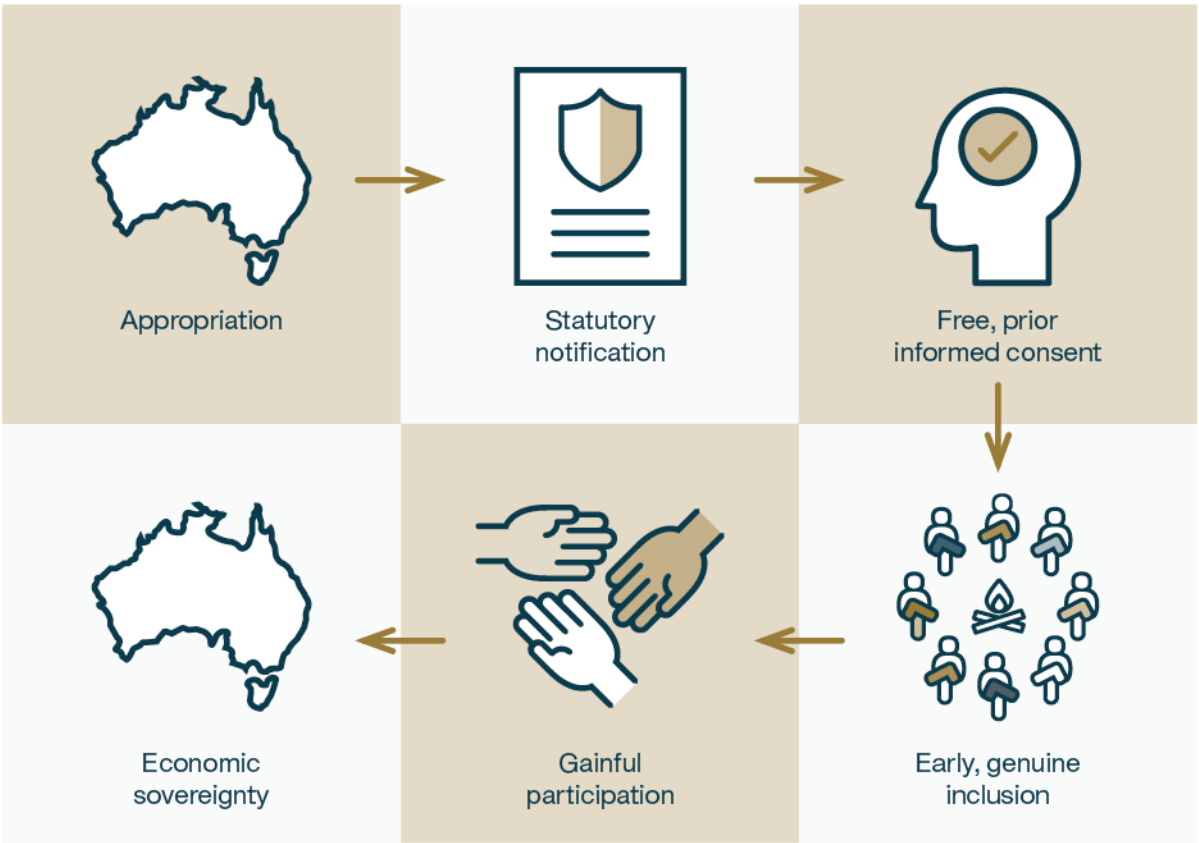

Figure 1: Tivan's framework in respect of Traditional Owners

Under the Letter of Intent, Tivan and Larrakia Energy will progress commercial and technical discussions on the potential supply of up to 30 MW of renewable energy commencing from 2026 to the proposed VE Facility, extending to supply quantities, pricing and scheduling. Any electricity supply arrangement between the parties will be subject to the negotiation and execution of a formal commercial supply agreement.

This follows the Letter of Intent signed by Tivan in April 2023 with AAPowerlink Australia Assets Pty Ltd, a Sun Cable renewable energy group company, to support the Company's planned TIVAN® Processing Facility in MASDP at a later development phase (see ASX announcement of 5 April 2023).

Vanadium Redox Flow Batteries at MASDP

As part of its firmwide mission, Tivan aims to facilitate the full cycle renewable value chain for grid storage: from resource to VRFB (see Figure 2).

VRFB are widely viewed as a preferred technology for long duration energy storage. Advantages include:

- Longevity: extended lifespan of greater than 25 years, with minimal performance degradation
- Cycle: capability for greater than 20,000 cycles
- Discharge: capability for full discharge without shortening battery life
- Duration: long duration optimised up to 12 hours of energy storage and power output
- Cost-competitive: lower maintenance and long life provides for lower levelised cost of energy storage
- Safety: use of aqueous electrolyte removes susceptibility of thermal runway events
- Recyclability: vanadium electrolyte can be reused and recycled indefinitely

VRFB are elemental, using only vanadium oxides as a feedstock, thereby avoid the complex chemistries in short duration lithium-ion batteries. This characteristic provides an opportunity for the entire renewable energy value chain to be developed in Australia, reducing sovereign dependency in the rollout of critical national infrastructure.

VRFB are a mature technology that are widely deployed on a commercial basis (over 200 installations globally).The largest VRFB value chain is in China, established by Dailan Rongke Power Co Ltd. CSIRO's Renewable Energy Storage Roadmap, published in March 2023, highlights the advanced commercial readiness of VRFB[1].

The principal inventor of VRFB is Professor Maria Skyllas-Kazacos from the School of Chemical Sciences and Engineering at the University of New South Wales, a member of Tivan's Technical Advisory Group.

[1] Refer to page 21: https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/energy-and-resources/renewable-energy-storage-roadmap

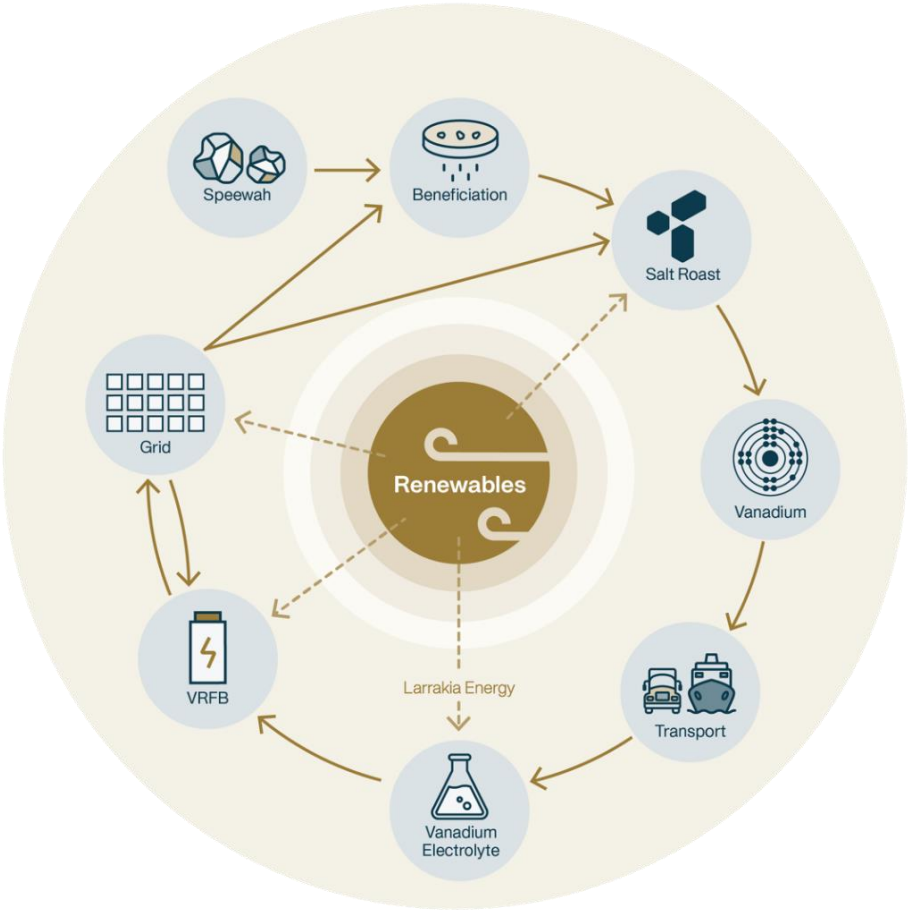

Figure 2: Tivan views circularity as integral to sustainability

Vanadium Electrolyte Facility at MASDP

The development of Tivan's large-scale Vanadium Electrolyte Facility is a critical step toward establishing a renewable energy value chain at MASDP. A secure, cost-effective and sustainable supply of vanadium electrolyte is a necessary intermediate staging point in facilitating the large-scale deployment of VRFB.

MASDP is a sustainable development precinct of strategic national importance, with planning and funding commitments from all levels of Government. This includes $1.5 billion of equity investment by the Federal Government for common use infrastructure announced in the Federal Budget in September 2022.

Tivan established its presence at MASDP in February 2023 via a committment "not to deal" agreed with the Northern Territory Government regarding the Southern Lode of Section 1817, Hundred of Ayers. This commitment was subsequently renewed and extended with the NT Government in August 2023 (refer to ASX announcements of 14 February and 24 August 2023).

Tivan views MASDP as a strategically important location for a VE Facility due to:

- Scaleable local demand for long duration energy storage, with multiple industrial users forming a demand hub.
- Federal Government equity investment to support common use infrastructure.
- Structure of the Northern Territory's electricity market (ie, independent of the National Energy Market) providing an opportunity for grid integration.
- Short supply chain for vanadium oxides from Speewah.
- Proximity to multiple large-scale solar projects.
- Opportunity to advance circularity principles within the Precinct, including through the retrofitting of renewable technologies to existing facilities in support of emissions reduction targets and export industries.
- Advanced master planning of the Precinct, inclusive of environmental assessments.
- Capability for deployment of VRFB to remote micro-grid locations across northern Australia.
- Alignment with Federal Government objectives of sovereign capability and downstream supply chain development in support of the energy transition.

In support of its plans at MASDP, Tivan has engaged extensively this year with local stakeholders and regulatory bodies, including the NT Environmental Protection Authority. Tivan remains deeply engaged in project facilitation processes at MASDP with multiple agencies of the NT Government including Investment Territory, Infrastructure NT, Department of Industry, Tourism and Trade ("DITT"), Department of Infrastructure, Planning and Logistics ("DIPL") and Land Development Corporation ("LDC"). Tivan has also advanced discussions with prospective commercial partners in long duration energy storage to unlock commercial synergies within the Precinct.

Tivan recognises the unique cultural significance of Darwin Harbour to the local community and to its Traditional Owners, the Larrakia. Tivan is committed to development pathways that maximise common use infrastructure, minimise environmental impacts and support the energy transition. In the management of impacts, Tivan supports a hierarchy of control to first "avoid", second "mitigate", and last "offset". Our planning with NT Government for the proposed TIVAN+ Processing Facility to use existing marine infrastructure at the Port of Darwin at East Arm is a primary example of this framework.

Tivan is in ongoing and constructive discussions with the NT Government and the Federal Government regarding the $1.5 billion in planned equity investment to support common use infrastructure at MASDP. This includes Tivan recently submitting infrastructure requirements and updated project development timelines to government to assist in planning and development of the Precinct.

Tivan views the optimal development pathway for MASDP as prioritising common use terrestrial works, including the development of the local transmission and grid network, in conjunction with required marine infrastructure. This pathway will pull forward private sector investment and assist the Precinct in earning and maintaining a social licence with the local community in Darwin, whilst delivering social, cultural and economic benefits.

Domestic Value-Add and Local Offtake

As noted above, vanadium oxides from the Speewah Project are the proposed feedstock for the VE Facility at MASDP. The VE Facility thus represents a form of local offtake for the Speewah Project, as part of establishing a large-scale renewable value chain across northern Australia, where value-add is retained onshore, consistent with the priorities of the Federal Government.

Local offtake is a strategic priority for Tivan, and an important attribute of sovereign capability. Local offtake supports project facilitation, including in project finance, through the elimination of cross-border risk. It will also enable Tivan to establish pricing of vanadium in Australian dollars and independent of benchmark global prices that are determined principally by the largest global producer, China.

Tivan has evaluated the scale of the proposed VE Facility, including with its Technical Advisory Group, based upon:

- Expected demand profile for long duration energy storage at MASDP and regional locations.
- Baseline projected vanadium oxide production from the Speewah Project.
- Global peer analysis of vanadium electrolyte facilities.
- Technical considerations, including operating ranges for the state of charge of VRFB.
- Infrastructure requirements and related logistical considerations.

Based on these factors, Tivan is targeting a VE Facility with a phased-in capacity of 500 MWh per annum of vanadium electrolyte production in line with project development timeframes at Speewah. This represents approximately 20% offtake of baseline vanadium oxides from the Speewah Project.

Appendix 1 provides a peer comparison table of vanadium electrolyte production facilities globally, and confirms that Tivan's proposed VE Facility is the largest outside of China. The scale is commensurate with the opportunity set that Tivan sees developing at MASDP.

Tivan views the development of a local renewable value chain at MASDP as the precursor for the emergence of large-scale green industries across northern Australia, such as minerals processing, hydrogen, data centres and agriculture. These industries require the provision of dispatchable renewable energy at large-scale and at a globally competitive price. This is achievable given the competitive advantage of the Northern Territory's vast solar resource and the technology readiness of VRFB for long duration energy storage. Tivan's role is to facilitate this downstream industry, with Speewah providing a superior feedstock, in support of the development of critical sovereign capabilities across northern Australia.

Comment from Chair of Larrakia Development Corporation and Larrakia Energy

Mr Mark Motlop commented:

"*Larrakia have cared for and protected our traditional lands, waters and skies since time immemorial. As development on Larrakia Country continues to expand, the Larrakia Development Corporation's vision is to harness the power of renewables to lessen that impact and ensure Country continues to be protected.*

Along with our joint venture partners in Larrakia Energy we look to a future that offers Larrakia and the people of the Northern Territory opportunities for employment, business creation and a landscape that continues to provide us all with our unique Territory lifestyle".

Comment from Executive Chairman of Tivan

Mr Grant Wilson commented:

"On behalf of the Board, I extend my thanks to Larrakia for this opportunity to work together, furthering Tivan's aim of developing a full cycle renewable value chain in Australia. Our agreement is based on a shared vision of harnessing the power of renewables, and grounded by a shared respect of country, culture and community.

Our agreement supports the prioritisation of renewable infrastructure at the Middle Arm Sustainable Development Precinct, thereby lessening impact and providing a sustainable development pathway for all concerned. Tivan looks forward to continuing to play a constructive role in supporting planning and development at the Precinct.

This partnership underscores Tivan's commitment to meet community expectations in all our proposed activities. We are advancing the renewable value chain for long duration energy storage in rapid time, including with local and global counterparts. Today's announcement will add further momentum to these initiatives, and provide an opportunity for MASDP to emerge at the global forefront of renewable technologies and the energy transition.

Our agreement also reflects Tivan's ongoing commitment to building genuine, inclusive and participatory relationships with Traditional Owners throughout Australia. Through the durable alignment of interests much can and will be achieved. We will tread gently on Larrakia Country, in the spirit of partnership, and always with deep respect".

This announcement has been approved by the Board of the Company.

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Forward looking statements disclaimer

This announcement contains certain “forward-looking statements” and comments about future matters. Forward-looking statements can generally be identified by the use of forward-looking words such as, “expect”, “anticipate”, “likely”, “intend”, “should”, “estimate”, “target”, “outlook”, and other similar expressions and include, but are not limited to, the timing, outcome and effects of the future studies, project development and other work. Indications of, and guidance or outlook on, future earnings or financial position or performance are also forward-looking statements. You are cautioned not to place undue reliance on forward-looking statements. Any such statements, opinions and estimates in this announcement speak only as of the date hereof, are preliminary views and are based on assumptions and contingencies subject to change without notice. Forward-looking statements are provided as a general guide only. There can be no assurance that actual outcomes will not differ materially from these forward-looking statements. Any such forward looking statement also inherently involves known and unknown risks, uncertainties and other factors and may involve significant elements of subjective judgement and assumptions that may cause actual results, performance and achievements to differ. Except as required by law the Company undertakes no obligation to finalise, check, supplement, revise or update forward-looking statements in the future, regardless of whether new information, future events or results or other factors affect the information contained in this announcement.

Appendix 1
Vanadium Electrolyte Facilities

Country	Company	Capacity per year	Status	Facility Location	Link
China	Rongke Power	1 GWh	Stage 1 complete. Stage 2 scoped at additional 1.5 GWh.	North Dalian, Liao Ning Province	https://www.desn.com.cn/news/show-1617246.html
China	Pangang Group	40 MWh*	Stage 1 complete. Stage 2 of additional 1.2 GWh to commence in 2024.	Panzhihua, Sichuan Province	https://www.lpvanadium.com/dist/assets/images/hero/Vanadium-Electrolyte-Production-Line-Completed.pdf
China	Tranvic Group	70 MWh*	Completed	Neijiang City, Sichuan Province	https://vanitec.org/latest-from-vanitec/article/tranvic-groups-3500-cubic-meter-vanadium-electrolyte-project-has-started-trial-production
South Africa	Bushveld Belco	160 MWh*	Targeted for commissioning 2023	East London, Great Britain	https://www.bushveldminerals.com/about/operations/belco/
Germany	AMG N.V.	120 MWh*	Completed late 2023	Nuremberg, Germany	https://amg-nv.com/investors/press-release/amg-advanced-metallurgical-group-n-v-announces-approval-for-vanadium-electrolyte-plant-at-amg-titanium/
United States	US Vanadium LLC	73 MWh	Completed 2022	Hot Springs, Arkansas	https://usvanadium.com/u-s-vanadium-launches-north-americas-largest-production-facility-for-made-in-usa-ultra-high-purity-electrolyte-for-vanadium-redox-flow-batteries/
United Kingdom	Oxkem	60 MWh*	Completed	Reading, Great Britain	https://flowbatteryforum.com/sponsor/oxkem/
Australia	Vecco Group	30 MWh	Commissioned. Stage 2 to scale over 100 MWh.	Townsville, Queensland	https://veccogroup.com.au/operations/electrolyte-manufacturing-facility/
Australia	Australian Vanadium Ltd	33 MWh	Announced	Perth, Western Australia	https://www.australianvanadium.com.au/announcements/vanadium-electrolyte-manufacturing-plant-build-awarded-to-primero/

* A conversion factor of 50 L/kWh is assumed to provide a point of project comparison. Actual output may vary.