



# Advancing the **Julia Creek** Project

**Investor Presentation IMARC October 2023**

"We would like to acknowledge the Wunumara people as Traditional Owners and their custodianship of the lands on which QEM operates its Julia Creek Project.  
We pay our respects to their Ancestors and their descendants, who continue cultural and spiritual connections to Country.  
We recognise their valuable contributions to Australian and global society."



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## Competent Persons and Qualified Estimator Statements

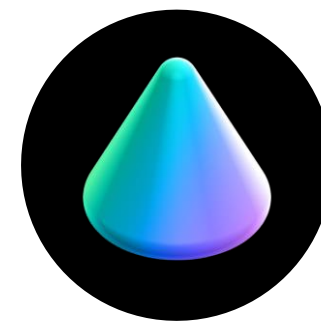
The information in this announcement that relates to exploration results, mineral resource and contingent resource estimates for the Company's Julia Creek Project was first reported by the Company in its IPO prospectus dated 20 August 2018 and supplementary prospectus dated 12 September 2018 (together, the "Prospectus") and the subsequent resource upgrade announcements ("Resource Upgrades") dated 14 October 2018 and 7 April 2022. The Company confirms that it is not aware of any new information or data that materially affects the information included in the Prospectus and Resource Upgrades, and in the case of estimates of Mineral Resources and Contingent Resources, that all material assumptions and technical parameters underpinning the estimates in the Prospectus and Resource Upgrades continue to apply and have not materially changed.

**QEM Limited** is focused on the exploration and development of the **Julia Creek Vanadium and Oil Shale Project**, a unique world class critical minerals resource.



# Julia Creek Project

QEM seeks to develop a World-Class  
Vanadium and Oil Shale Project



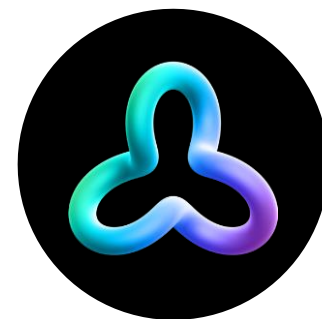
## Multi Commodity

Vanadium  
Transport Fuel



## Sovereign Supply

Fuel Security  
High Purity  $V_2O_5$



## Unique Process

Renewable Power  
Green Hydrogen



## Globally Significant

Vanadium Resource  
Critical Mineral





Vanadium is classed as a **Critical Mineral** by the Australian Government. Vanadium is a 'strategic metal' when building a new energy economy. As a Critical Mineral, Vanadium is listed for priority development and investment.



# Vanadium – Supply & Demand

Market Set for growth



Market expected to reach

## \$3.89 Billion

in 2025 at CAGR of ~ 5%.

VRFB demand expected to equate

## ~23%

 of vanadium market

by 2030. Currently about ~7%.

Global Production 2022

## ~118,000 MTV\*

or approx. 200,000tpa  $V_2O_5$  equivalent.

Australia holds

## 31%

 of undeveloped

global reserves BUT has no domestic production – YET!

Vanadium Listed as

## Critical Mineral

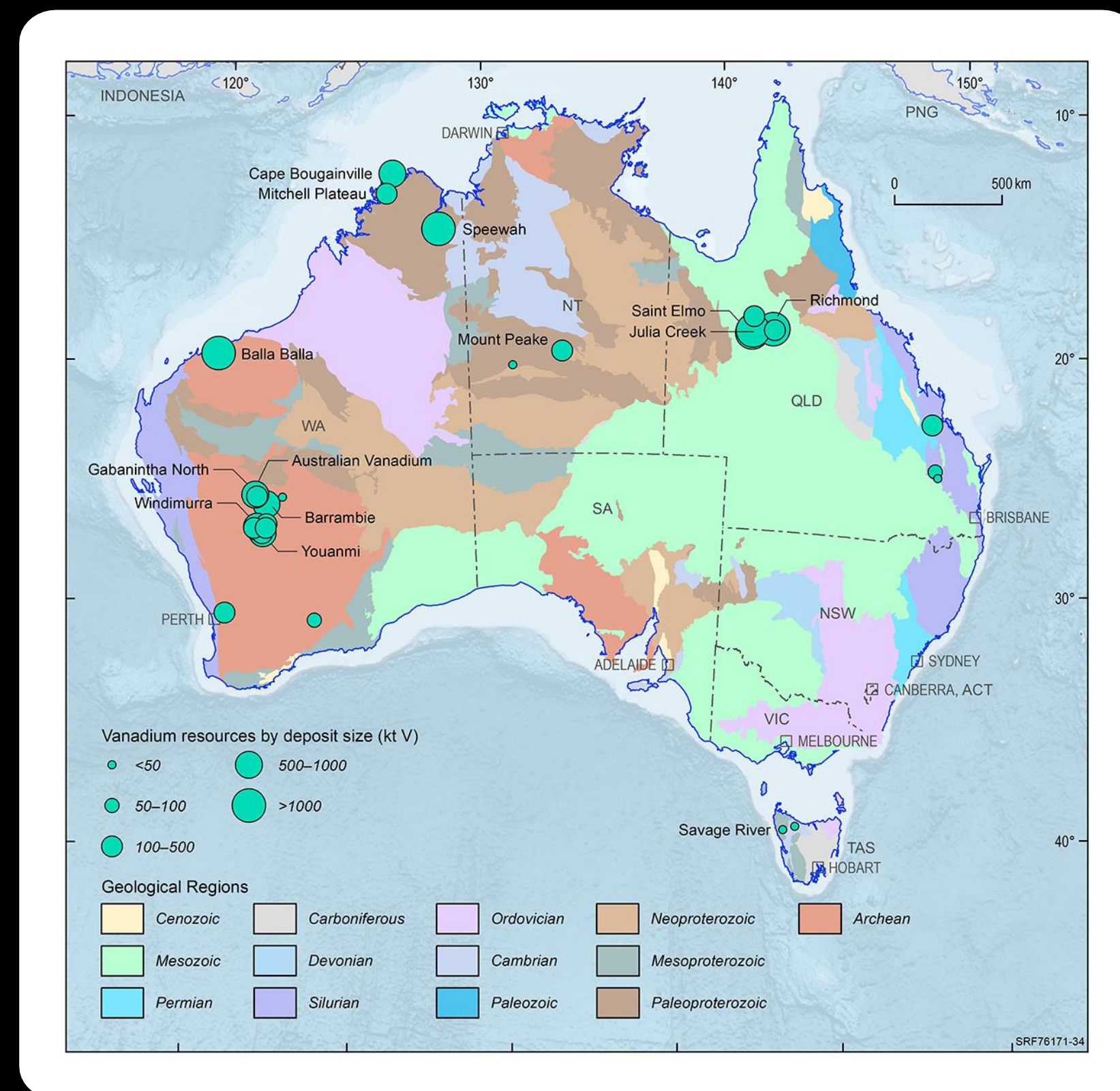
in Aust, US, EU and Japan

Global Vanadium demand

## 100%

 Increase by 2030

This is due to the growing demand for Vanadium Redox Flow Batteries (VRFBs) – Vanitec, 2022.



\* MTV is Metric Tonne Unit of Vanadium



# Vanadium Uses

Vanadium - The Versatile Element



## Improves Tensile Steel Strength

Most widely used alloy to strengthen steel (HSLA.) in construction, automotive, aerospace, rail, shipping, tools, drilling and more.



## Lowers CO<sub>2</sub> emissions

In steel-Lowers CO<sub>2</sub> emissions by 185 million metric tons annually.

- Texas A&M University



## Supports Fuel Efficiency

High strength-to-weight ratio makes vanadium a critical component in the automotive industries. In 85% of all vehicles by 2025. Henry Ford first used in Model – T.





# Vanadium Uses

Vanadium - The Versatile Element



## Durability and Weather Resistance

Vanadium alloys are naturally durable to extreme temperature and corrosion, making it irreplaceable in the aerospace industry. Suitable for hydrogen storage and pipes (reduces failure due to hydrogen embrittlement).

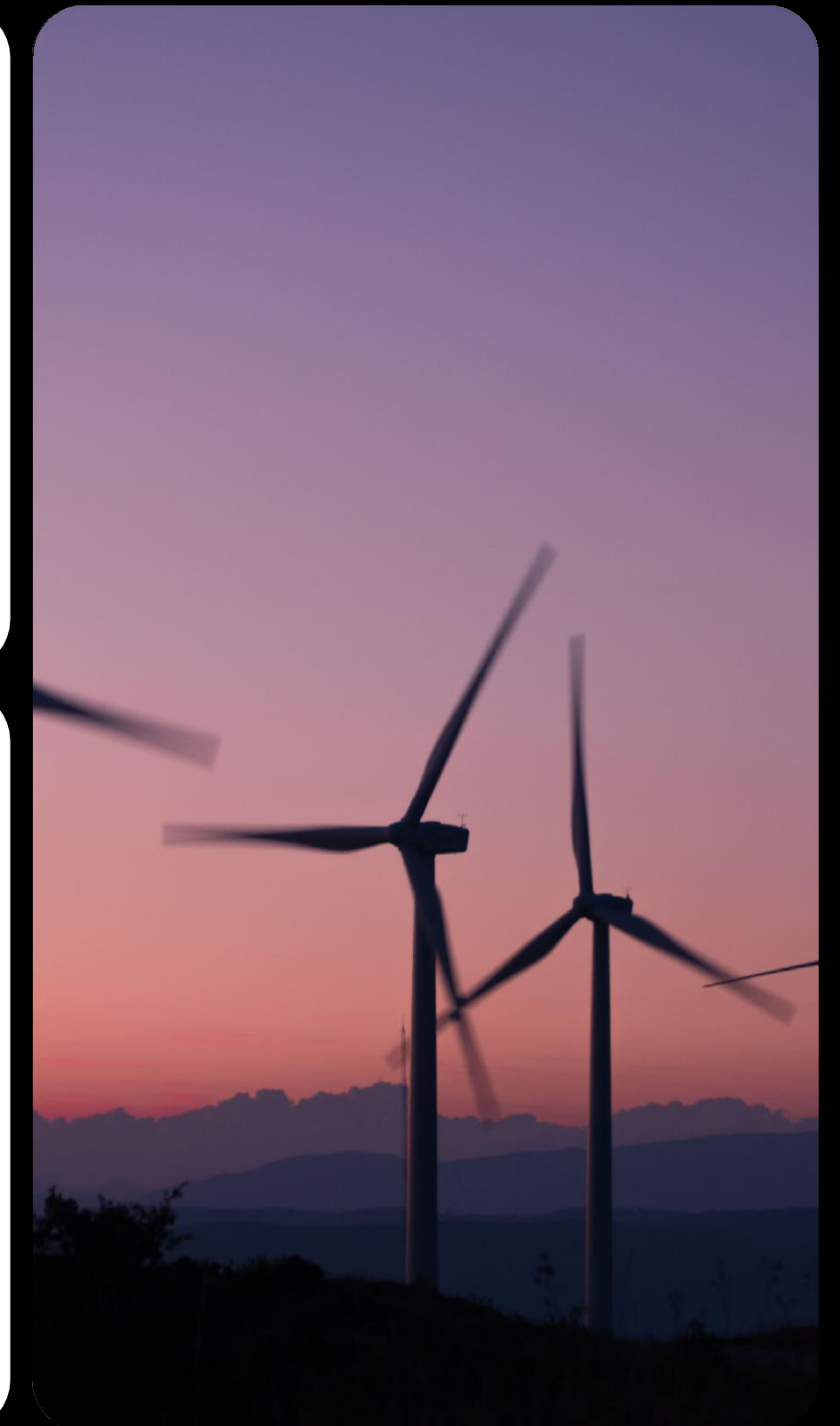


## Chemical and Catalysts

Catalysts, 'Smart Glass', sulphuric acid production, ceramics, dyes, cathodes for lithium batteries.

## Renewable Energy Storage

Vanadium Redox Flow Batteries (VRFB) are the preferred solution for large scale energy storage globally. Produces 78% less CO<sub>2</sub> than Li-B - Cradle-to-gate, with recycling and renewables.





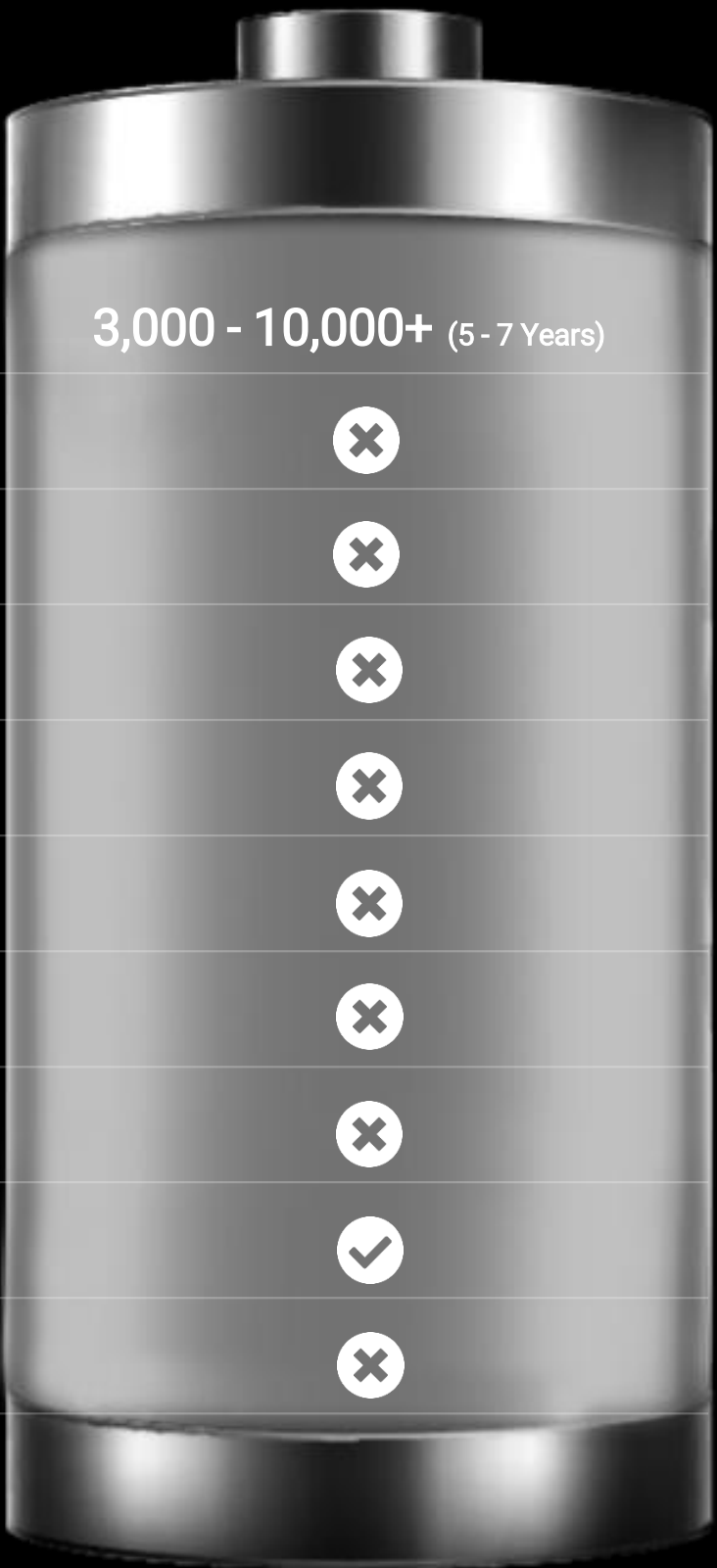
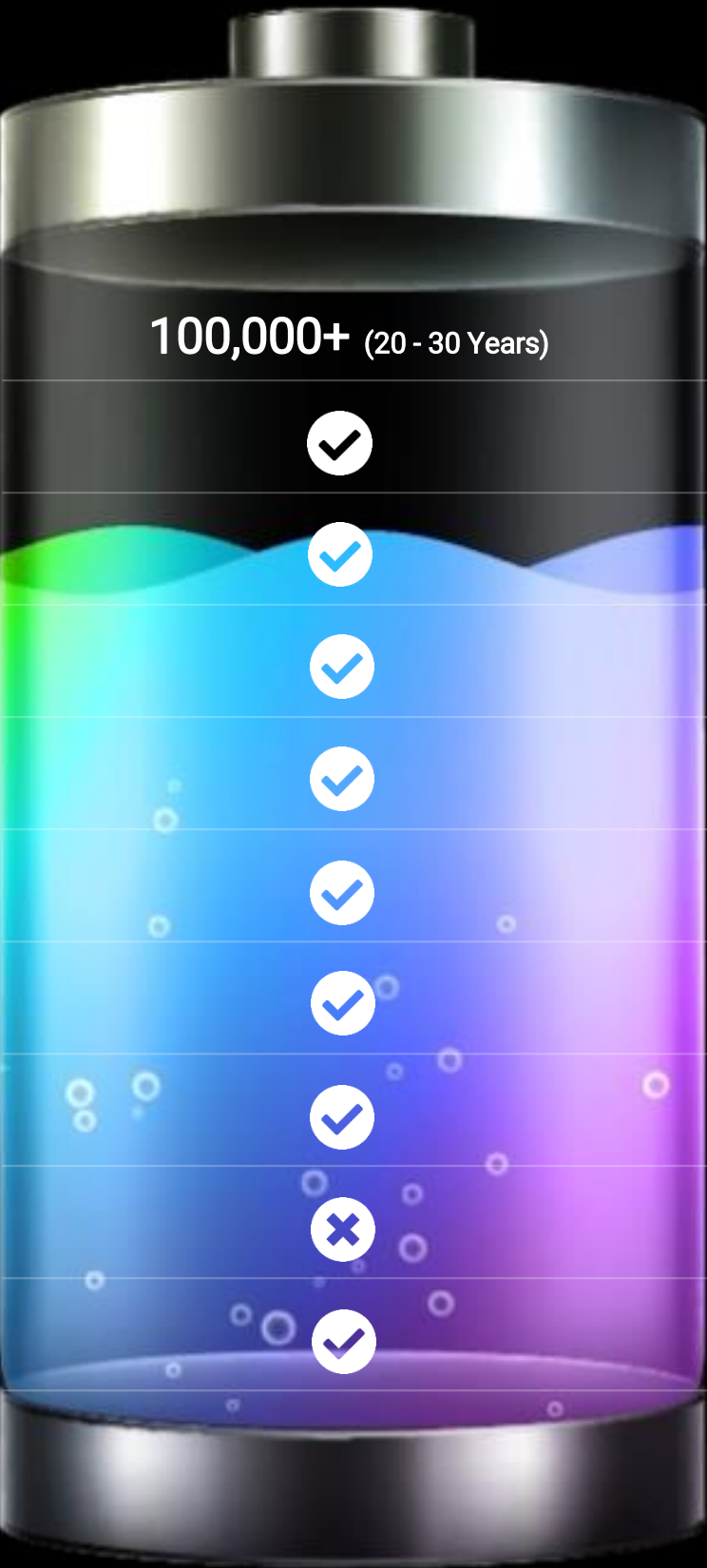
# Renewable Storage

Building a Renewable Future with Vanadium Redox Flow Batteries (VRFB)



## Vanadium

## Lithium



Number of Cycles

3,000 - 10,000+ (5 - 7 Years)

Low Self Discharge (Stays Charged)

Low Environmental Footprint

Highly Expandable

Generates Low Level of Heat

Charges and Discharges Simultaneously

Can Release Energy Instantaneously

Suitable for Connection to Power Grid

Small Footprint

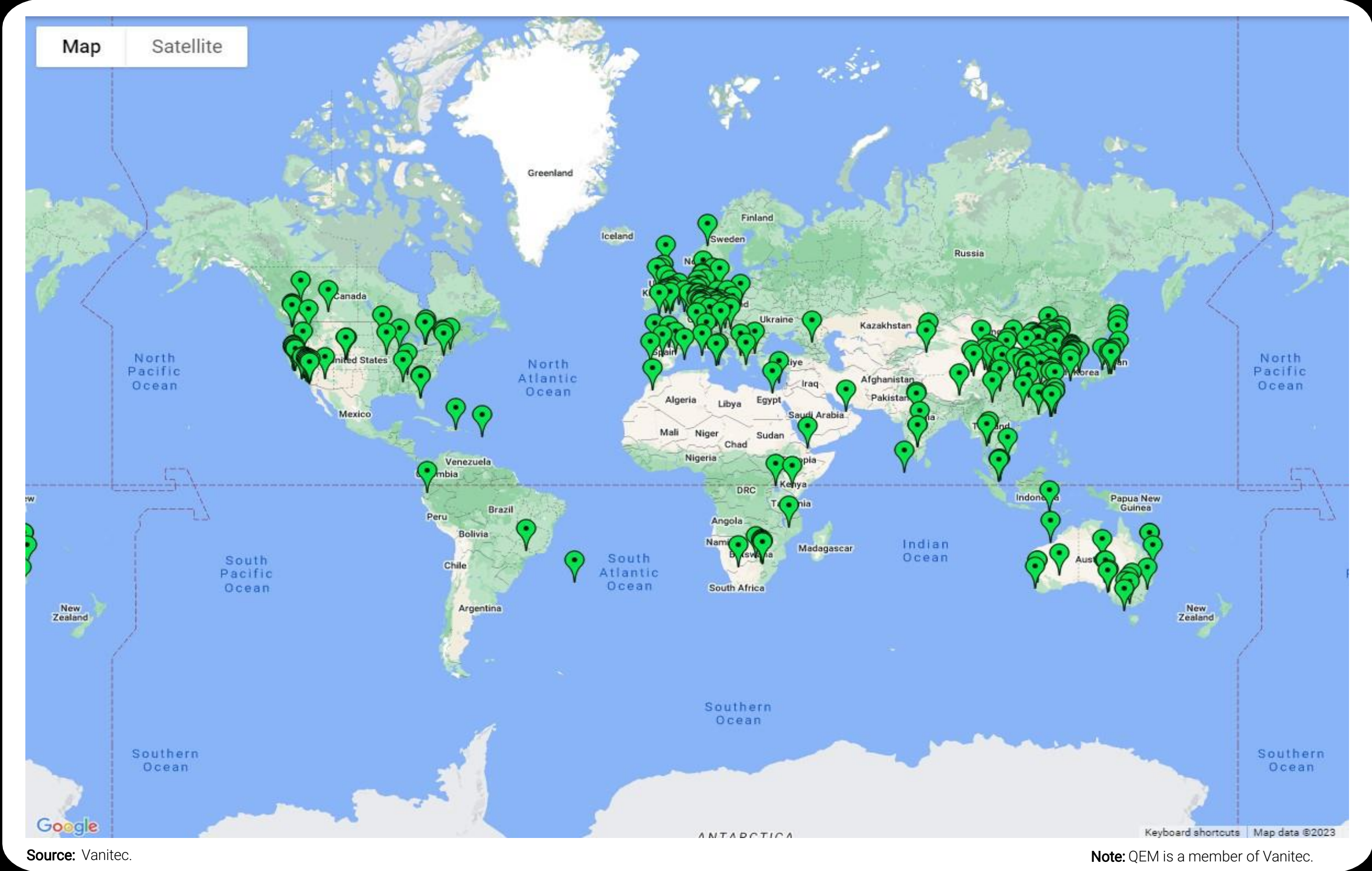
Can be Completely Recycled

Source: energyandcapital.com



# VFRB Global Installations 2023

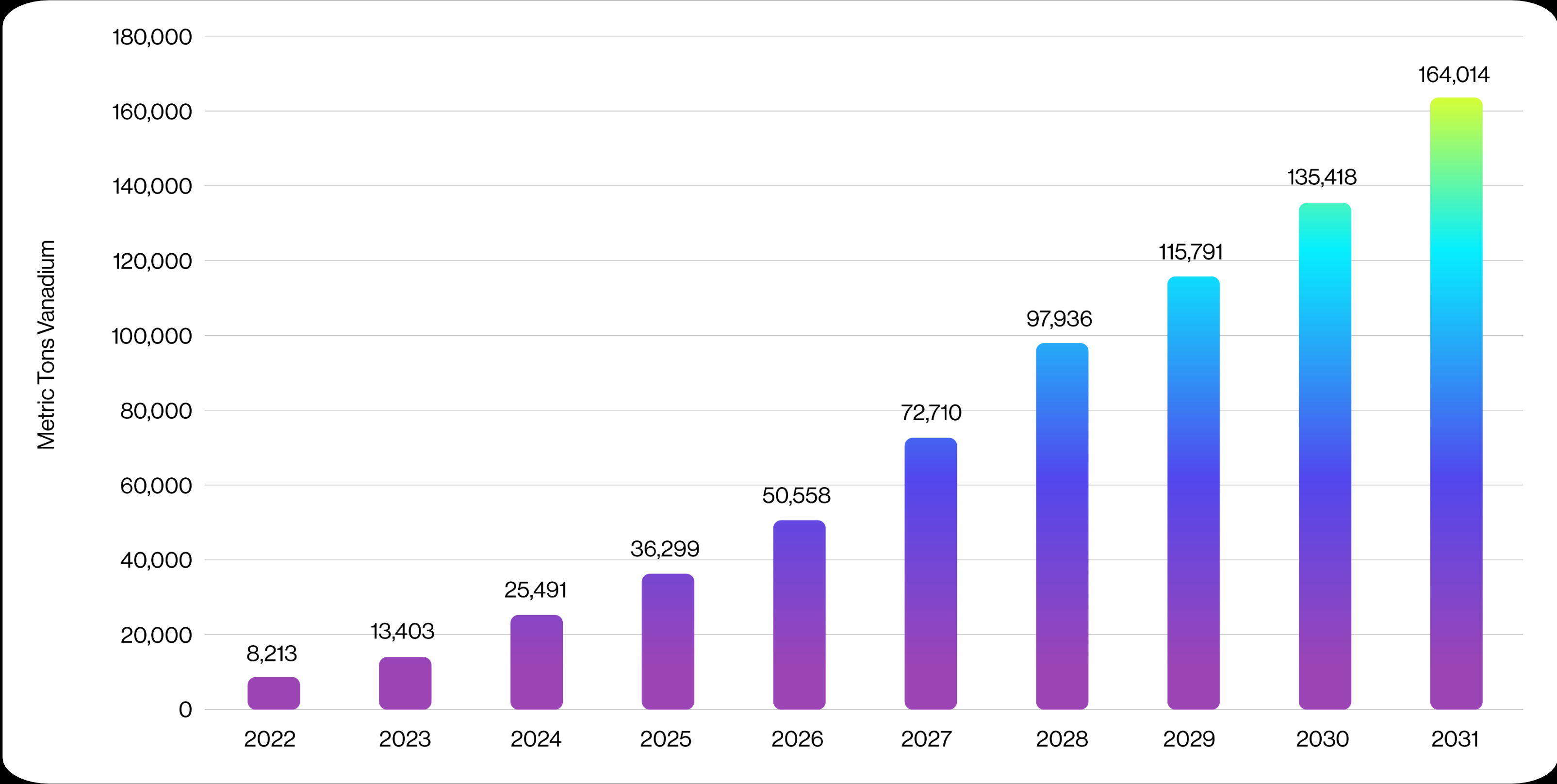
Over 200 large scale VRFB projects worldwide





# VFRB Market Forecasts

Vanadium for VRFB forecast to grow at an average compound rate of 41% YOY to 2031



Source: Guidehouse Insights: White Paper Identifying Market Opportunities and Enablers Q2 2022, for Vanitec.

Note: QEM is a member of Vanitec.



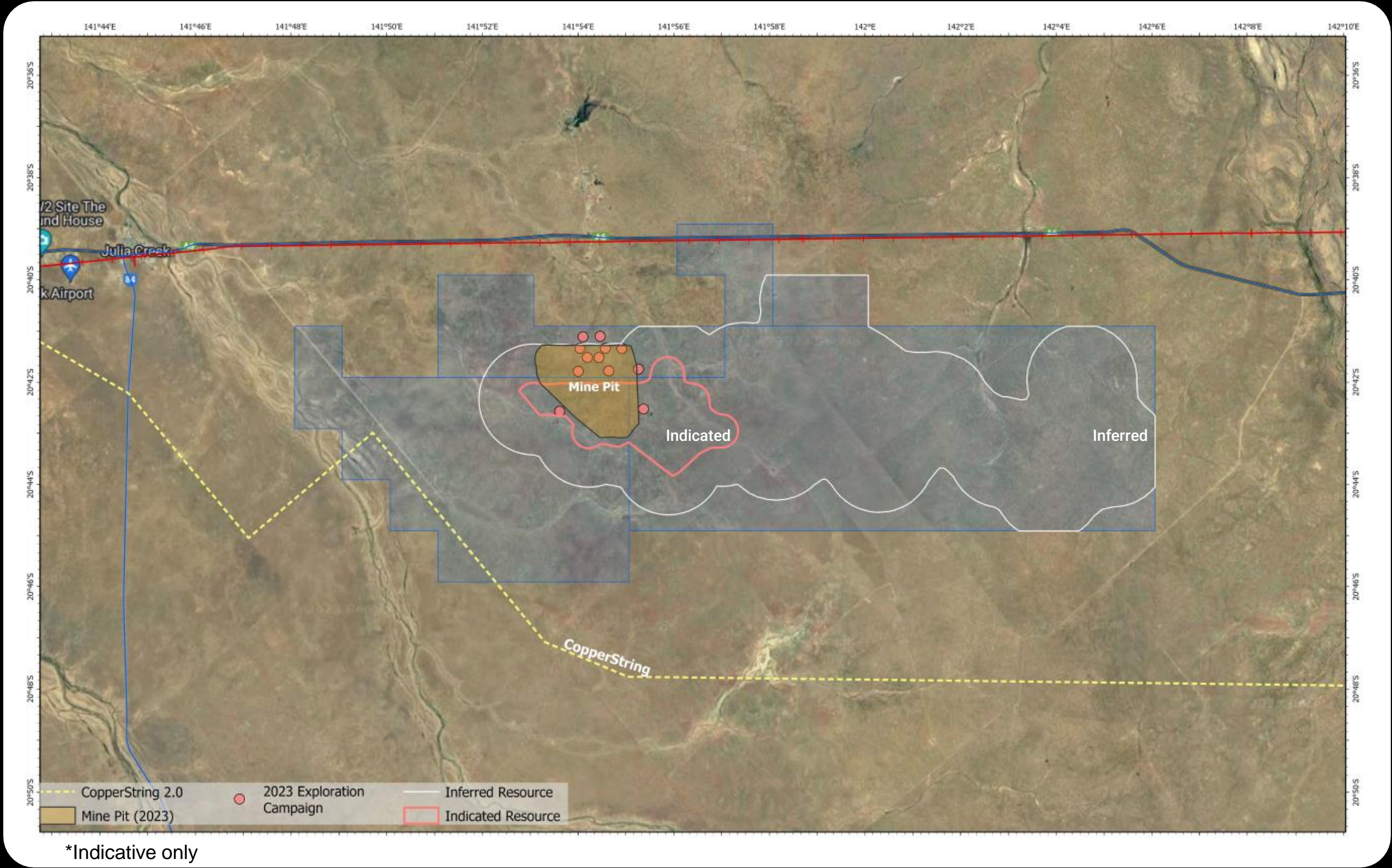
Located in a Tier 1 mining jurisdiction,  
QEM aims to develop Australia's  
**Critical Minerals** Resources in  
Queensland's North West Minerals Province.





# Julia Creek Project

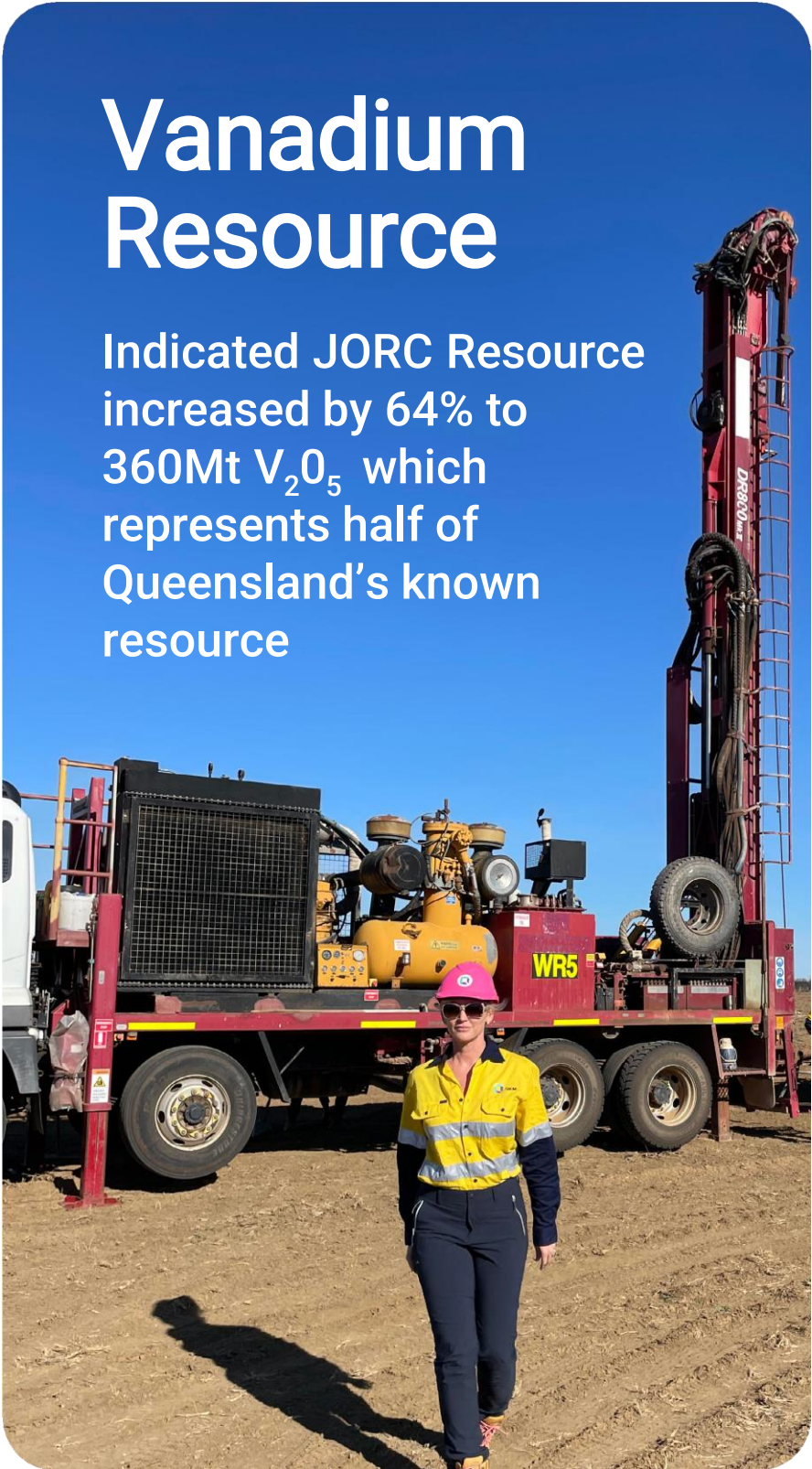
4 Exploration Tenements Covering 249.6km<sup>2</sup> in the Julia Creek Area, North-Western Queensland  
12 holes (620m) completed. Update to JORC Report pending.





# Large JORC Resources

One of the world's largest single vanadium resources.



## Vanadium Resource

Indicated JORC Resource increased by 64% to 360Mt  $V_2O_5$  which represents half of Queensland's known resource



2,490Mt

Inferred @ Ave  $V_2O_5$  ore content of 0.31%

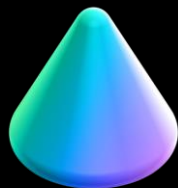


360Mt

Indicated @ Ave  $V_2O_5$  ore content of 0.29%

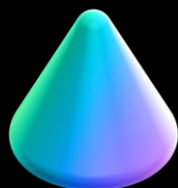


## Oil Resource



626MMbbl's

3C 626 MMbbl's (SPE-PRMS) (recoverable @ 90%)



71 MMbbl's

2C 71MMbbl's (SPE-PRMS) (recoverable @ 90%)

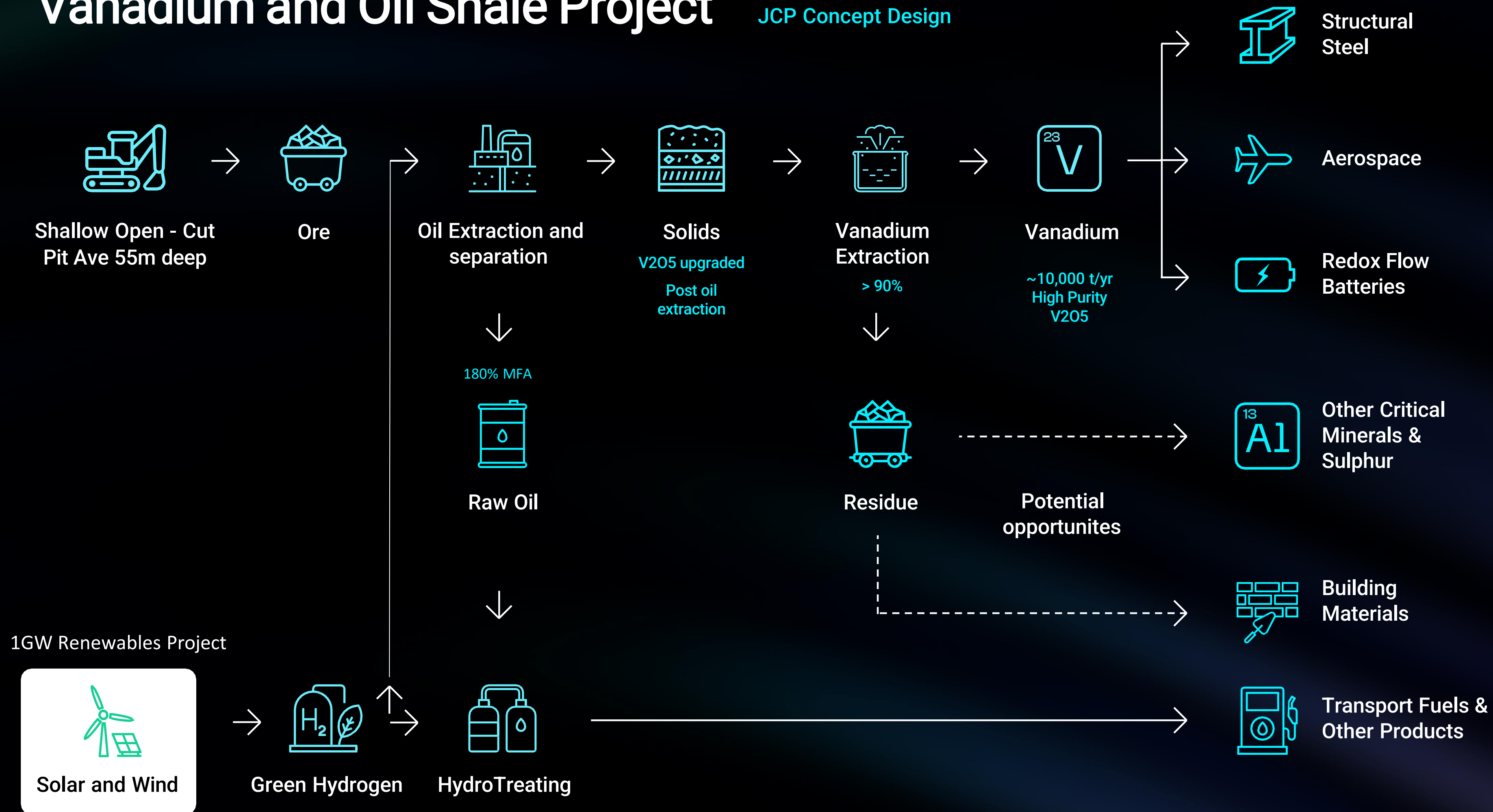


**QEM** can efficiently reap the rewards of multiple commodities while only having to mine once. This offers potential to enhance margins and **drive long-term shareholder value.**



# Vanadium and Oil Shale Project

JCP Concept Design







## Pilot Plant Progress

Bench scale pilot plant - Testing program and optimisation program underway

- Pilot plant test program delivering exciting results
- >98%  $V_2O_5$  extraction achieved using acid leaching\*
- >92%  $V_2O_5$  extraction achieved using alkali leaching\*

\* QEM ASX Announcement February 28th 2023

- Oil yields (equivalent) ~180% of Modified Fischer Assay (MFA)\*\*
- Petrology studies now underway to understand potential product suite
- Pilot is a proof of concept that enables QEM to maximise vanadium and oil recovery, using this proprietary extraction process

\*\* QEM ASX Announcement December 6th 2022



# Fuel Security

## Running on Empty

- Fuel imports at 93%, adding \$30B to Australia's trade deficit
- Australia now highly exposed to supply shock
- Australia's obligation as a member of the International Energy Agency (IEA) – Minimum 90 days supply
- Currently, 21 days of diesel supply as of July 2023. (energy.gov.au)
- COVID-19 has further exposed Australia's lack of resilience in this area



We consider this an opportunity!



The QEM Board draws upon decades of experience in the resources sector ensuring that the Company is best placed to capitalise on the vast opportunities afforded by the **Julia Creek Project**.



# Experienced Team

Led by a team of successful and invested professionals, with proven record of project development



**Tim Wall**

Chair

- Senior Executive of multiple ASX 100 companies
- Director and Principle of TJW Energy, Senior Advisor ANZ – Oil and Gas at DSS+
- Former MD BP Refinery (Bulwer)
- Former President Global Manufacturing at Incitec Pivot Ltd (ASX:IPL)



**Daniel Harris**

Non - Executive Director

- Over 40 years of global vanadium experience
- Director of US Vanadium LLC (USA), Australian Vanadium Ltd (ASX: AVL)
- Former CEO positions with Atlantic (ASX: ATI) Atlas Iron (ASX: AGO) ex VP EVRAZ plc. - Vanadium Assets



**Gavin Loyden**

Founder and Managing Director

- QEM Founder
- Identified & acquired QEM's Julia Creek resource
- Over 10 years experience in mining industry
- Responsible for QEM's project development



**Tony Pearson**

Non - Executive Director

- Chair of Possability Group Ltd & ASX-listed Cellnet Group Ltd; Non-Executive Director of ASX listed Xanadu Mines & not-for-profit Communicare
- Global investment and finance experience - former MD of HSBC
- Strong ESG & critical minerals credentials



**David Fitch**

Non - Executive Director

- President & CEO Class1 Nickel (Canada) (CSE:NICO)
- Director of BioCentral Laboratories Ltd
- QEM's largest shareholder
- Former Chief Operating Officer of the Fitch Group



# Corporate Snapshot

QEM Limited

Shares on Issue

151.4m

Share Price 01/09/23

\$0.21

Cash at 01/09/23

\$2.0m

Options on issue

250k Exp 01/05/25 @ \$0.20

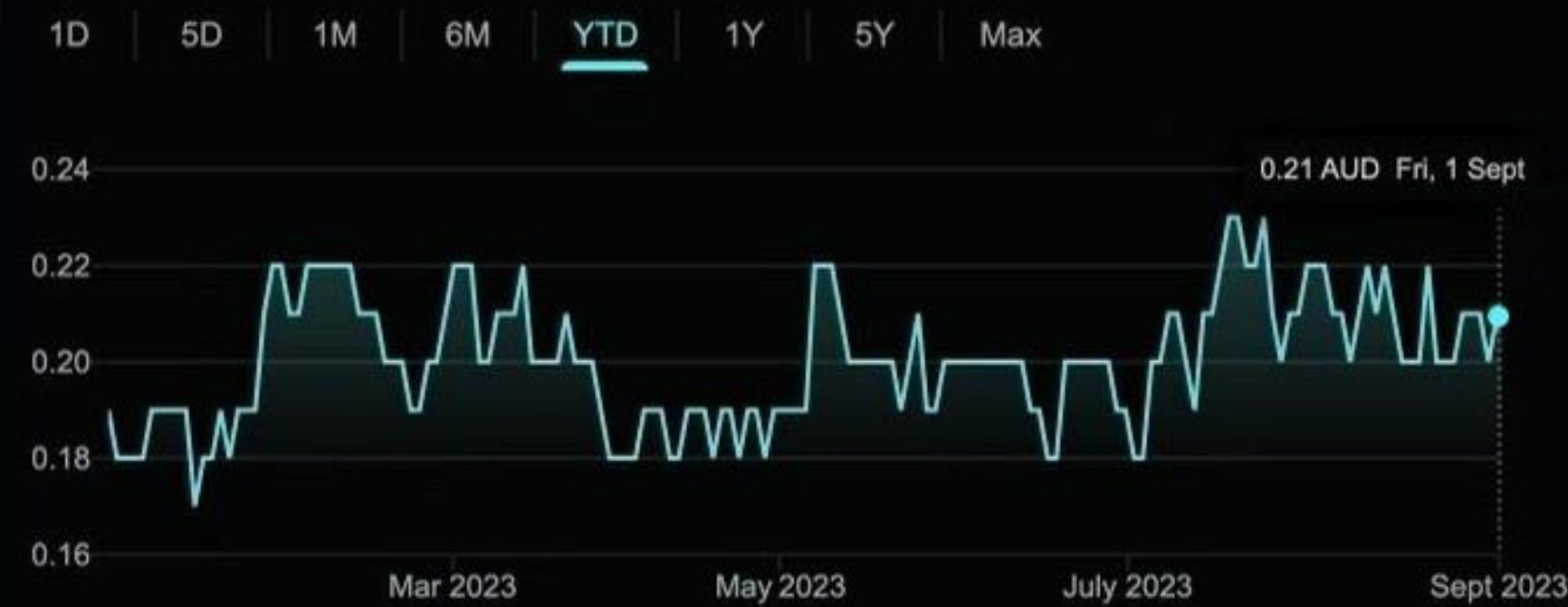
5.6m Exp 12/08/25 @ \$0.345

5,850,000

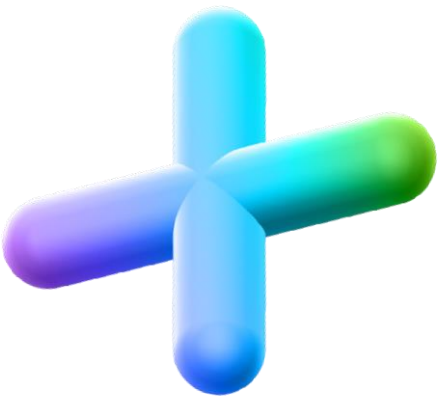
0.21 AUD

+0.01 (5.26%) ↑ year to date

01 Sept, 10:25 am AEST • Disclaimer



Open	0.21	Mkt cap	30.28M	52-wk high	0.24
High	0.21	P/E ratio	-	52-wk low	0.16
Low	0.21	Div yield	-		



\$31.79m

Market Cap (01/09/23)



## Director Support

Management alignment with public shareholders

71.5%

Top 20 Shareholders

28.5%



# De-risking the Project

Access to affordable, reliable and renewable energy is a key development pillar for QEM.

With the **\$5B CopperString network** proposed to run through the western portion of QEM's Julia Creek Vanadium and Oil shale project, clean renewable energy will power the project operations.





# Renewable Power Update

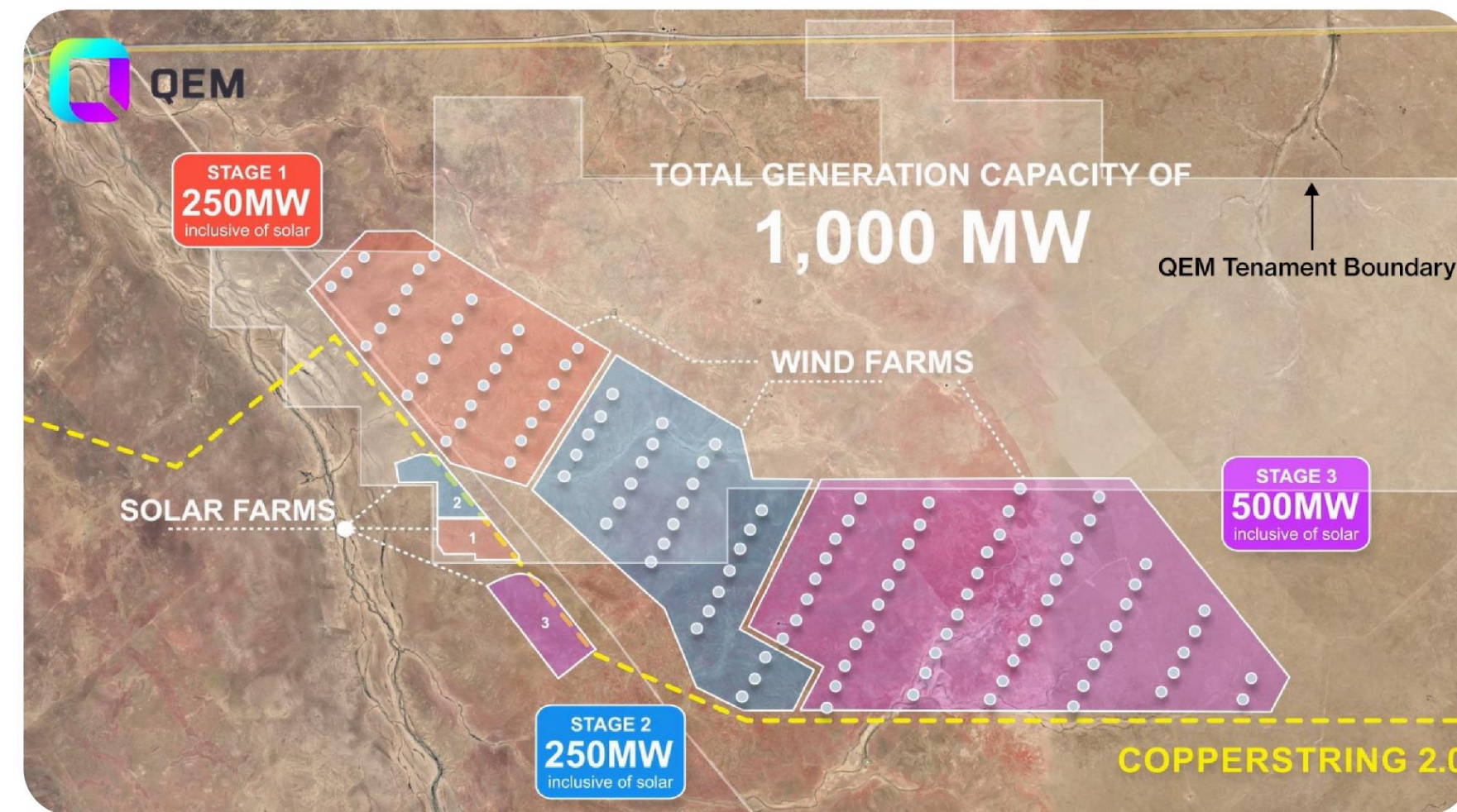
*"Situated in the best co-located wind and solar resources in Eastern Australia" - AEMO*

- Meteorological mast, SoDAR and solar monitoring instruments are transmitting data in real time. Over 14 months of data collected since installation
- Modelling for 250 MW, 500MW and 1GW, hybrid solar/wind
- Julia Creek Project (JCP) proposed off-taker for renewable power
- 3 global developers now short-listed to develop 1GW project
- The JCP will utilise this renewable power to generate Green hydrogen for processing and power the mining operations.
- The JCRP will have access to the NEM via the CopperString network. Delivery of CopperString expected at Julia Creek 2028, aligning with QEM development timeframes



The Queensland government will deliver CopperString to provide affordable, renewable energy to open up the North West Minerals Province. The 1,100 kilometre \$5 billion expanded CopperString project will be 100 per cent government owned.

Source: Premier's Speech, Townsville 7 March 2023



On site: McKinlay Shire CEO Trevor Williams, Qld Resources Minister Hon. Scott Stewart, QEM MD Gavin Loyden, Deputy Mayor Janene Fegan, QEM Project Coord. Lian D'Netto



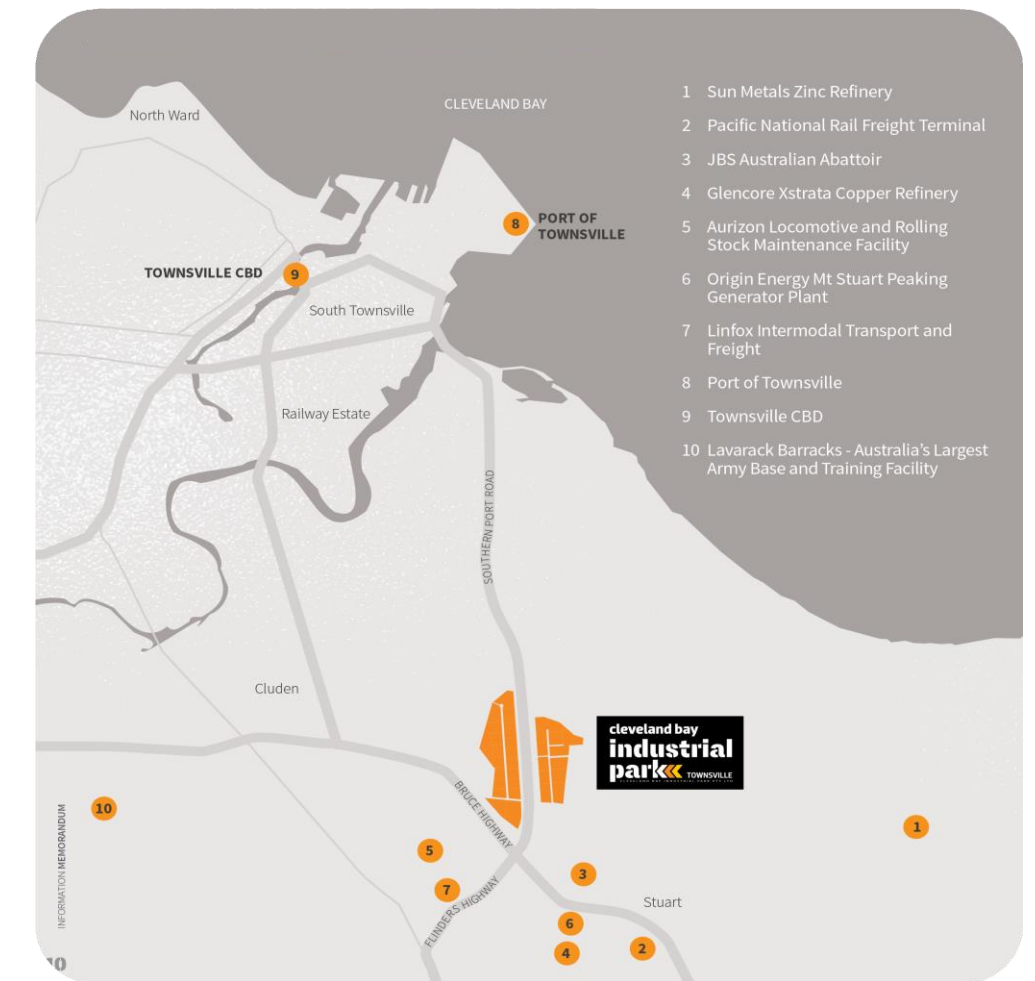
# Queensland Government - Industry Support

## Townsville QR-CUF Progress

- On January 24<sup>th</sup> 2023, the Qld Premier announced funding to increase from \$10M to **\$75M** for the construction of the **Queensland Resources Common User Facility (QR-CUF)**.
- QEM has been involved in the design inputs for the project since its inception and will utilise the facility to demonstrate its vanadium extraction flowsheet at demonstration scale.
- Queensland Government will provide introductions to off-take partners and assistance in accessing finance.
- The QR-CUF has been granted a Prescribed Project Status, with project completion due in early 2025.

**June 2023:** Qld Premier announced the Queensland Critical Minerals Strategy and a \$245 million investment into the sector, including:

- Reducing rent for new and existing exploration permits for minerals to **\$0** for the next five years
- Establishing critical mineral zones, initially at Julia Creek/Richmond and around Mount Isa, to support critical minerals projects
- **\$75M**. Establishing Critical Minerals Queensland, a one-stop office to oversee the development of the sector
- Investment to target mining waste and tailings for critical minerals, and scientific research including circular economy initiatives
- Delivering the **\$100M** Critical Minerals and Battery Technology Fund to support new projects

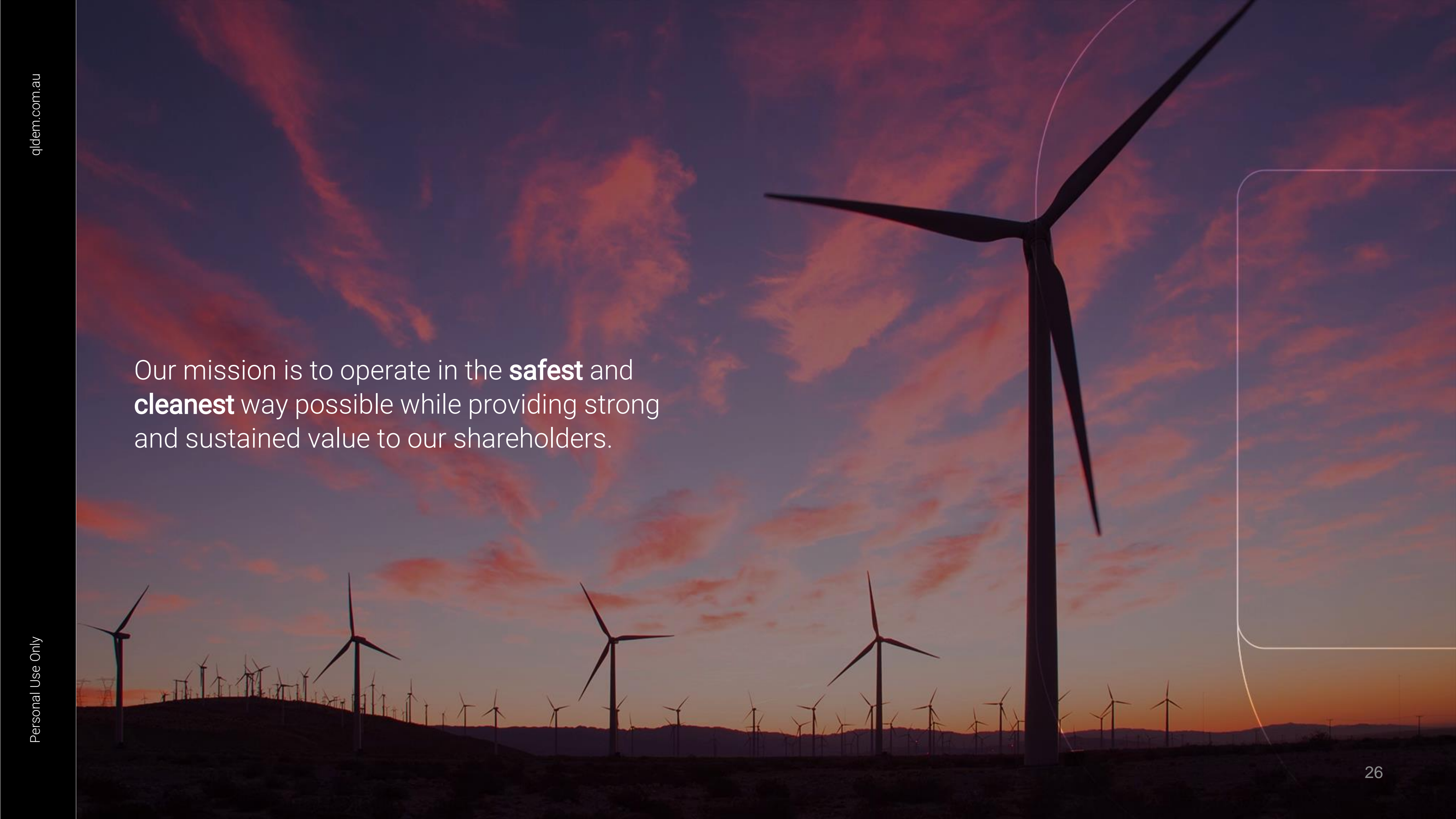


Ref: Cleveland Bay Industrial Park Information Memo, Sep 2022



Ref: World Mining Congress, June 2023. (L to R: QEM Chair Tim Wall, Communications Director Joanne Bergamin, Qld Premier Annastacia Palaszczuk, Minister for Resources Scott Stewart)



A large-scale photograph of a wind farm at sunset. The sky is a mix of deep blue and vibrant orange-red, with wispy clouds catching the low light. In the foreground, a large wind turbine is partially visible on the right side. The middle ground and background are filled with a dense field of smaller wind turbines stretching across a dark, silhouetted landscape. The overall mood is serene and emphasizes clean energy.

Our mission is to operate in the **safest** and **cleanest** way possible while providing strong and sustained value to our shareholders.



# QEM's ESG UPDATE Q3 2023

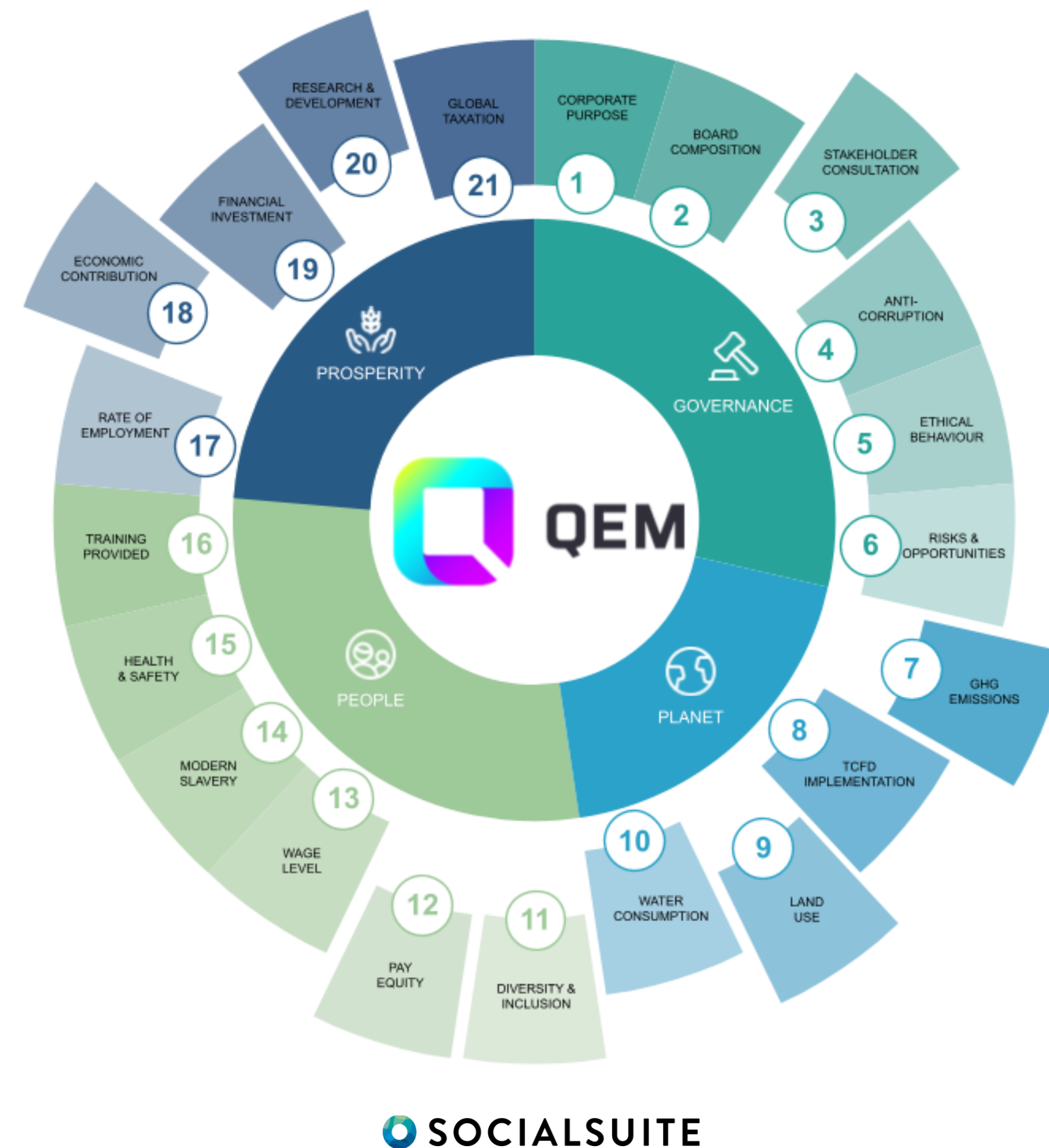
## Highlights and achievements Q1-2:

- QEM secured Circular Economy opportunities with Sun Metals and Incitec Pivot to upcycle Queensland industrial waste to battery grade vanadium pentoxide (V2O5).
- QEM's investment in our community - 9 work packages awarded locally in Julia Creek & NWMP; opened local office; sponsored Dirt N Dust, Saxby Roundup, Julia Creek Saints etc.

## Focus areas for Q3-4:

- Finalise and disclose QEM's 2<sup>nd</sup> annual Greenhouse Gas (GHG) emissions inventory assessment at a 3<sup>rd</sup> party verified level (Carbonhalo)
- Conduct Stakeholder Materiality Assessment
- Review ESG-inclusive Board Skills Matrix
- New ESG website dashboard

## QEM's ESG Focus Areas\*



\*QEM has adopted the WEF Stakeholder Capitalism Metrics ESG Framework

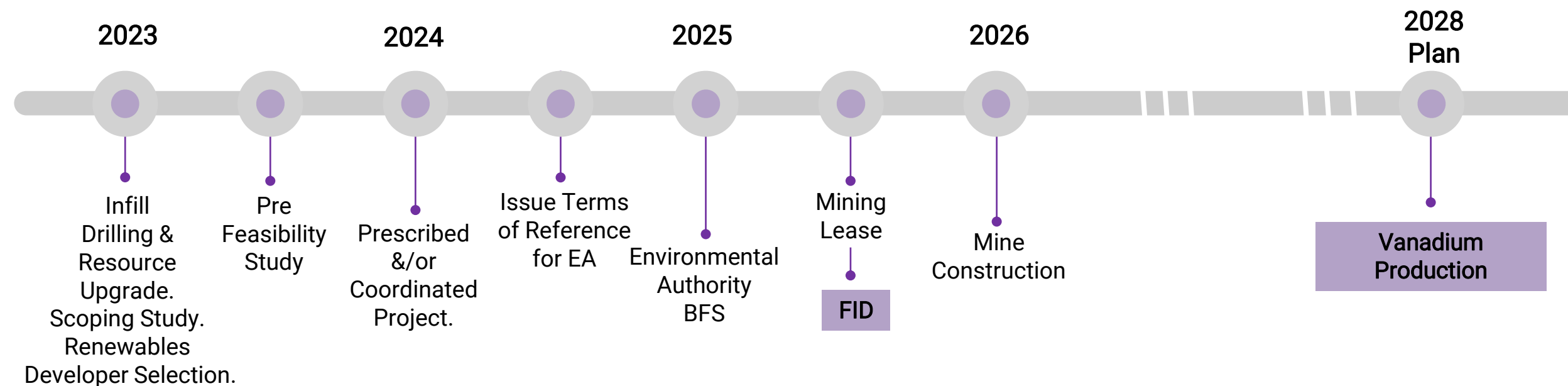


# Right Project at Right Time

- Multi Commodity Exposure in high growth markets
- Globally significant Critical Minerals opportunity
- Fuel Security
- Helping to meet Australia's energy transition targets
- Unique proprietary extraction technology
- Low market capitalization
- Strong government support
- Tier 1 Mining Jurisdiction



## Project Development







## QEM joins up with UQ as a new vanadium company hits ASX

BUSINESS

The University of Queensland has signed on with fledgling vanadium company QEM to improve the value and yields from the Julia Creek deposit and search for rare earths.

## ASX Resources Quarterlies: This oil play is raking in the dollars

January 31, 2023 | Bevis Yeo **STOCKHEAD**

## Queensland just made a \$75m move to become a critical minerals centre of excellence

January 26, 2023 | Christian Edwards **STOCKHEAD**

## QEM's critical minerals project is clearing and it looks really bright

March 8, 2023 | Special Report **STOCKHEAD**

## Queensland transmission line upgrade to enable battery and renewables manufacturing ambitions

By Jonathan Tourino Jacobo, Andy Colthorpe  
March 7, 2023

## QEM achieves highest vanadium extraction results to date from Julia Creek Project in Queensland

By Adam Drought 1 March 2023 | mining.com.au

## Outstanding extraction tests put vanadium spotlight on QEM's Julia Creek Shale

February 28, 2023 | Special Report **STOCKHEAD**

## QEM's critical minerals project is clearing and it looks really bright

BUSINESS



Queensland's premier Annastacia Palaszczuk with the QEM team.

## QEM, University of Queensland Partner for Minerals Study at Queensland Project; Shares Rise 3%

12/14/2022 | 03:29am GMT

MarketScreener







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# Appendix A:

## Julia Creek Resource



# Julia Creek Resource Overview

## Vanadium & Other Metals



Resource Class	Strat Unit	Mass (Mt)	Average Thickness (m)	Insitu Density (gm/cc)	V <sub>2</sub> O <sub>5</sub> (Wt%)	Cu (ppm)	Mo (ppm)	Ni (ppm)	Zi (ppm)	Al (ppm)
Indicated	CQLA	127	3.16	2.41	0.24	161	132	121	763	4525
	CQLB	104	2.74	2.32	0.30	201	180	151	912	5756
	OSU	64	1.97	1.99	0.32	217	162	194	1012	49360
	OSL	64	2.05	1.95	0.32	206	143	182	1006	52759
Inferred	CQLA	698	2.52	2.42	0.23	156	136	120	810	2706
	CQLB	879	3.32	2.24	0.38	225	226	205	1197	5322
	OSU	458	1.92	2.02	0.31	229	150	189	1121	60505
	OSL	457	1.94	1.97	0.29	215	130	169	1051	59696
Total		2,850		2.21	0.31	203	167	169	1029	24304

Table 1: Summary of JORC Mineral Resource Estimate 31 March 2022

**Note:**

- 1. The estimate uses a minimum cut-off of 0.2% V2O5 for the oil shale units, and minimum cut-off of 0.15% V2O5 for the Coquina units.
- 2. The total resource tonnage reported is rounded to reflect the relative uncertainty in the estimate categories and component horizons may not sum correctly.



# Julia Creek Resource Overview



## Oil Content

Resource Class	Strat Unit	Mass (Mt)	Average Thickness (m)	Total Moisture (Wt%)	Oil Yield (L/tonne)	Oil Yield LTOM	MMBbls (in-situ PIIP)	MMBbls Recoverable
3C Contingent	CQLB	983	2.8	5.6	49.2	51.2	274	247
	OSU	522	1.8	5.6	74.6	78.8	221	199
	OSL	521	1.9	5.6	68.3	71	202	181
Total / Ave		2026		5.6	64	67	696	626
2C Contingent	CQLB	104	2.6	2.6	43.7	44.5	27	24
	OSU	64	1.9	9.5	79.4	83	28	25
	OSL	64	1.9	12.2	74.2	76	25	23
Total / Ave		2,850		8.1	66	68	79	71

Table 2: Summary of SPE-PRMS Oil Resource estimate 31 March 2022

**Note:**

- 1. The total resource tonnage reported is rounded to reflect the relative uncertainty in the estimate and component horizons may not sum correctly.
- 2. The 3C petroleum resource reported includes the 2C volumes, ie. They are cumulative not incremental as per the PRMS 2018 guidelines
- 3. An economic cut-off of 40l/tonne was applied prior to the calculation; it must be noted that the CQU and CQLA did not meet the >40l/tonnne for inclusion in the calculation. The 2C and 3C volumes reported here are unrisked.