



**QEM**

ASX : QEM

# Advancing the **Julia Creek Vanadium & Energy Project**

**IMARC Sydney, 29-31 October 2024**

"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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# Disclaimer

Refer to QEM Limited ASX announcement 27 August 2024 for full details of the Julia Creek Project Scoping Study (including all relevant material assumptions). QEM confirms that it is not aware of any new information or data that materially affects the information included in the relevant announcement and that all material assumptions and technical parameters underpinning the forecast financial information and production target in the relevant announcement continue to apply and have not materially changed.

## Scoping Study Cautionary Statement

The Scoping Study referred to in this presentation was undertaken for the purpose of initial evaluation of the potential for development of a series of an open pit and processing facilities at the Julia Creek Project. It is a preliminary technical and economic study of the potential viability of the Julia Creek Project.

The Scoping Study is based on low level technical and economic assessments (+/- 40% accuracy) that are not sufficient to support the estimation of Ore Reserves or to provide assurance of an economic development case at this stage or to provide certainty that the conclusions of the Scoping Study will be realised. Further exploration and evaluation work and appropriate studies are required before QEM will be able to estimate any Ore Reserves or to provide any assurance of an economic development case.

The Scoping Study is based on the material assumptions outlined in the Scoping Study. These include assumptions about the availability of funding. While QEM considers all the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Scoping Study will be achieved. To achieve the range of outcomes indicated in the Scoping Study, funding of in the order of \$744 million excluding contingency costs and indirect costs such as owner's costs and EPCM (inclusive of these elements, the pre-production capital expenditure is \$1,095 million) will likely be required. Investors should note that there is no certainty that the Company will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of QEM's existing shares.

Given the scale of the pre-production capital expenditure required, it is likely that QEM will need to access multiple streams of funding opportunities and/or partnering opportunities in order to support the pre-production capital expenditure, which may include a combination of project debt, equity capital, offtake prepayment, farm-in, joint venture and other appropriate initiatives.

It is also possible that QEM could pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the project. If it does, this could materially reduce the Company's proportionate ownership of the project. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.

## 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, 7 April 2022 and February 2024. 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 & Energy Project**, a unique world class critical minerals and oil shale resource.



# Experienced Team

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



## Tim Wall

Chair

- Former Senior Executive of multiple ASX 100 companies. Over 35 years of global Oil Refining & Fuel Supply experience.
- Global experience in Hydrogen, Ammonia and Chemical processing, Former President Global Manufacturing at IPL (ASX:IPL)
- Director & Principal of TJW Energy, Senior Advisor Oil, Gas, Energy dss+



## Daniel Harris

Non - Executive Director

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



## Gavin Loyden

Founder and Managing Director

- QEM Founder
- Identified & acquired QEM's Julia Creek resource
- Over 12 years experience in mining industry
- Responsible for QEM's project development along with renewables project development and sale



## Tony Pearson

Non - Executive Director

- NED of ASX listed Xanadu Mines
- Chair of Possability Group Ltd & former Chair of ASX-listed Cellnet Group Ltd and Peak Rare Earths;
- Global investment and finance experience - former MD of HSBC
- Strong ESG & critical minerals credentials

# Corporate Snapshot

QEM Limited

Shares on Issue

190.8m

Share Price 25/10/24

\$0.056

Cash at 25/10/24

>\$3.0m

post raise

Options on issue

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

500k Exp 01/03/26 @ \$0.20

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

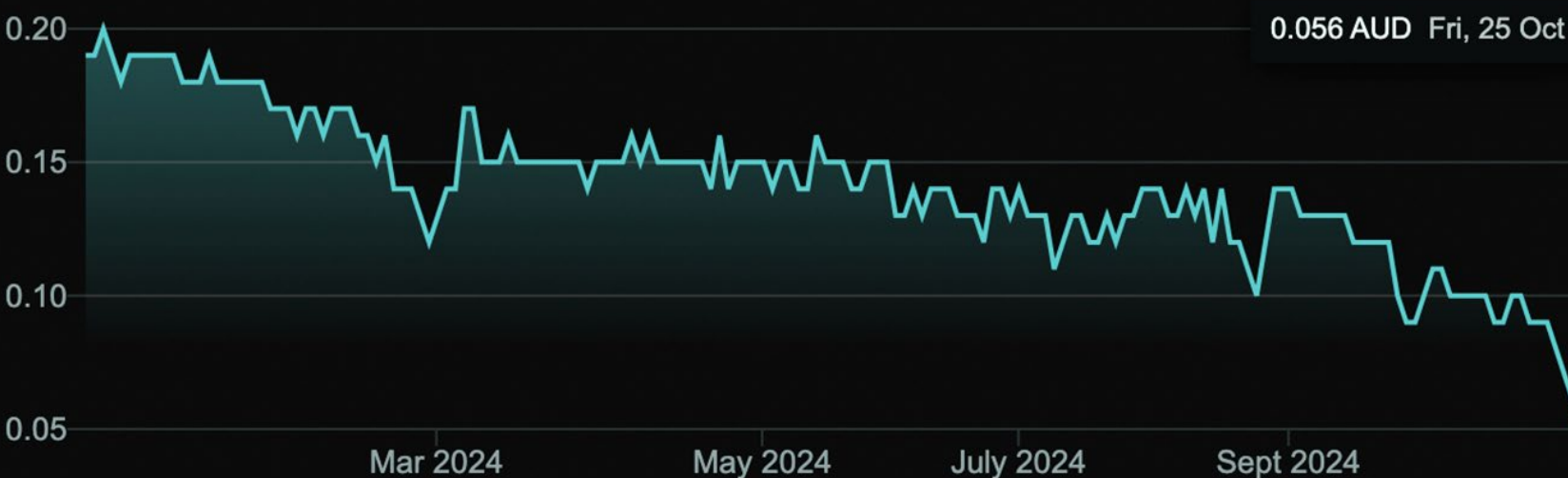
20.8m Exp 20/09/26 @ 0.14

0.056 AUD

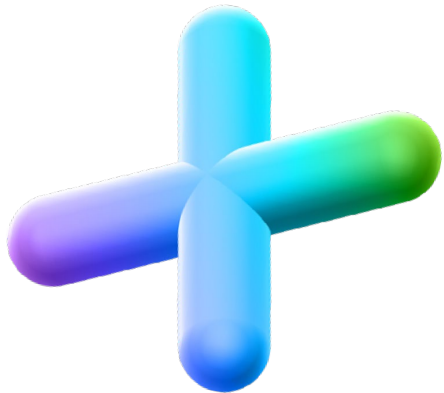
-0.13 (-70.53%) ↓ year to date

25 Oct, 4:10 pm AEDT • Disclaimer

1D 5D 1M 6M YTD 1Y 5Y Max



Open	0.068	Mkt cap	10.90M	52-wk high	0.20
High	0.068	P/E ratio	-	52-wk low	0.052
Low	0.052	Div yield	-		



\$10.7m

Market Cap (25/10/24)



## Director Support

Management alignment with public shareholders

66.6%

Top 20 Shareholders

33.4%



# Investment Highlights - 2024 JORC and SPE-PRMS Resources



One of the world's largest single vanadium resources with significant oil resource.

## Vanadium Resource

Indicated JORC Resource increased by 28% to 461Mt V<sub>2</sub>O<sub>5</sub>



2,870 Mt

Inferred @ Ave V<sub>2</sub>O<sub>5</sub> ore content of 0.31%



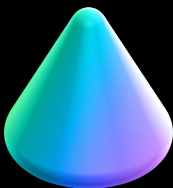
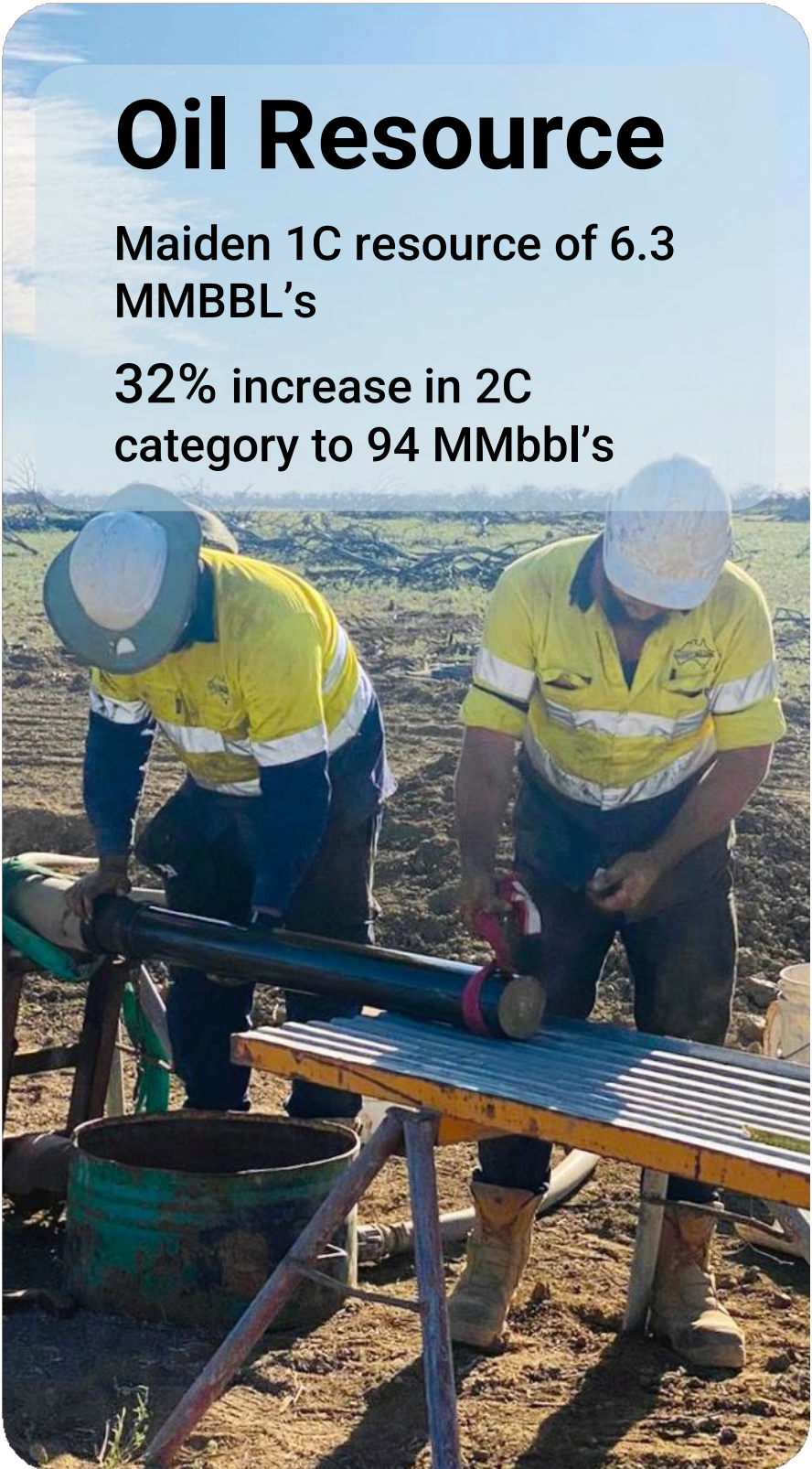
461 Mt

Indicated @ Ave V<sub>2</sub>O<sub>5</sub> ore content of 0.28%

## Oil Resource

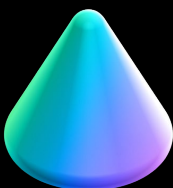
Maiden 1C resource of 6.3 MMBBL's

32% increase in 2C category to 94 MMBbl's



654 MMBbl's

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



94 MMBbl's

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

Refer to QEM ASX Announcement dated 4 March 2024. QEM confirms that it is not aware of any new information or data that materially affects the information included in the relevant announcement, and all material assumptions and technical parameters underpinning the mineral resource estimates in the relevant announcement continue to apply and have not materially changed.



# 2024 Scoping Study Highlights



Post - Tax  
NPV (8%):

AUD **1,106M**

IRR:

**16.3%**

Payback  
Period:

**5 Years**

Pre - production  
CAPEX  
(ex-contingency,  
owners' costs & EPCM)

AUD **791M**

Life of Mine:

**30 Years**

ROM:

**5.1Mt (dry)**

Annual  
Production:

**10,571 tonnes  $V_2O_5$**   
**313M litres of fuel**

OPEX:

**$V_2O_5$  : USD \$5.80/lb**  
**Fuel : AUD \$0.59L**

Refer to ASX announcement dated 27 August 2024 and the following slide for further information. QEM confirms that it is not aware of any new information or data that materially affects the information included in the relevant announcement and that all material assumptions and technical parameters underpinning the forecast financial information and production target in the relevant announcement continue to apply and have not materially changed.



# 2024 Scoping Study Highlights - Detail



## Key Outcomes of the Scoping Study:<sup>1</sup>

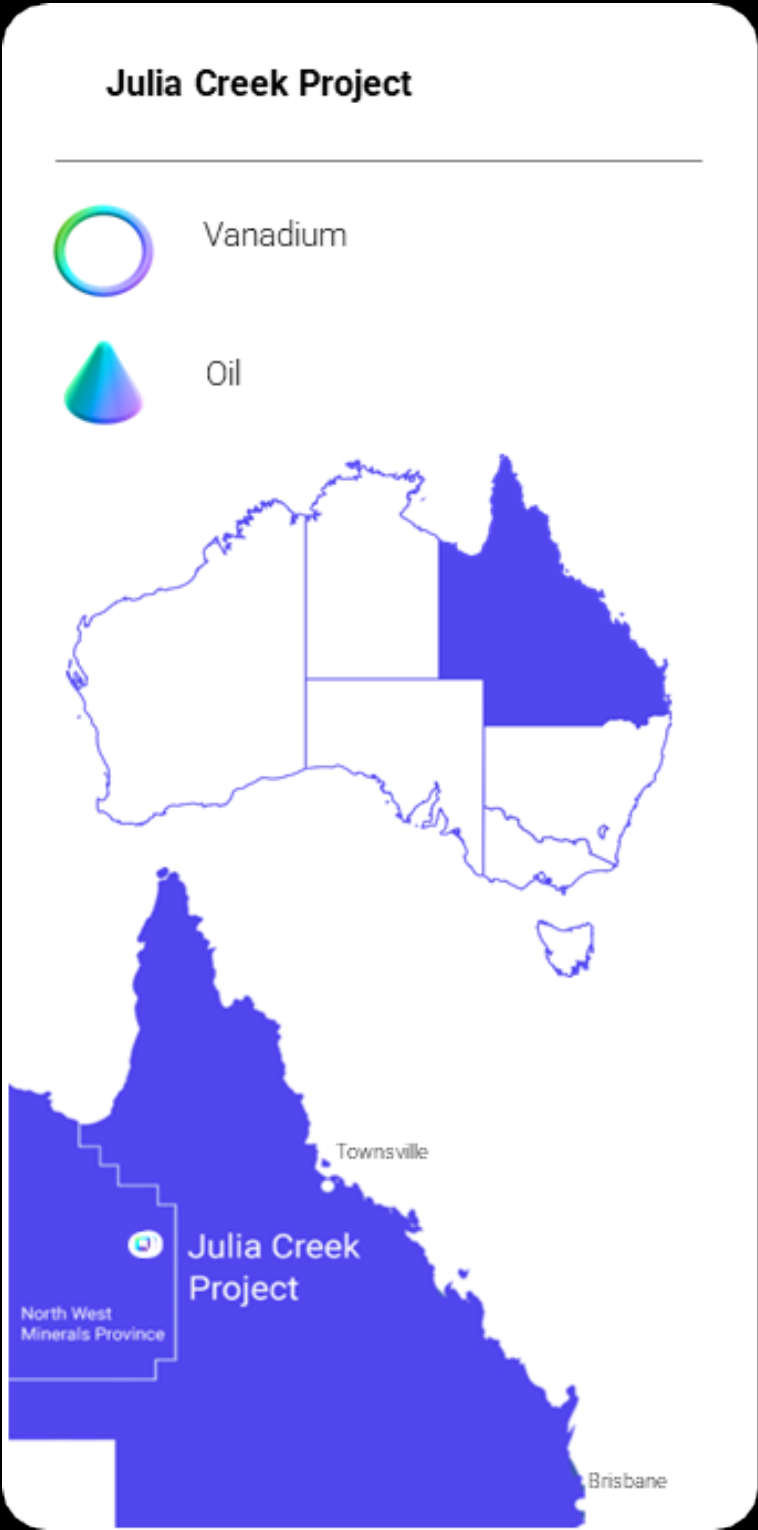
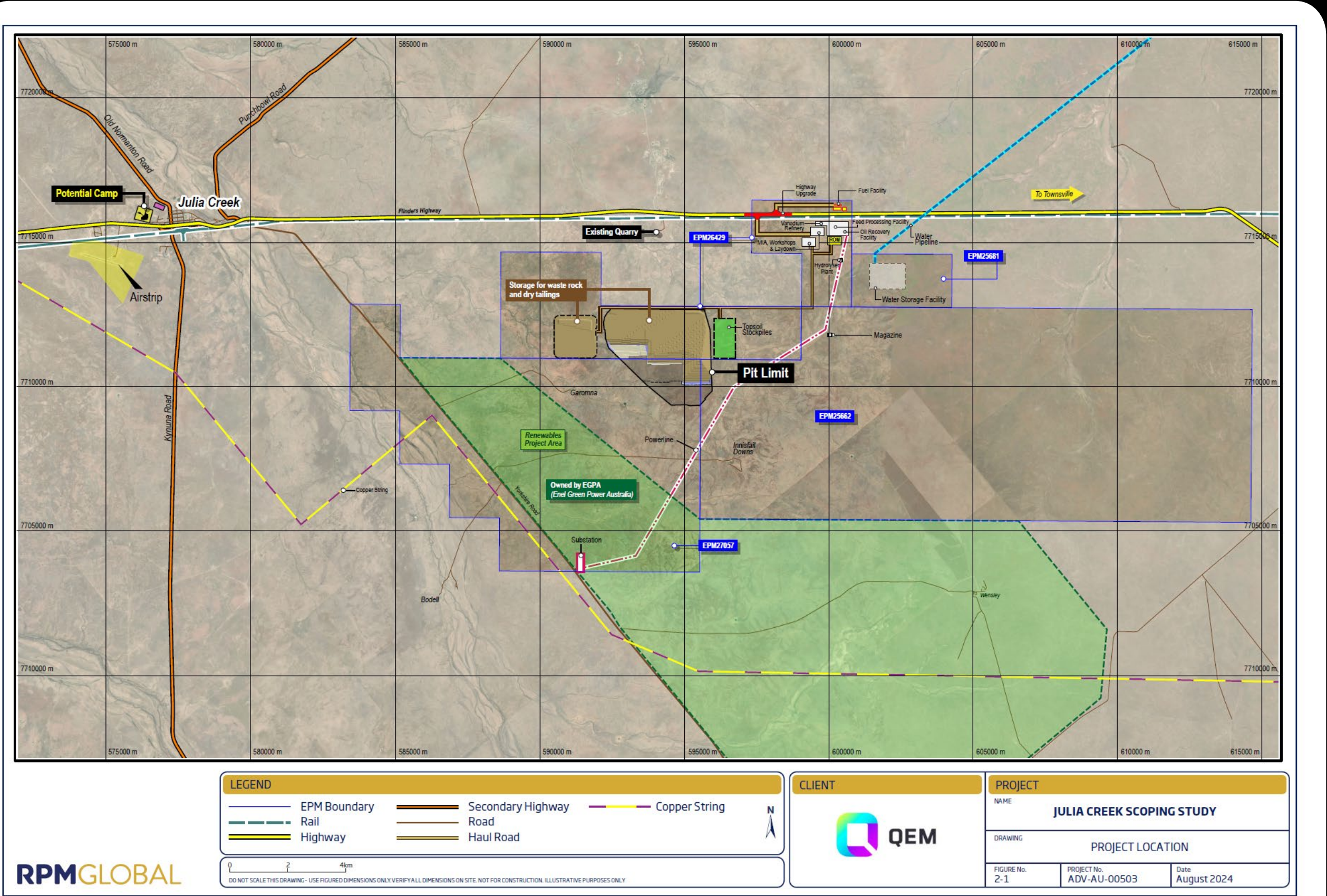
- Post-tax NPV of AUD 1,106 M (8% discount rate), DCF-IRR of 16.3%, and a payback period of 5 years from the start of mining <sup>1</sup>
- Pre-production capital expenditure is estimated at approximately AUD 791M.<sup>2</sup>
- Projected revenue over the life of mine from V2O5 sales is approximately 11.5Bn AUD and approximately 10.1Bn AUD from sale of transport fuel (Total revenue 21.7Bn)
- 30-year mine schedule with over 80% of the process plant feed is Indicated Resources
- Scheduled plant feed quantities of approximately 148.4M dmt (154.7 M wmt @ ~4% moisture) at an average of 0.27% V2O5 and 54.1 litres per tonne (L/t) (PRMS), and strip ratio of 5:1
- Pit limit sensitivity analysis indicated the majority of the lease has economic ore and, therefore, the Project has significant potential to increase production or the life of the operation
- Mine life of 30 years, assuming an ore production rate of 5.1 Mt (dry) (5.3 Mt wet) per year
- Over the LOM, an average production of 10,571 tpa (23.3Mlbs) V2O5 (99.5% grade) and 5,960 bbl/day (313 million litres per annum) of transport fuel
- Approximately 7% of the produced transport fuel is to be provided free-issue to the mining contractor to undertake the mining work. Therefore, the average transport fuel sold is 5,500 bbl/day (874,500 L/day) totalling 291 million litres per annum
- Ongoing replacement and sustaining capital of AUD 598 M (over 30-year mine life ~AUD 20 M per annum), resulting in a total capital expenditure of AUD 1,694 M (including contingency costs and indirect costs)
- Mine cash operating costs average AUD 83.36/dmt plant feed (including royalties, transport costs and contingency)
- Projected vanadium pentoxide (V2O5) selling price of approximately USD11.56/lb and transport fuel at AUD 1.20/L (AUD 191.18/bbl) excluding excise and GST <sup>3</sup>

- (1) A sensitivity analysis across a range of +/-15% undertaken on product selling price, capital and operating costs, and product output indicates that the NPV remains positive for each analysis. Refer to ASX announcement dated 27 August 2024 for further information.
- (2) Excluding contingency costs and indirect costs such as owner's costs and EPCM. Inclusive of contingency costs and indirect costs, pre-production capital expenditure is estimated at AUD 1,096M.
- (3) Based on a projected V2O5 selling price of approximately USD11.56/lb and exchange rate of AUD:USD 0.68. The projected selling price has been selected on the assumption that a premium is to be applied on the basis of the 99.5% grade of the V2O5 and with reference to the Vanitec Forecast and Vanadium Market Overview presented in July 2024 which projects the long-term average price of V2O5 to be USD12.26/lb. The transport fuel selling price of AUD 1.20/L (AUD 191.18/bbl) has been selected based on the 3-year average wholesale price at the gate price for diesel ex. Brisbane (excluding excise and GST).



# Julia Creek Vanadium & Energy Project

4 EPMs covering 250km<sup>2</sup> in Queensland's NWMP. Well-located on major infrastructure corridor, including Copperstring access.





# Australia's Vanadium Deposits

QEM- Globally significant vanadium project with half of Queensland's total resource



## Vanadium

### Critical Mineral

World Ranking

Resources  
2 (31%)

Production  
0 (0%)

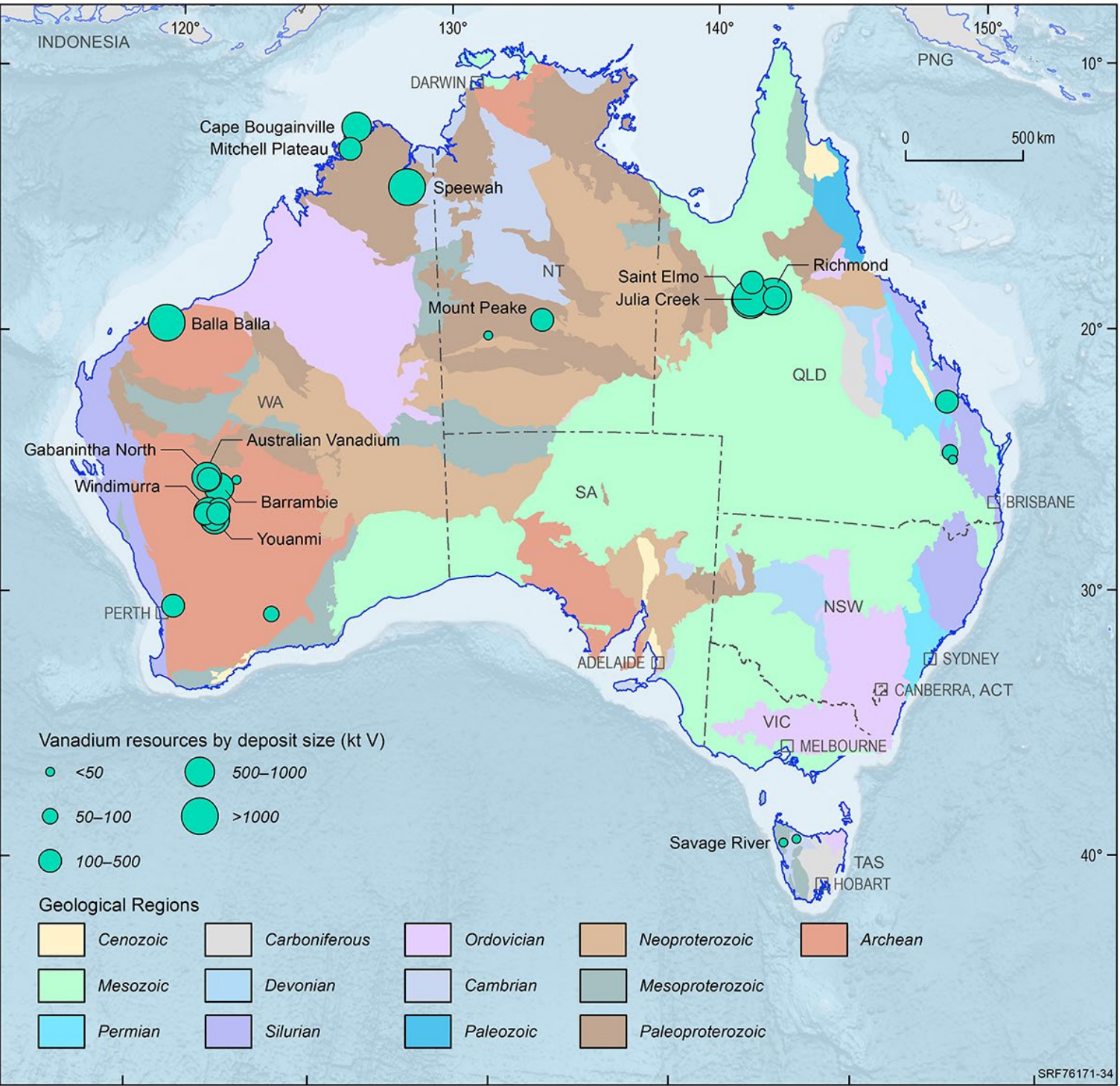
Operating Mines  
0

Production  
0 kt V (0%)

Export Income  
\$0 (0%)

EDR  
8,110 kt V (▲ 10%)

Ore Reserves  
2,948 kt V (▲ 75%)





# Vanadium Global Production

Market set for strong growth driven by LDES of 4-10 hours+ - VFB

Market expected to reach  
**\$2.36 Billion**  
in 2025 at CAGR of 10.2%

VFB demand expected to equate  
**~25%** of vanadium market  
by 2040 currently only ~ 4% (CRU- 17  
Nov 2022)

Global Production 2023  
**125,190 MTV\***  
85% of supply from China,  
Russia & South Africa (vanitec  
2024)

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  
**200%** Increase by 2050  
5<sup>th</sup> highest growth market in  
critical minerals according to the  
World Bank- Minerals for Climate Action

\* MTV is Metric Tonne Unit of Vanadium

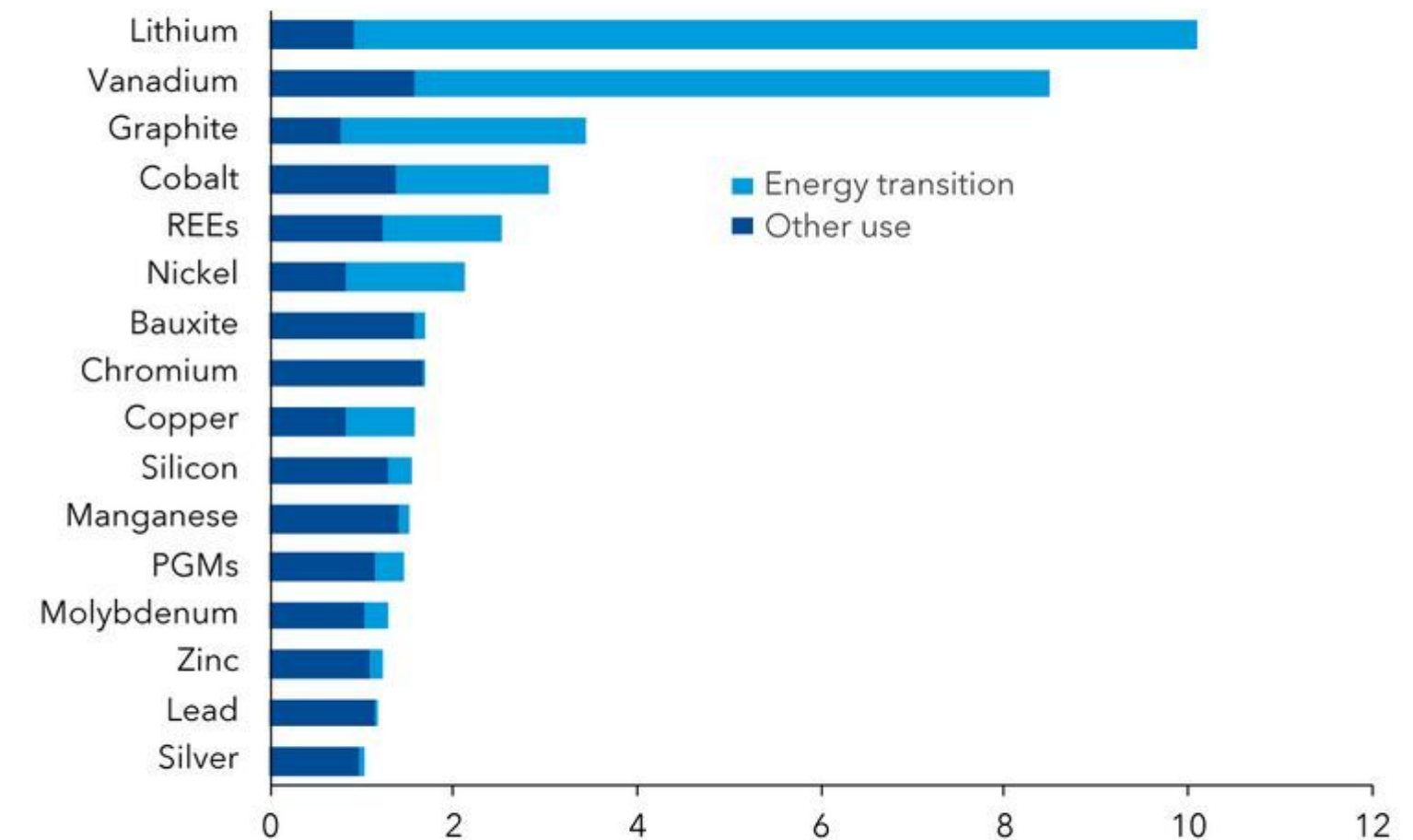


## IMF predicts 8-fold surge in Vanadium Demand by 2050

### A critical surge

Global demand for energy transition minerals will increase significantly in the coming decades.

Ratio of 2050 to 2022 demand under a net zero emissions scenario



Sources: International Energy Agency (IEA) World Energy Outlook (2023); and IMF staff calculations.

Note: The chart shows the IEA's projected increase in mineral demand (in quantity terms) broken down by sector as a ratio of 2050 to 2022 demand, under the IEA's net zero emissions transition scenario. REE = Rare Earth Elements; PGMs = Platinum Group Metals.

IMF

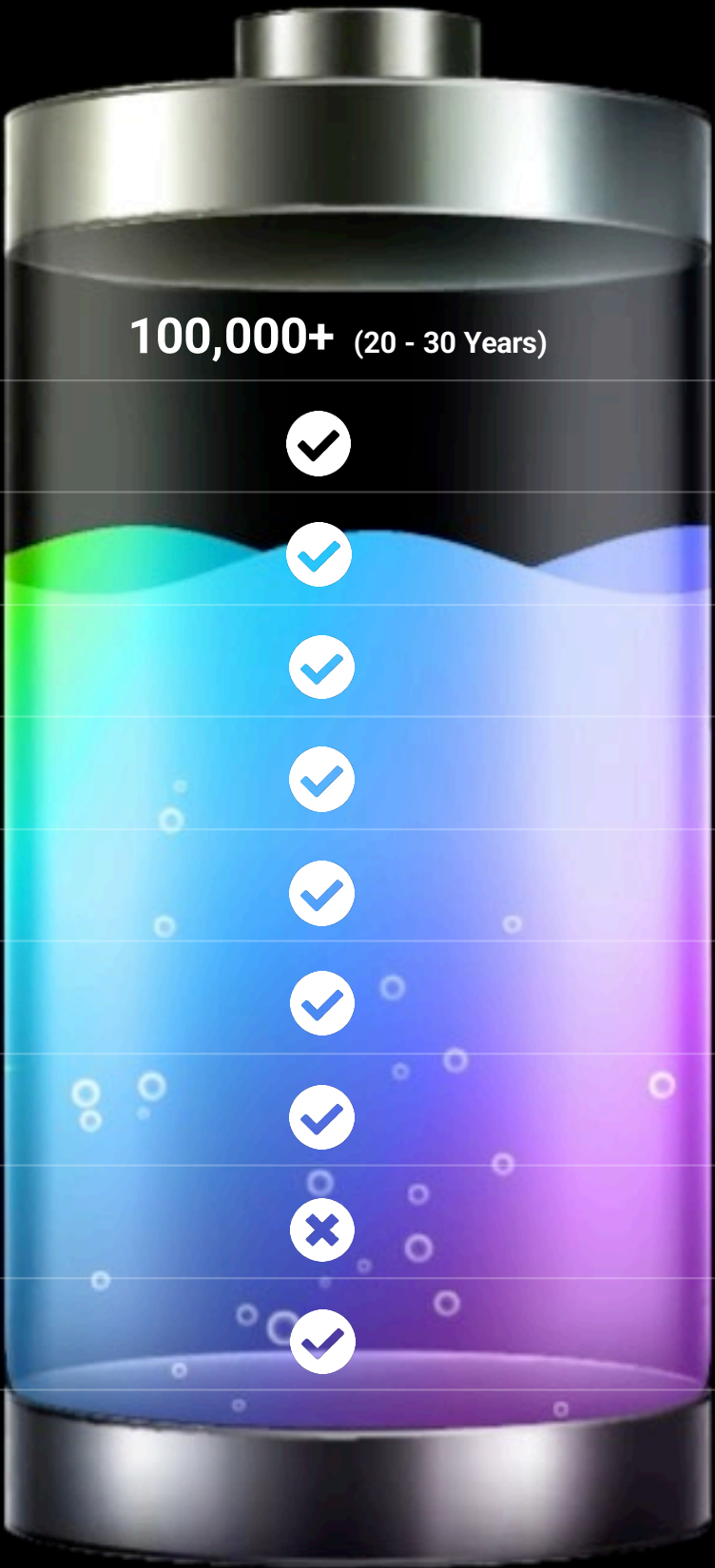


# Renewable Storage

Building a Renewable Future with Vanadium Flow Batteries (VFB)



## Vanadium



LONG ASSET LIFE - Number of Cycles

Low Self Discharge (Stays Charged)

Long Duration Energy Storage (LDES 4hr+)

Highly Expandable

SAFETY – Non Flammable, non Toxic.

Charges and Discharges Simultaneously

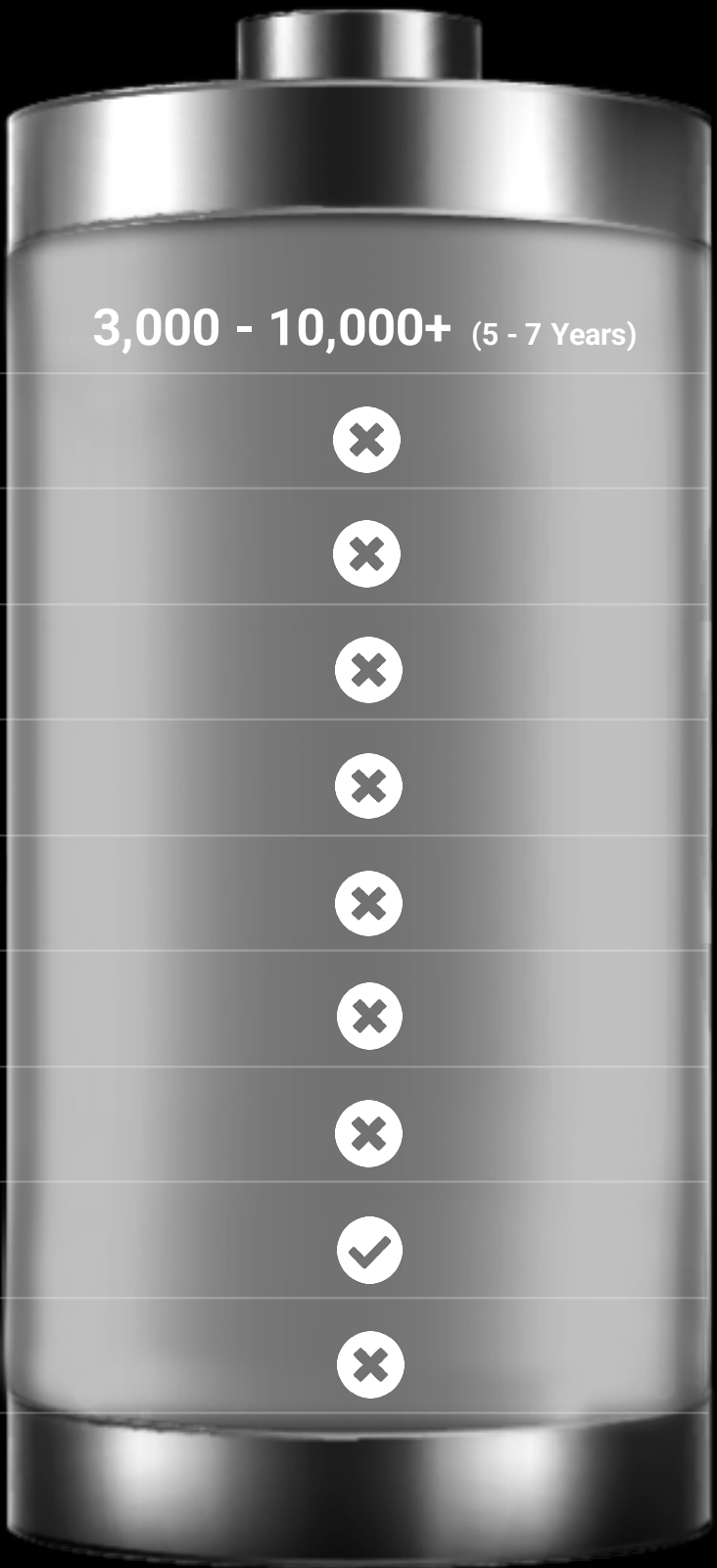
COST - Lower Operating Cost (LCOS)

Suitable for Connection to Power Grid

Small Footprint

**Can be Completely Recycled**

## Lithium



LONG ASSET LIFE - Number of Cycles

Low Self Discharge (Stays Charged)

Long Duration Energy Storage (LDES 4hr+)

Highly Expandable

SAFETY – Non Flammable, non Toxic.

Charges and Discharges Simultaneously

COST - Lower Operating Cost (LCOS)

Suitable for Connection to Power Grid

Small Footprint

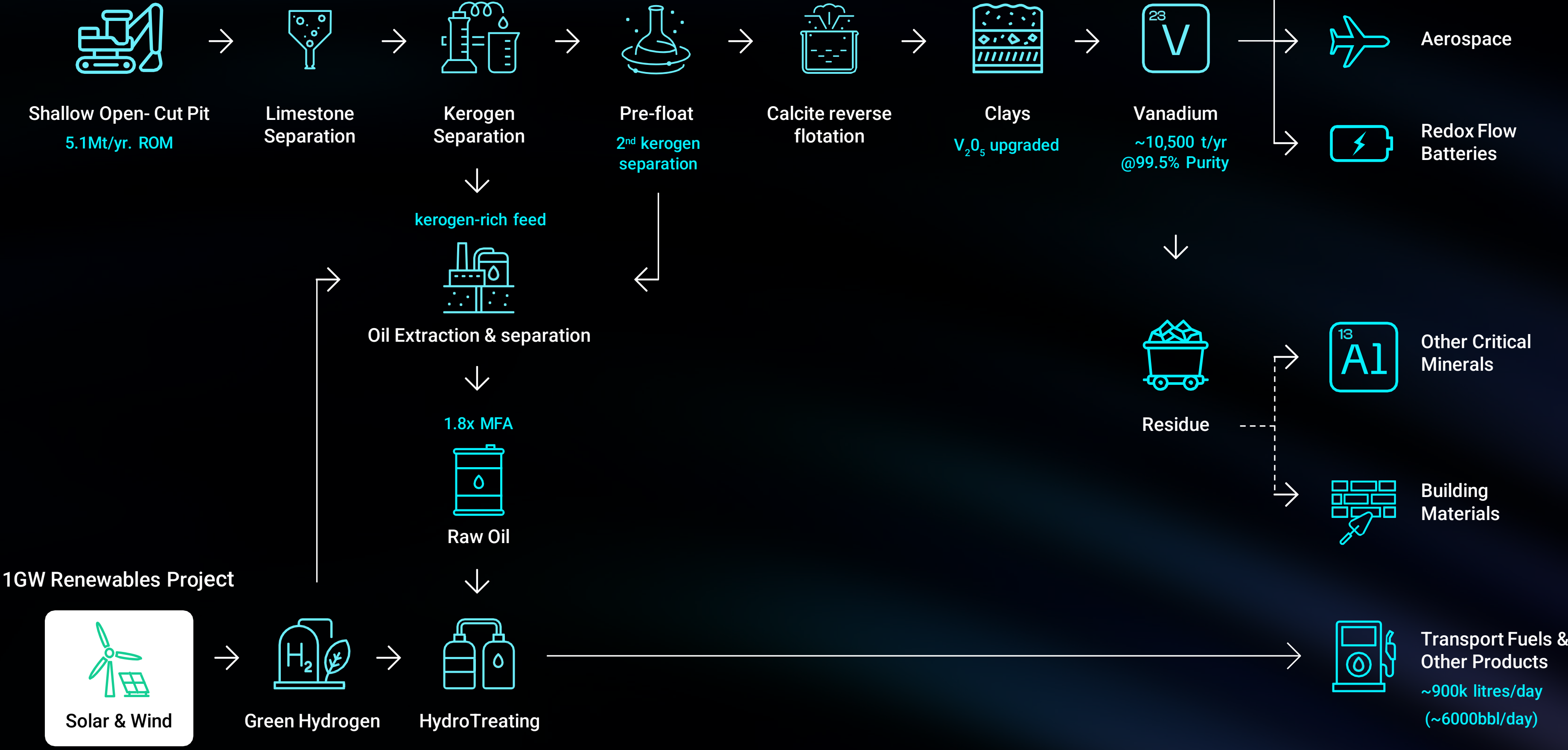
**Can be Completely Recycled**

Source: energyandcapital.com



# Vanadium and Oil Shale Project

JCP Scoping Study Concept Design







## Pilot Plant

**Bench scale pilot plant** - Testing and optimisation program - HRL Labs Vic.

Bench scale pilot plant commissioned May in 2022\*

Oil yields (equivalent) ~**180%** that of a Modified Fischer Assay (MFA)\*\* indicating that this is a highly effective method of oil extraction, when compared to traditional methods such as retorting.

Pilot is a 25kg batch, sealed reactor as a proof of concept model that enables QEM to maximise oil recovery, using this innovative extraction process

\* QEM ASX Announcement 25 May 2022; \*\* QEM ASX Announcement December 6th 2022; (MFA is the standard method of measuring oil grade, for in-situ shale resources)



# Renewable Power Project - sale of assets to EGPA



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

- EGPA to develop up to 1GW hybrid wind, solar and BESS project
- In January 2024 QEM sold its project assets to global renewables giant ENEL Green Power Australia (EGPA) with first payment of \$3m being received in February 2024
- In addition to this upfront payment, the consideration for the sale of Sale Interest is as follows:
  - two contingent milestone payments totaling \$4,000,000 in aggregate, payable in separate tranches upon achievement of key Project development milestones; and
  - a contingent milestone payment upon EGPA reaching Final Investment Decision (FID) (the FID Payment).
- Separately, on and from the Commercial Operations Date EGPA has agreed to pay QEM a revenue-based royalty of between 1- 2% generated by the JCRP operations. Additionally, through Project operations, QEM will be offered a 10-year off-take agreement (PPA), on an arm's length basis, for up to 25MW firm capacity to supply its mine operations.
- Delivery of CopperString expected at Julia Creek in 2029, 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**.

**SODAR and Solar equipment**  
installed on site at Julia Creek



**160m Met Mast** commissioned  
on-site July 2022





# QEM and UQ produce first vanadium pentoxide 99.93% from Queensland industrial waste



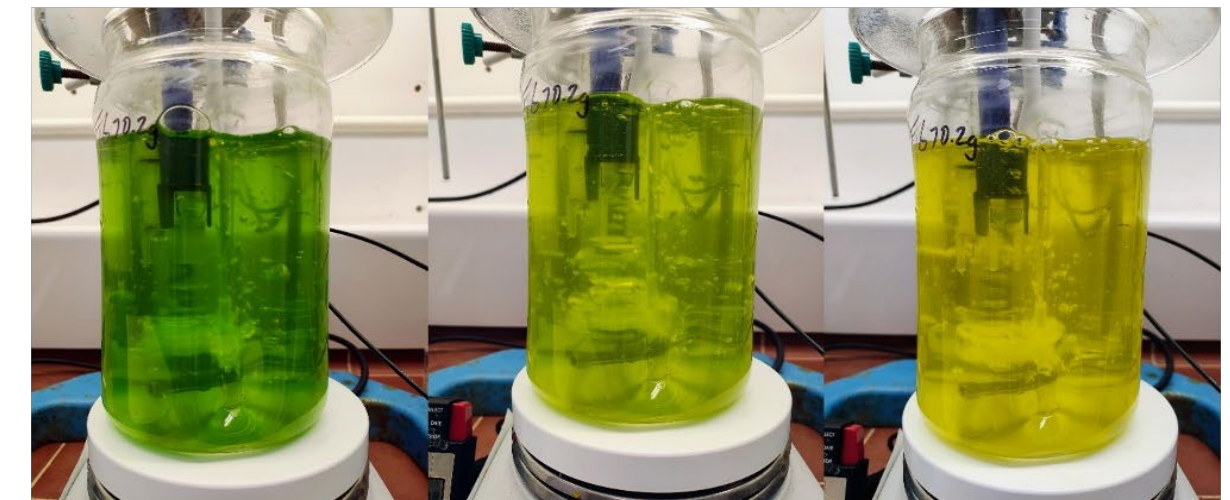
- QEM partnered with The University of Queensland (UQ) to produce the first high purity vanadium pentoxide (V2O5) from an industrial waste stream in Australia.
- QEM engaged UQ in this Circular Economy project to upcycle spent vanadium-bearing catalyst from Queensland industrial waste (Sourced from Sun Metals Corporation's Townsville Zinc Refinery and Incitec Pivot's Mount Isa Plant).
- UQ conducted a small-scale laboratory demonstration of all the processing steps in recycling the vanadium catalyst into a high purity vanadium pentoxide product, repeatedly producing a **99.93%** product, suitable for VRB's.
- UQ is now optimising the processing conditions for subsequent piloting, as well as producing larger samples of V2O5 for potential future marketing purposes.
- This research and development project is part of the Trailblazer Universities Program for Resources Technology and Critical Minerals.



Industrial waste  
(spent catalyst)

Crushed catalyst

Acid leaching



Leachate from acid tests - Ozone sparging at 0, 20, and 35 minutes



Dried ammonium metavanadate

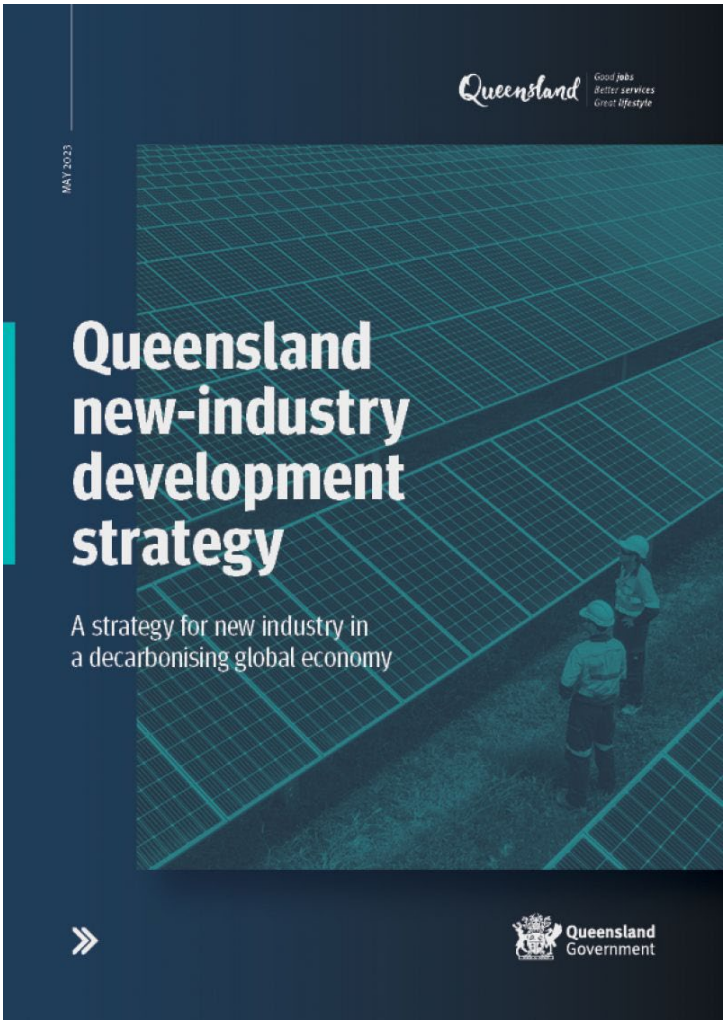
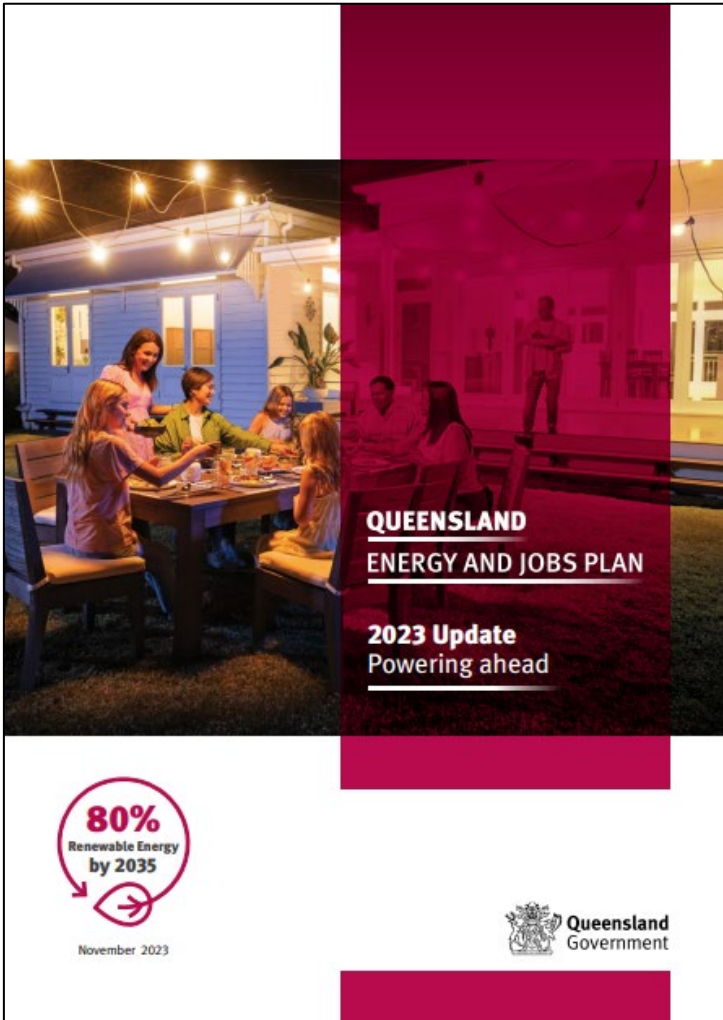
Calcined V2O5

Vanadium Pentoxide extraction from spent catalyst :  
QEM ASX Announcement - 22 February 2024



# Strong Government Support

A framework of support across the Value Chain





# Right Project at Right Time

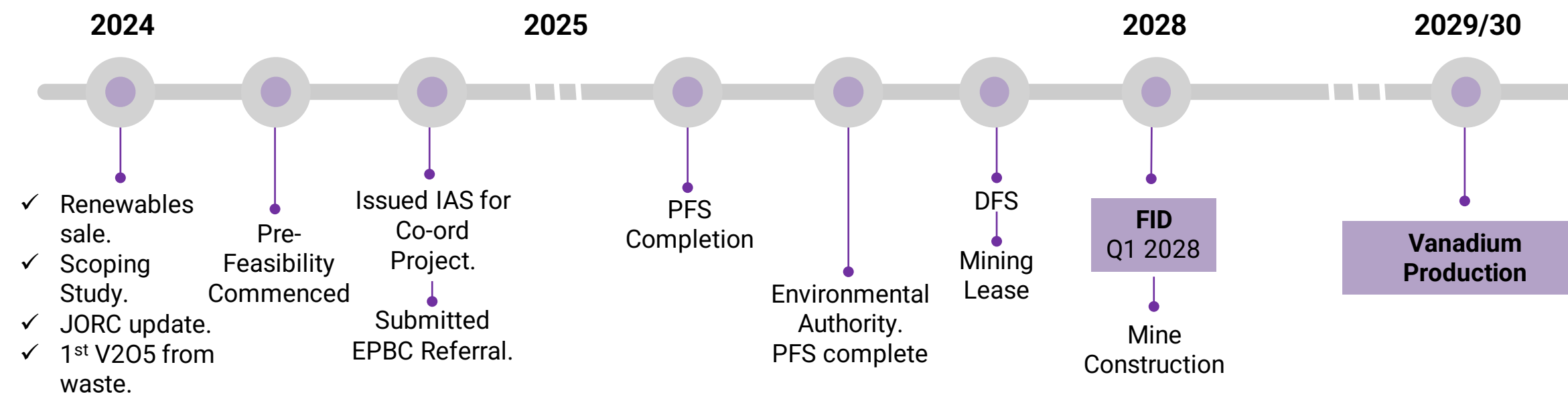
- **Multi Commodity Exposure** in high growth markets
- Globally significant Critical Minerals opportunity
- Domestic Fuel Security
- Strong Government Support - State & Federal

## Target milestones to 2026

- Complete MET test work- Q2 2025
- Pre-feasibility Study- targeted to complete- Q12026
- Complete Technical Studies for EIS- Q12026
- EA, ML & Petroleum licence approvals Q4 2026



## Project Development







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