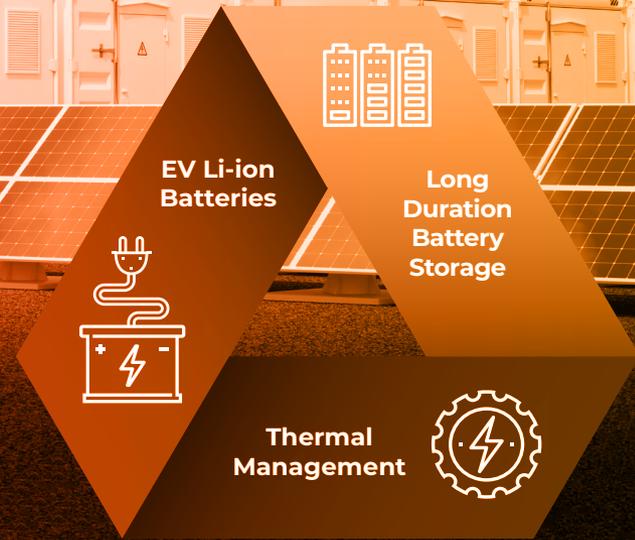




# QGL: THE FUTURE OF GRAPHITE...

European Investor Presentation April 2022



# About Quantum Graphite Limited

## Board of Directors

Bruno Ruggiero, Chairman  
Sal Catalano, Managing Director  
Bob Osmetti  
David Trimboli

## Key Technical Personnel/Partners

Mine Engineer, Dr. Karen Lloyd  
(Jorvik Resources)  
Metallurgical, Steven Chadwick  
(Spectrum Metallurgical Consultants)  
Mineral Process Engineers  
(Lycopodium Minerals)  
Thermal Process Engineers  
(ProTherm Systems)  
High Temperature Research Partner  
(TU Freiburg, INEMET)

## Capital Structure

Shares on Issue (on a fully diluted basis) approx.  
321 million.

Top 50 Shareholders >75%.

Board represents approximately >40% shareholding.

## Project

Uley 2 fully permitted - Program for Environmental  
Protection and Remediation, PEPR 2014/110

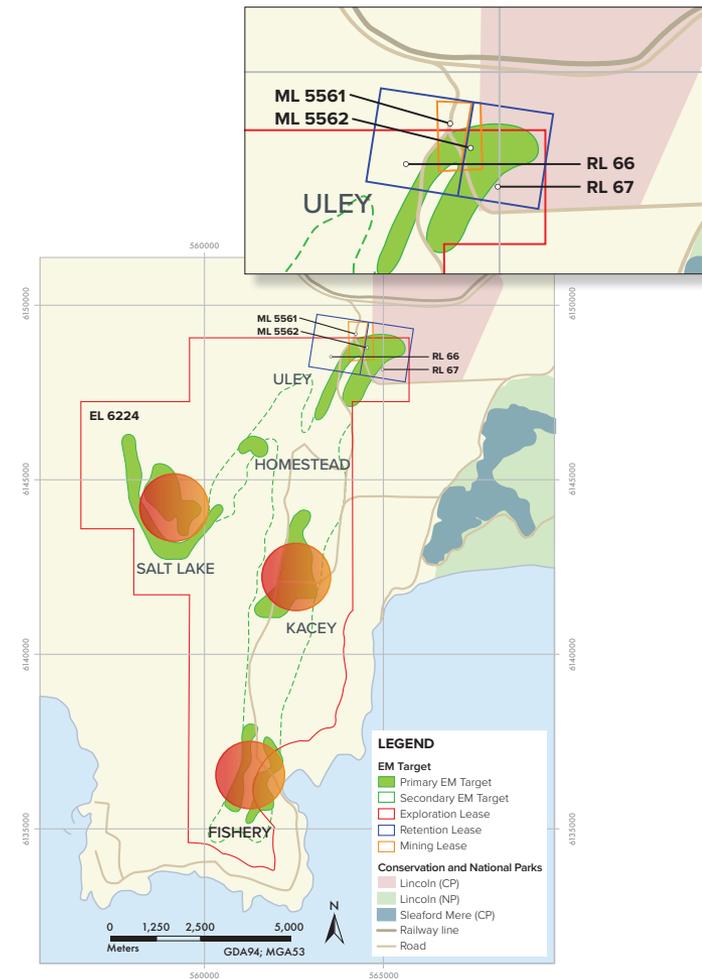
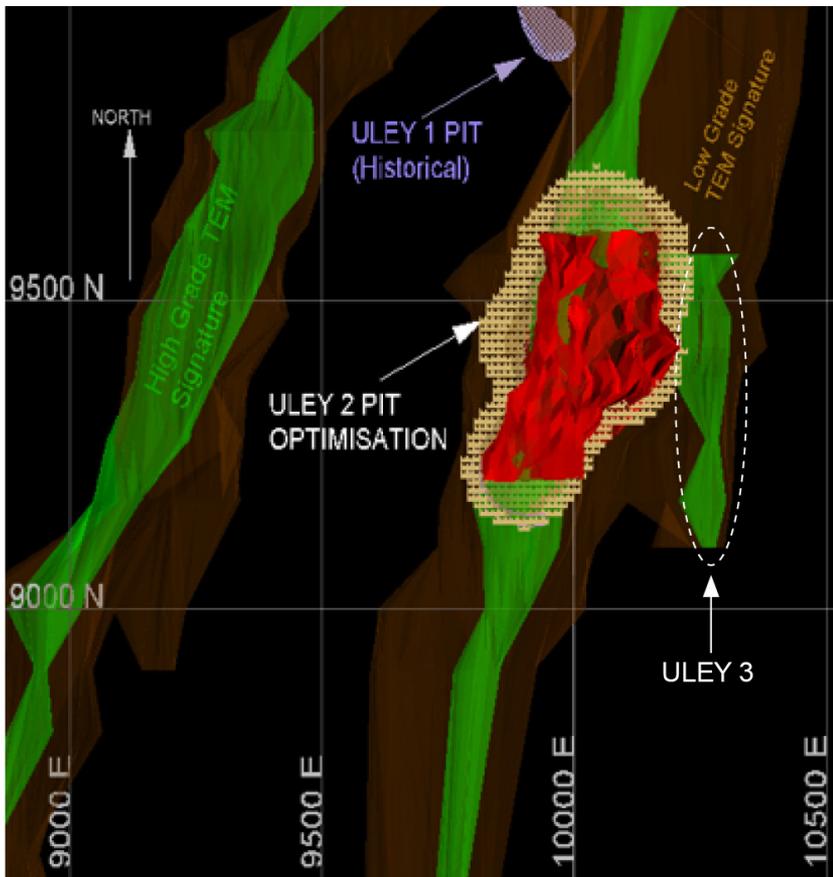
Tenement	Tenement Type	Interest
ML5561	Mining Licence	100%
ML5562	Mining Licence	100%
RL66	Retention Licence	100%
RL67	Retention Licence	100%
EL6224	Exploration Licence	100%

Uley Graphite Mine

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# **ULEY 2, PHASE 1 AT A GLANCE.**

# At a glance... large resource province



# At a glance... immediate expansion options

Excluding the other mineralised envelopes (within EL 6224) the Uley 2 Project is a multi-generation project.

## Priority 1 Short Term Ore Reserve extension

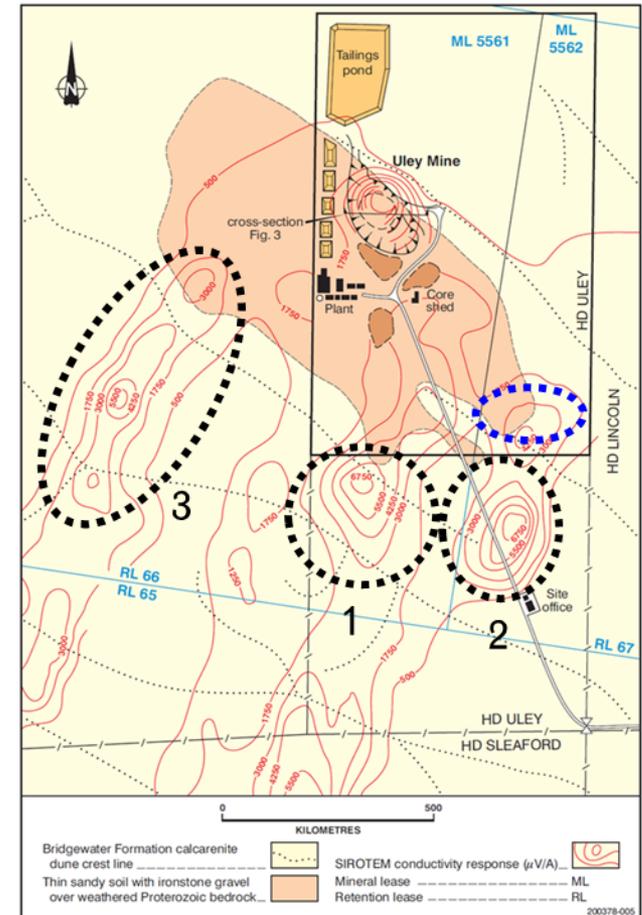
- Uley 2 South 50m
- Infill drilling at Uley 3 (area bordered by blue dotted line)

## Priority 2 Medium Term Resource extension

- Uley 3 South
- Extension drilling to 50m-by-50m intervals

## Priority 3 Long Term Resource extension

- Uley 2 West geophysical anomaly target
- Uley 2 South beyond Priority 1 along strike of the geophysical anomaly.

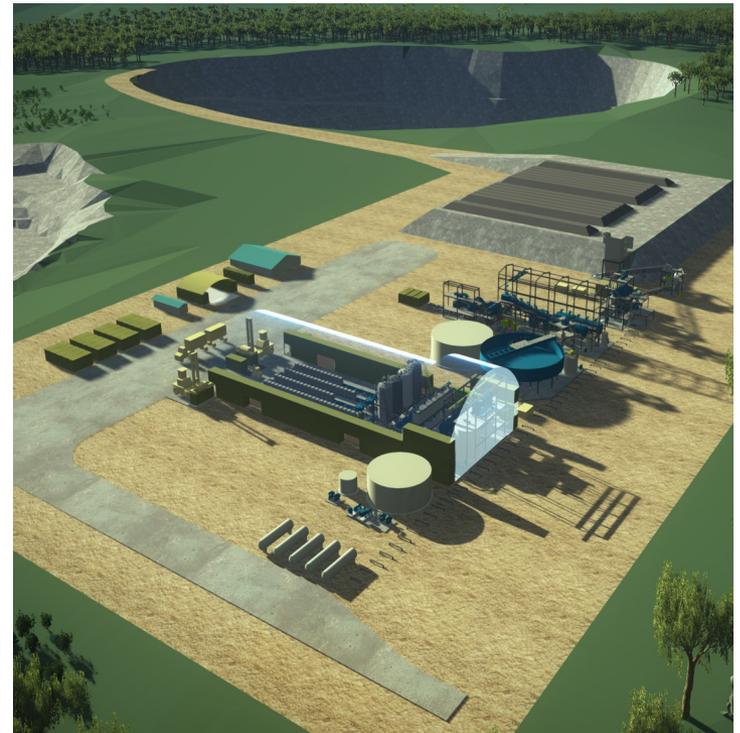


# At a glance... Uley 2 Phase 1, low cost, high spec producer

## Uley 2 Mining Study and Feasibility delivers strong financial metrics

Total undiscounted cash flow	A\$310.5million*
Crusher feed	500,000 tonnes per annum
Graphitic carbon grade	11.89%
Graphitic carbon recovery	84%
Concentrate purity	>97% graphitic carbon
Capital expenditure	A\$79.98 million
Processing cost (PCAF)	A\$55.3 per tonne
Mining cost (MCAF)	A\$2.5/t milled at surface plus 5c for every 4m
Production	55,000 tonnes per annum
Product Cost (Av LOM)	US\$368 dmt
Product Price (Ex-works)	US\$919 dmt

\*Includes JORC 2012 Reserves and Resources

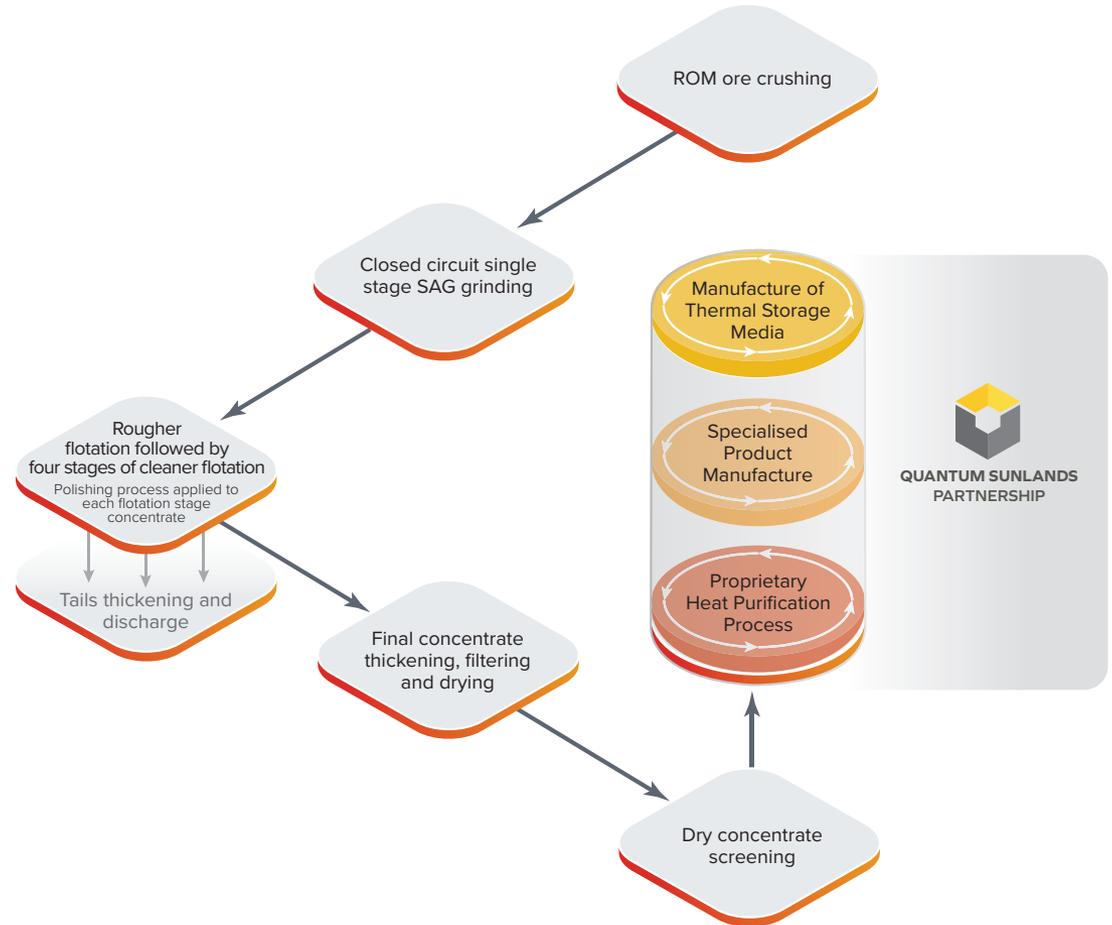


# At a glance... Uley 2 Phase 1, processing and production

Comprehensive met results confirm historical high quality production mix

- Medium to Extra-Large Flake - 75% of overall production of gC.
- Very clean geochemistry, no deleterious elements, remaining impurities are quartz and alumina.

Size Fraction (Mesh)	Approx. Weight Dist. (%)	Graphitic C Purity (%)
+50	10.5	97.8
-50+100	35.8	97.3
-100+200	28.7	97.2
-200	25.0	90.7



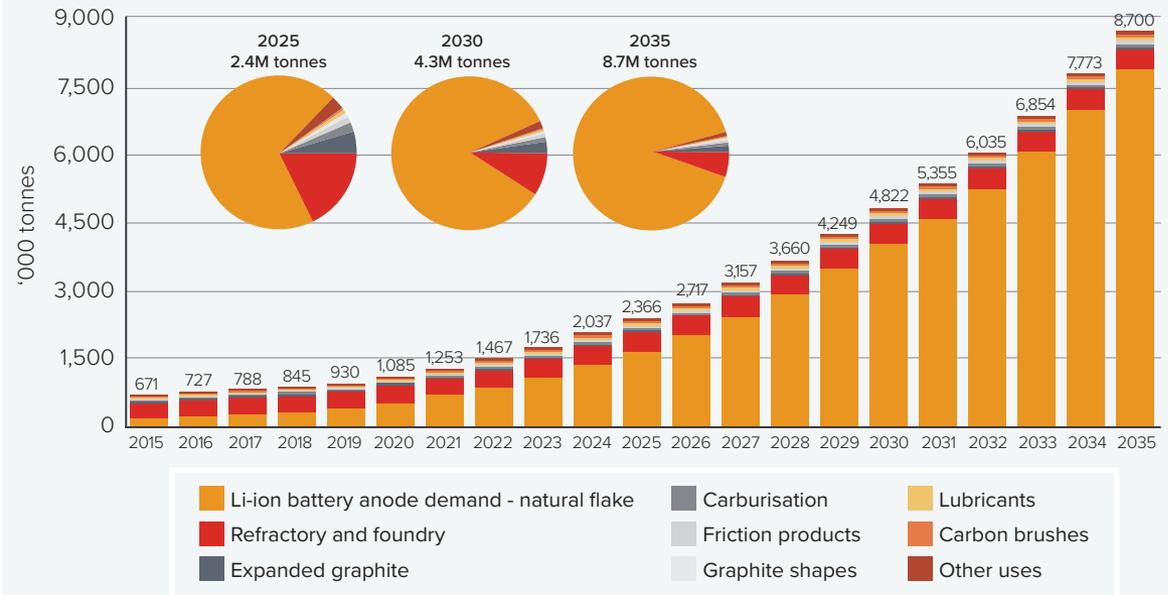
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**THE GRAPHITE  
MARKET -  
CRYSTAL BALL  
GAZING**

# Benchmark Mineral Intelligence... today, seems about right

- Anode has now emerged as dominant market for natural flake.
- Overall production of natural flake must double to meet rapid transition to EV.
- Doubling of natural flake graphite every 5 years will exert significant pressure on prices at short end of price curve (eg. lithium post Jan 2021).

Flake Long Term Demand Forecast

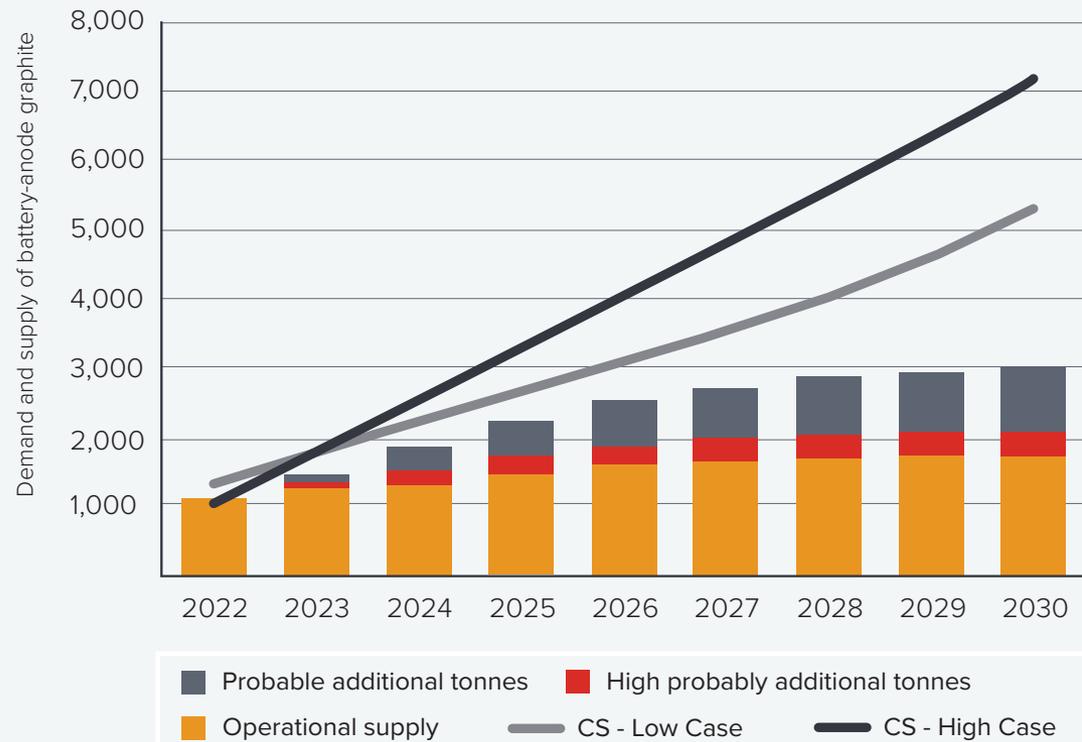


Source: Benchmark Mineral Intelligence

# Credit Suisse... a little more bullish

- Structural deficit at least from 2025 but likely earlier.
- High probability that deficit may exceed forecasts given unreliability of historical forecasting.
- QGL remains one of the stand out options for high probability significant additional tonnage given completed permitting and brownfields status.

Demand outstrips supply in both a high and low case

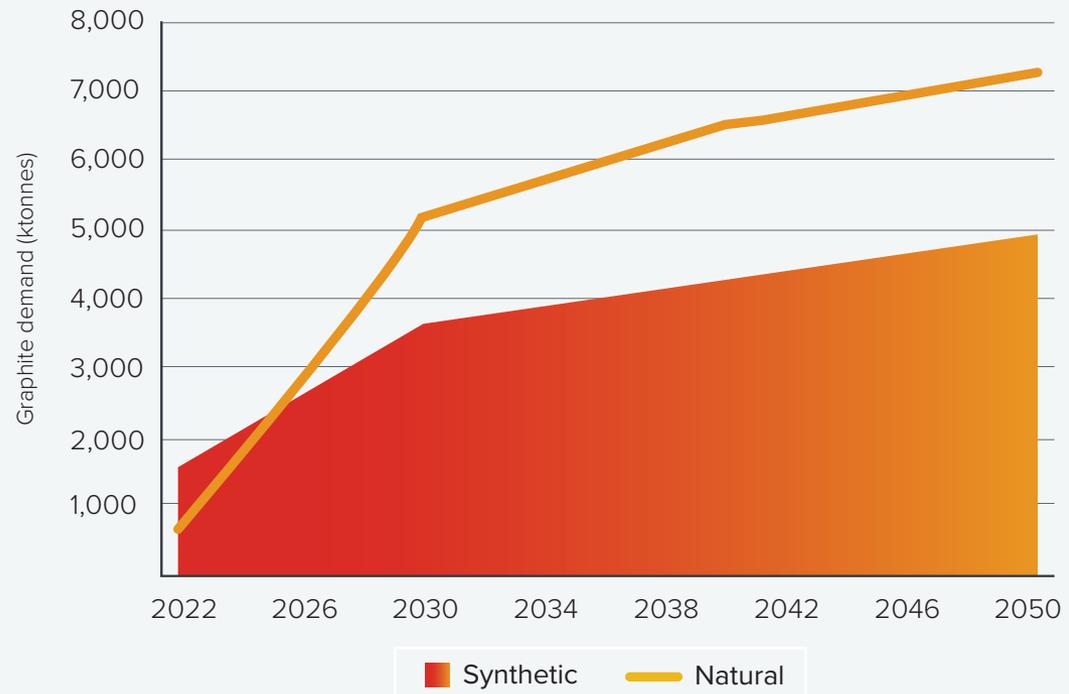


Source: Credit Suisse - Super Materials Demand Model; CS commodities

# Critical metrics... these are the numbers to watch

- Anode raw material synthetic to natural flake market share currently set at 2:1.
- Over the next 12-18 months natural flake will increase from 1/3 anode market share to more than 50%.
- From 2025 onwards, natural flake dominates anode raw material.
- Dominance of natural flake coincides with structural market deficit resulting in significant price pressures.

Natural vs synthetic graphite demand - high case

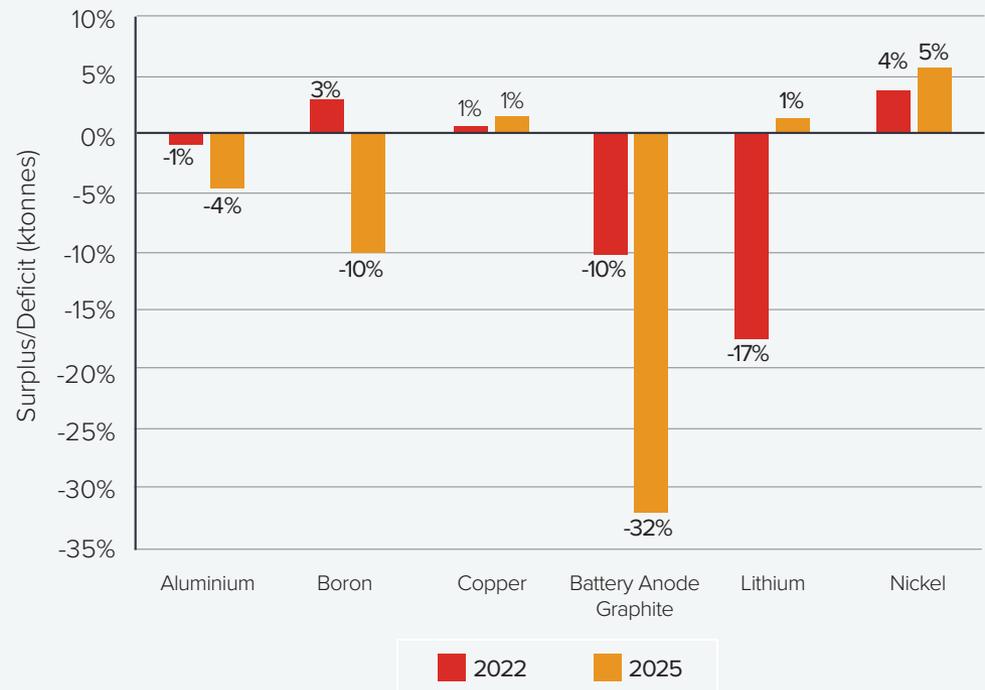


Source: Credit Suisse - Super Materials Demand Model

# Short term... this is what we're facing

- 10% deficit this year largely covered by inventories, manageable impact on price.
- Significant higher prices will emerge well before forecast 2025 deficit of 32%
- QGL expansion strategy clearly aimed at providing maximum optionality to deliver increase in quality tonnage over the 2024 - 2027 period.

**2022E vs 2025E forecasted surplus/deficit shows a sustained deficit for graphite used in Li-ion batteries**

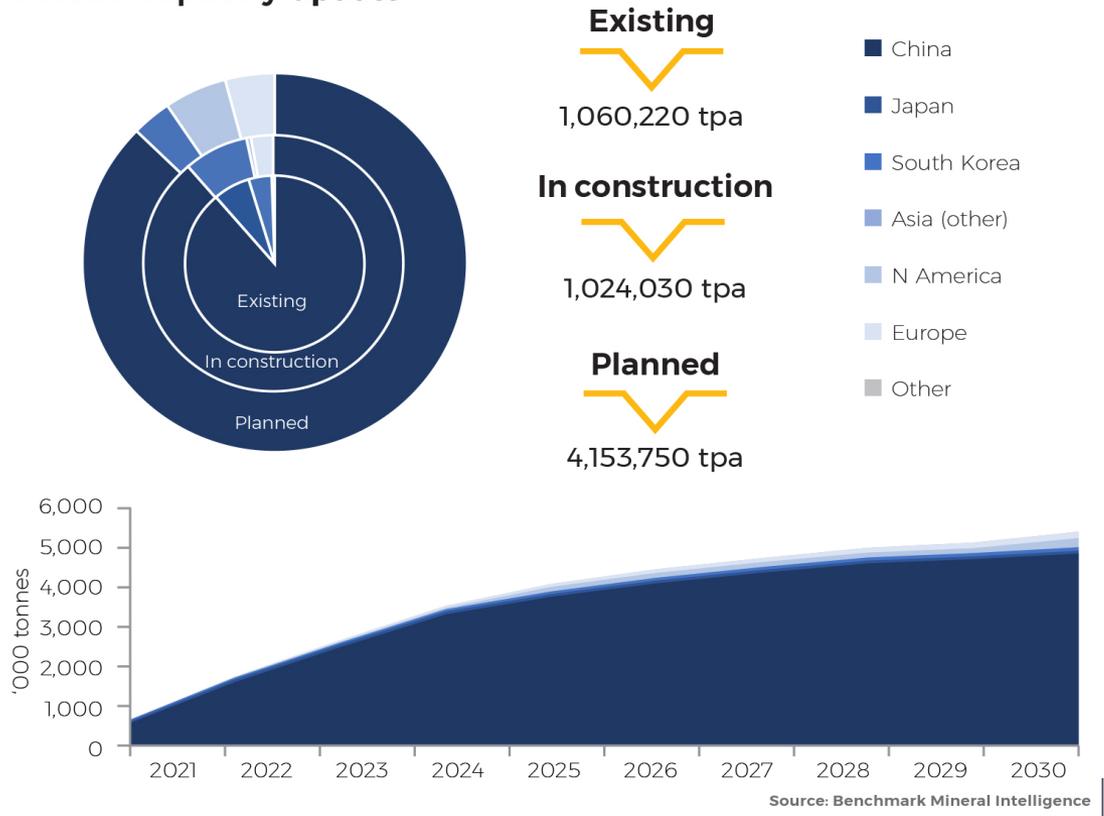


Source: Credit Suisse - Super Materials Demand Model; CS commodities

# CSPG, Anode production ex China... unlikely without partnerships

- China is overwhelmingly the dominant producer.
- Current anode production estimated at 700,000 tonnes of which China represents approximately 610,000 tonnes.
- New capacity under construction will increase China's capacity by approximately 70%.
- Planned new Chinese capacity is almost 4 times capacity under construction.

## Anode capacity update

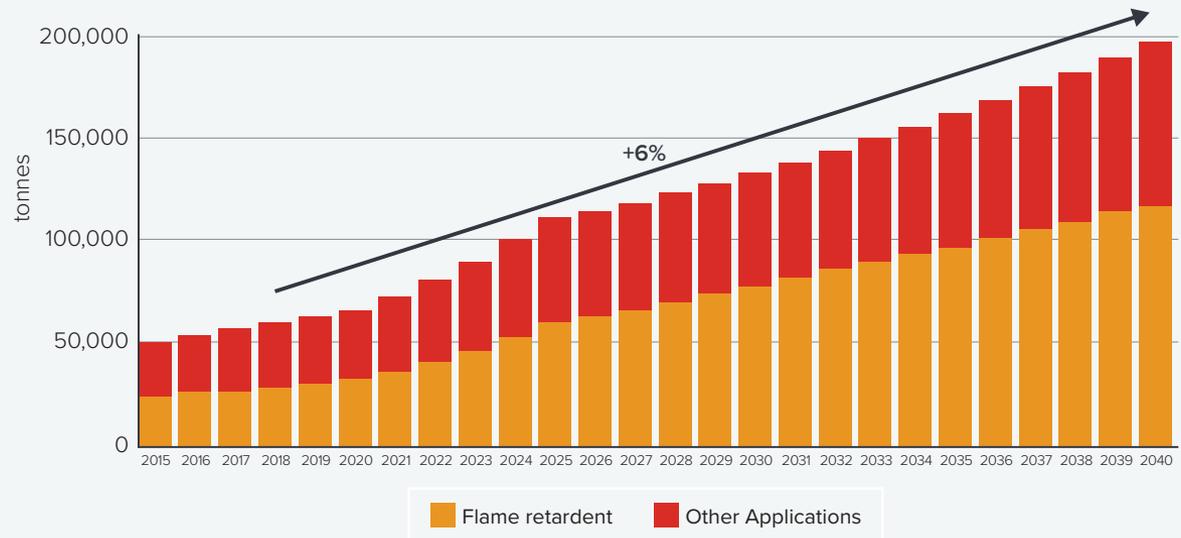


# Other growth segments... expandables, foils, etc.

- Non EV long term growth of natural flake demand driven by higher end thermal management applications.
- Growth in expandables forecast at approximately 6% compared with approximately 3% for traditional refractory products.
- Specialised natural flake powders is the target market for QGL's extra large flake production.
- Does not include thermal storage media

## Expandable Graphite Demand Forecast

Expandable graphite demand forecast, 2015-2040



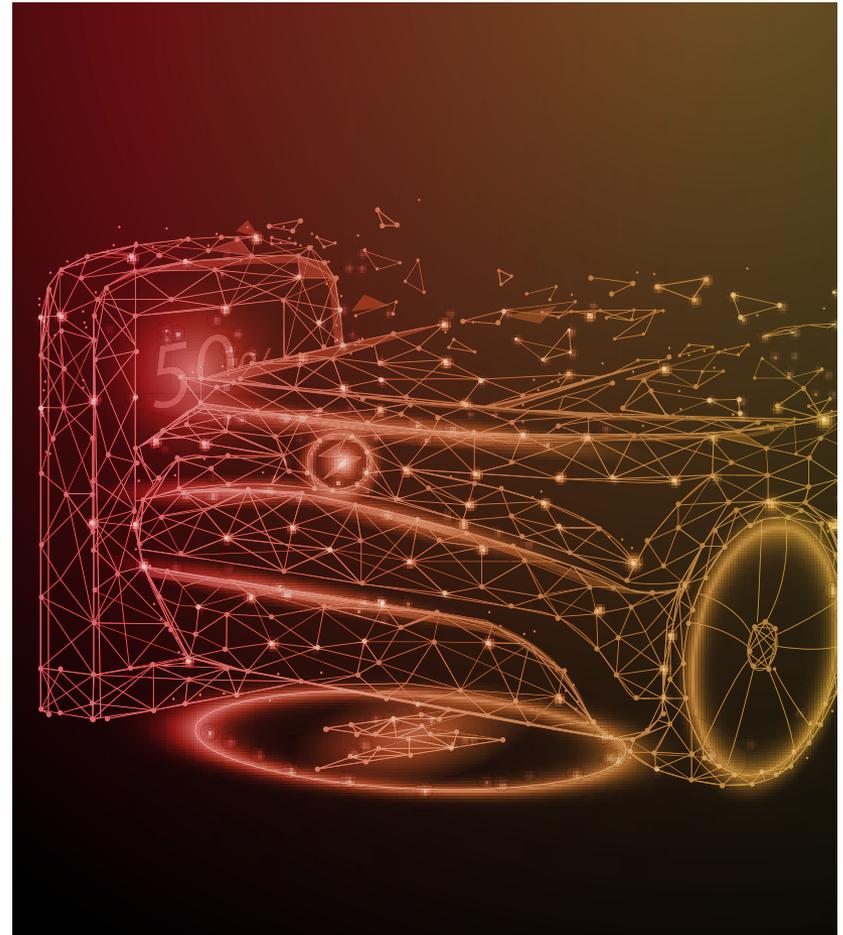
Source: Benchmark Mineral Intelligence

# QGL EV market takeaways... tread carefully downstream, choose partners wisely

- Anode market (and natural flake) is moving to structural deficit within the next 30 months
- China remains the overwhelming producer of tier 1 and tier 2 quality anode material
- China's development of additional capacity ensures it remains the dominant producer of anode
- Natural flake set to dominate anode raw material - emerging technologies ex China directed at alternatives to hydrofluoric acid treatment

## What this means for QGL

- Manufacture of CSPG (or anode!) by natural flake producers is not an option
- Development of downstream partnerships with alternative technology owners is a medium to long term strategic priority
- Development of key supply relationships with OEMs is a critical short to medium term priority
- Ensure execution readiness of mine production expansion strategy

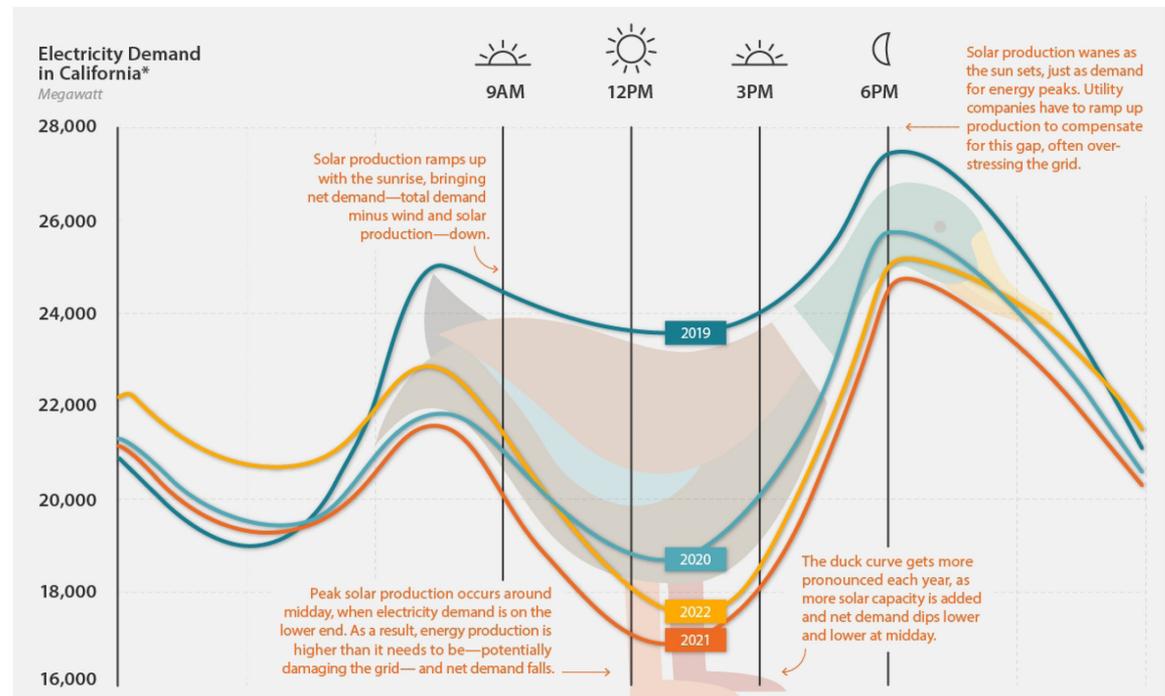


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**THE GRAPHITE  
MARKET  
MEETS THE  
ELECTRICITY  
MARKET - QGL'S  
ELEPHANT IN  
THE ROOM**

# If it quacks like a duck... the whacky world of negative prices

- In February 2008, an enterprising team of analysts at the US Department of Energy's National Renewables Energy Laboratory (NREL) published a prophetic piece of research which foreshadowed the logical outcomes associated with adding increasing renewables generation to conventional grid networks.
- By 2013, California's Independent System Operator (CAISO), graphically illustrated these outcomes in the form of the now famous "duck curve".



Source: CAISO. Data compares the first Saturday in February from 2019 to 2022.

- From California to South Australia, the results are the same; excess generation in the middle of the day (and early hours of the morning) gives rise to a sharp drop in demand and prices plunge, often to negative.

# And the loss of inertia... conjuring up inertia is tough

- The result is the loss of inertia, i.e., grid stability/reliability evaporates. Our toolbox is very limited:
  - Grid operators regularly curtail renewables (okay for large scale installations but rooftop solar presents challenges);
  - Quickly ramp up conventional generation (supported by short duration Li-ion) to meet the rapid demand requirements, especially for the end of the working day and restore frequency control/stability
- And the “creation” of inertia utilising various technologies with renewables is a stretch.  
Only dispatchable generation achieves this at a grid scale.

**CURRENT<sup>±</sup>**  
**BRIEFINGS**

The emerging inertia market in Britain

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As renewable capacity on Britain’s grid continues to grow apace, the need for alternative sources of inertia is becoming increasingly pressing. To manage this, National Grid ESO began running pathfinders a few years ago, with the first projects now coming to fruition.

While some involve innovative new technologies such as Quinbrook’s synchronous condenser or the use of Drax’s Cruachan hydroelectric pumped storage plant, existing energy sources will also be able to contribute thanks to a recent Grid Code modification. GC0137 will allow renewables and inverters to provide inertia using virtual synchronous machine capability.

Following these developments, we take a look at what the emerging inertia market is set to look like **in the next of our Current<sup>±</sup> Briefings series**, including which technologies are likely to come online in the short term, the demand for inertia in the UK, and the potential revenue opportunities it offers for renewables and other energy technologies.

Wednesday, April 27th 2022 - 11:00 AM (BST)

# And there's more... Australia's Net Zero by 2050 Plan

- Australia has embarked on a plan to decarbonise by 2050 (Net Zero Plan). If emissions reductions milestones are to be met, electricity generation will have to be extended beyond its current uses to cover most of the energy required in transport and industry.
- The Net Zero Plan is likely to require increasing electricity generation from between five and nine times that of existing levels in advanced economies.
- The Net Zero Plan relies on solar and wind as the primary energy sources, together with high level of confidence in the successful development of emerging technologies.
- Unlike California and Germany, the execution of Australia's plan does not have the benefit of critical support from an alternative large scale neighbouring grid. In this sense Australia is unique amongst large industrial economies.



# The puzzle of an emissions free grid... summing up the challenges

- Current renewables generation numbers
  - 20% of NEM load
  - 35% of generation capacity
  - 2.4 million solar PV systems delivering 10.7GW

**BUT**

- Continued penetration of renewables limited by:
  - Operational and regulatory hurdles due to intermittency
  - Low marginal value of despatch

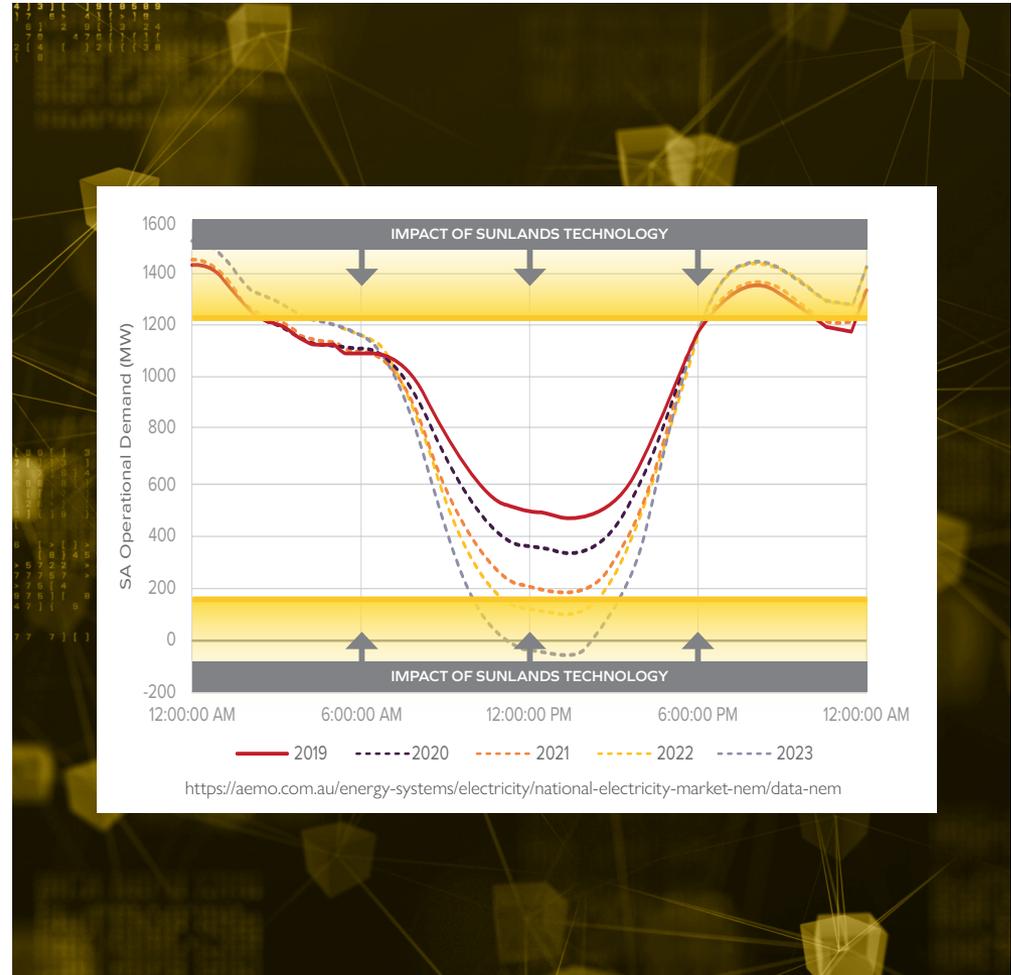
- Coal fired generators provide >40% of the NEM's base load and substantially all its inertia.

**BUT**

- Most of these facilities are scheduled to close within the next 7-15 years and solutions to replace the loss of inertia and dispatchability remain illusive.

# The Solution... Long Duration Energy Storage

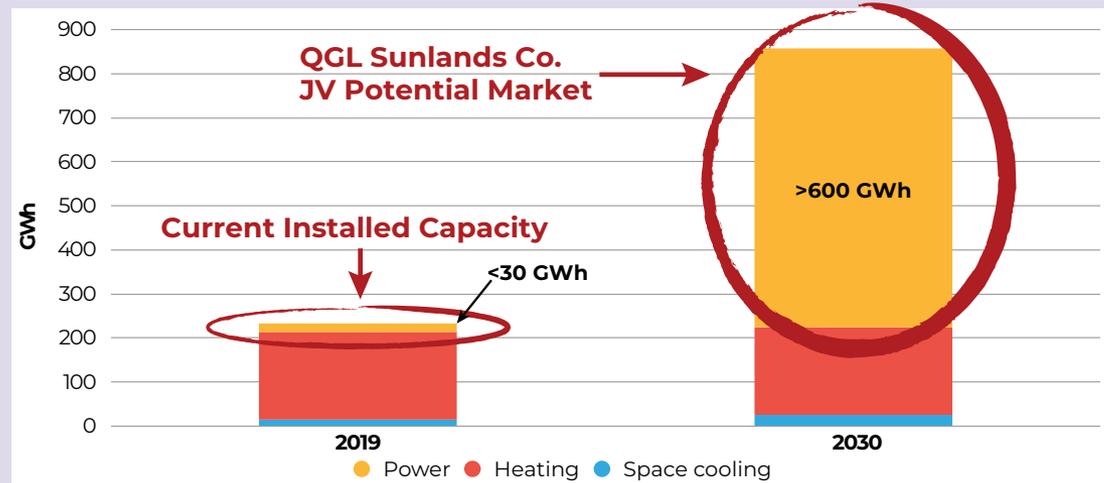
- LDES delivers dispatchable generation, maintains grid stability and enables the acceleration of renewables penetration within the grid
- QGL joint venture partner Sunlands Co.'s LDES technology uniquely positions it as a leading technology:
  - capable of driving utility scale steam turbines (eg. retrofitting of coal fired power stations)
  - has an effective life measured in the decades
  - can be charged and discharged simultaneously
- The key to the Sunlands Co. technology is the natural flake based storage media to be manufactured by the Quantum Sunlands Partnership



# Long Duration Energy Storage... size of the market

- IRENA estimates the market to grow 20x within the decade
- Following Glasgow (COP 26) this estimate is likely to be increased significantly
- The Quantum Sunlands Partnership independent Australian electricity market study concluded that:
  - Australia alone will require in excess of 10 GWh of storage
  - At least 100,000 tonnes (equivalent to 1 GWh) of natural flake graphite will be required annually to meet Australia's Net Zero by 2050 Plan

Figure 3: Installed TES capacity projections according to IRENA's Paris Agreement-aligned Transforming Energy Scenario



Note: Heating projections are not in the scope of this analysis due to a lack of data on aquifers and small-scale distributed TES (e.g. residential water tanks). Nonetheless, growth in the installed capacity of these technologies is expected given their versatile use from short to seasonal scale.

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# Quantum Sunlands Partnership... economics

- The Quantum Sunlands Partnership (QSP) is the exclusive manufacturer of the natural flake thermal storage media required by Sunlands Co.'s energy storage cells
- This is big business – comparison of sheer tonnage requirements relative to EV

<u>EV Anode</u>	<u>1.2kg per kWh</u>
<u>Thermal Media</u>	<u>5.0 kg per kWh</u>

- QGL - QSP transfer price assumptions based on sale of natural flake at the basket price of US\$919 and sale of manufactured media at a price of US\$3,500 to US\$4,000 which represents the range of market pricing for similar media
- QGL's estimated EBIT margin on every tonne sold to QSP (i.e., includes net contribution from its share of the JV) is estimated at US\$1,650 subject to completion of TU Freiburg (INEMET) final test work program



# Where to from here...

## Quantum Graphite Limited

- Complete offtake negotiations and conclude binding agreements
- Complete financing of Uley 2 including funding options for near term mine expansion
- Upgrade feasibility to encompass Phase 2 production expansion
- Ongoing resource definition and increase in reserves

## Quantum Sunlands Partnership

- Complete TU Freiburg test work
- Construct thermal energy storage cell pilot
- Conclude negotiations with key industry partners including critical suppliers
- Undertake feasibility for the construction of media storage facility



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**QUESTIONS...**

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