



**MARKET RELEASE**  
For Immediate Release  
14 March 2023

## Company Presentation

This week, in London, United Kingdom, the attached presentation is being utilized for showcasing the Company to insurance underwriters.

**FOR FURTHER INFORMATION CONTACT:**

Company Secretary

Quantum Graphite Limited

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**ABOUT QUANTUM GRAPHITE LIMITED**

QGL is the owner of the Uley flake graphite mineral deposits located south-west of Port Lincoln, South Australia. The company's Uley 2 project represents the next stage of development of the century old Uley mine, one of the largest high-grade natural flake deposits in the world. For further information, [qgraphite.com](http://qgraphite.com).

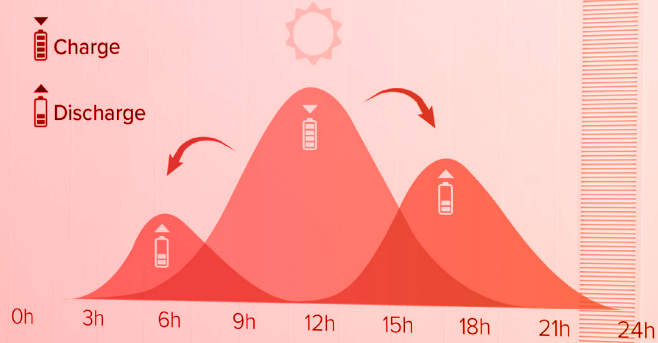


**ABOUT THE QUANTUM SUNLANDS PARTNERSHIP**

QSP is our joint venture with Sunlands Co. for the manufacture of coarse natural flake based thermal storage media. The flake will be sourced exclusively from the QGL's Uley mine. The manufactured media will be fitted within Sunlands Co.'s long duration energy storage cells. <https://www.sunlandsc.com/>



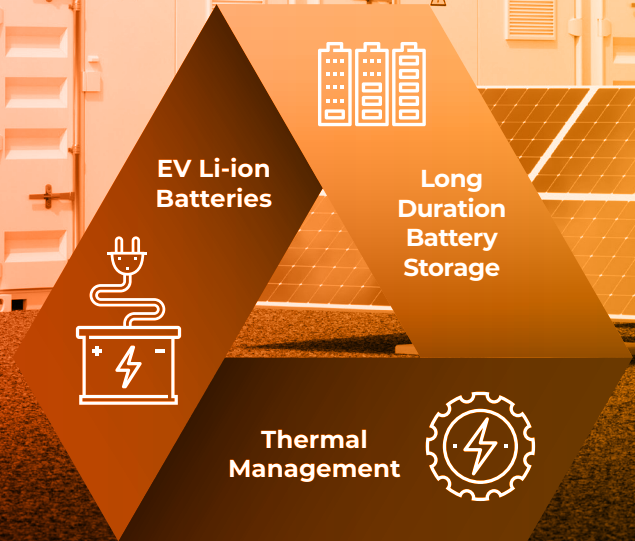
**QUANTUM**  
GRAPHITE



# THE FUTURE OF GRAPHITE

Presentation to London Insurance Markets

MARCH 2023



# About Quantum Graphite Limited

## Board of Directors

Bruno Ruggiero, Chairman  
Sal Catalano, Managing Director  
David Trimboli  
Michael Wyer

## Key Technical Personnel/Partners

Mine Engineer, Dr. Karen Lloyd  
(Jorvik Resources)  
Metallurgical  
(ALS Global, Lycopodium Minerals)  
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. 337 million.

Top 50 Shareholders >75%.

Board represents approximately >40% shareholding.

## Project

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

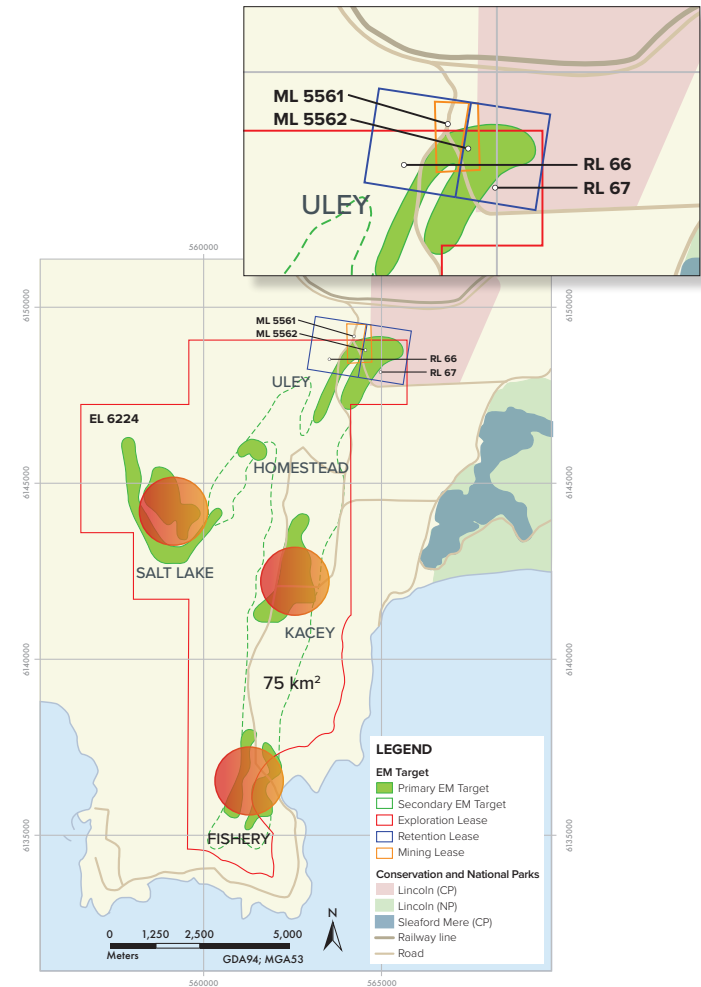
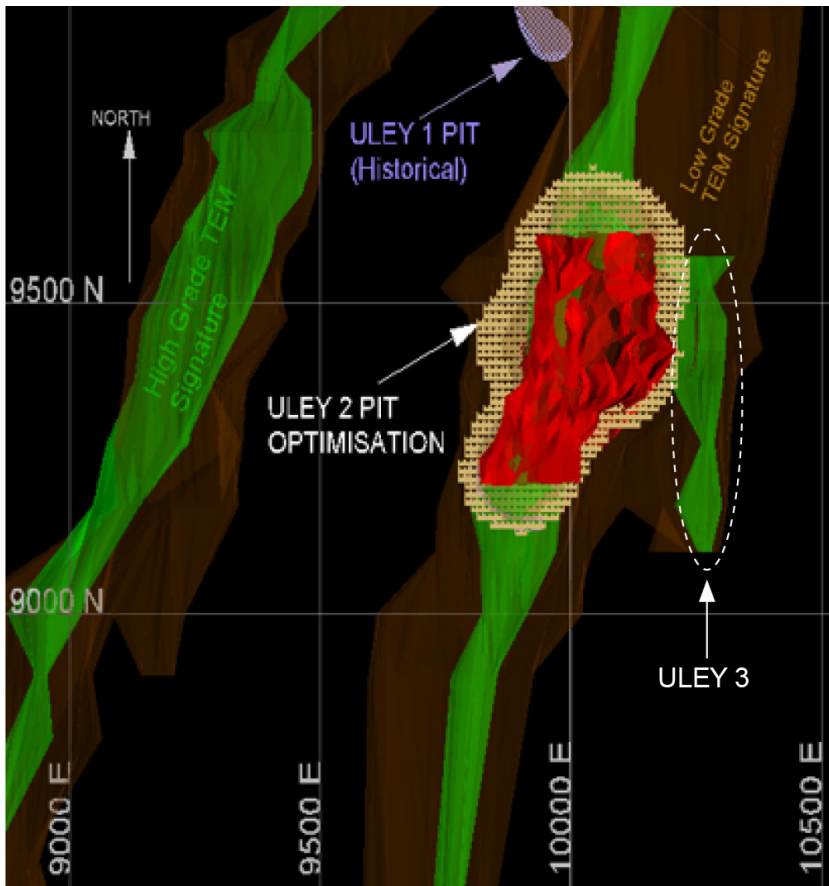
Tenement	Tenement Type	Interest
ML5561	Mining Licence	100%
ML5562	Mining Licence	100%
RL66	Retention Licence	100%
RL67	Retention Licence	100%
EL6224	Exploration Licence	100%

Uley Graphite Mine

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

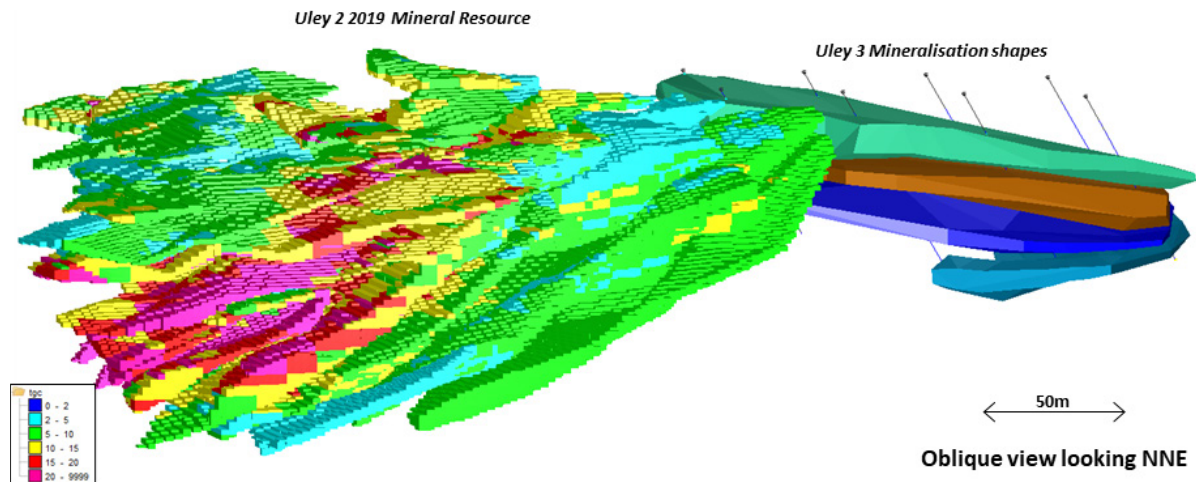
# At a glance... large resource province



# At a glance... JORC 2012 Mineral Resources and Reserves

Mineralisation remains open along strike to the south and north and at depth, well within the Company's Mining and Retention leases.

Resource	Classification	Tonnes (kt)	TGC (%)	Density (t/m <sup>3</sup> )	TGC (kt)
Uley 3	Inferred	900	6.6	2.1	59
	<b>Uley 3 Total</b>	<b>900</b>	<b>6.6</b>	<b>2.1</b>	<b>59</b>
Uley 2	Measured	800	15.6	2.1	125
	Indicated	4,200	10.4	2.1	435
	Inferred	1,300	10.5	2.2	137
	<b>Uley 2 Total</b>	<b>6,300</b>	<b>11.1</b>	<b>2.1</b>	<b>697</b>
<b>Uley Project Total</b>	<b>TOTAL</b>	<b>7,200</b>	<b>10.5</b>	<b>2.1</b>	<b>757</b>



# 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

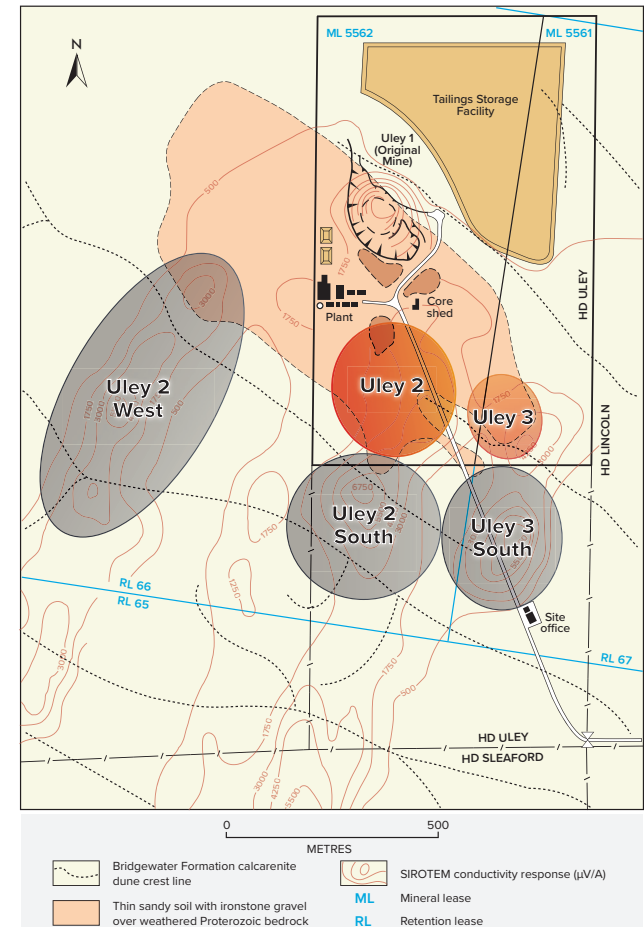
- Uley 2 South 50m
- Infill drilling at Uley 3 (area bordered by blue dotted line)

## 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.



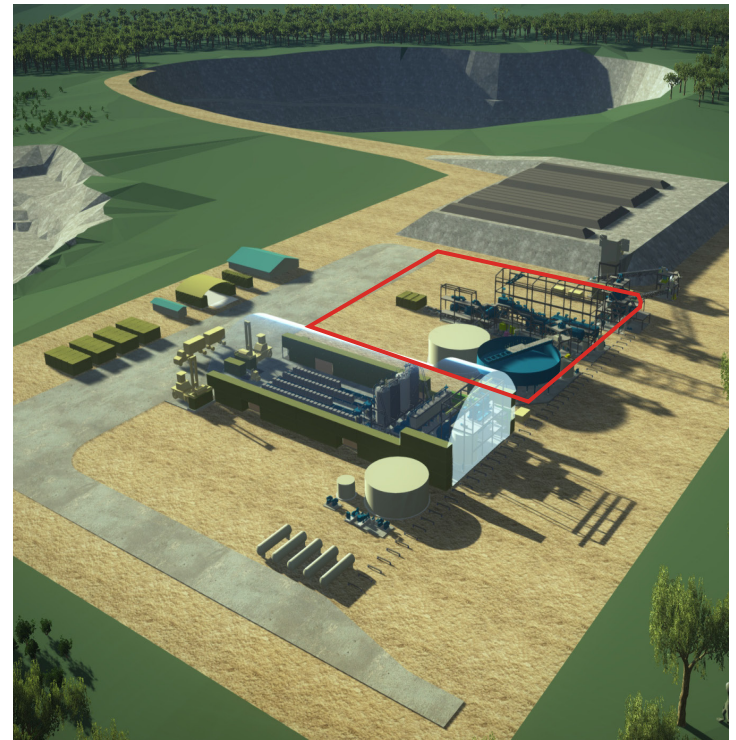
*Uley 2 Ore Reserve and near-mine extension target priorities*

# 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



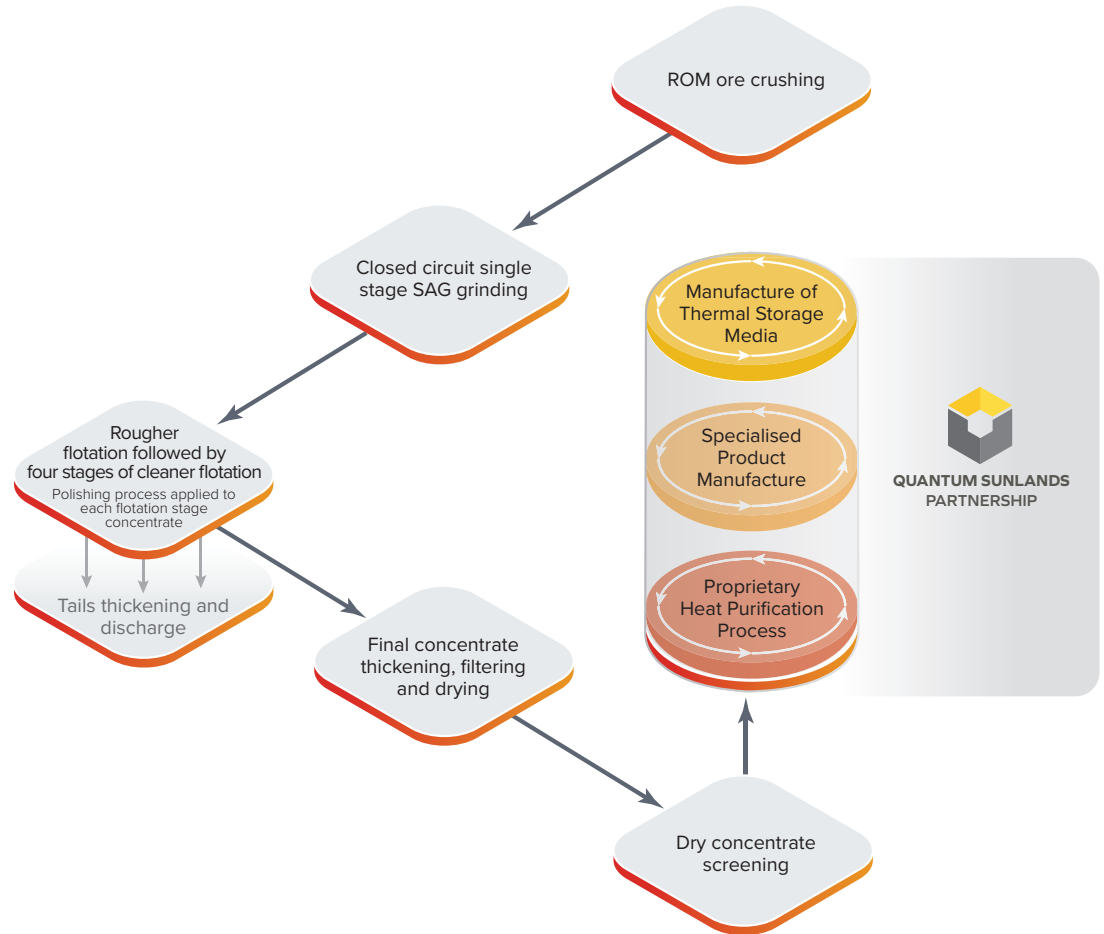


# At a glance... Uley 2 Phase 1, processing and production

Comprehensive met results confirm historical high quality production mix

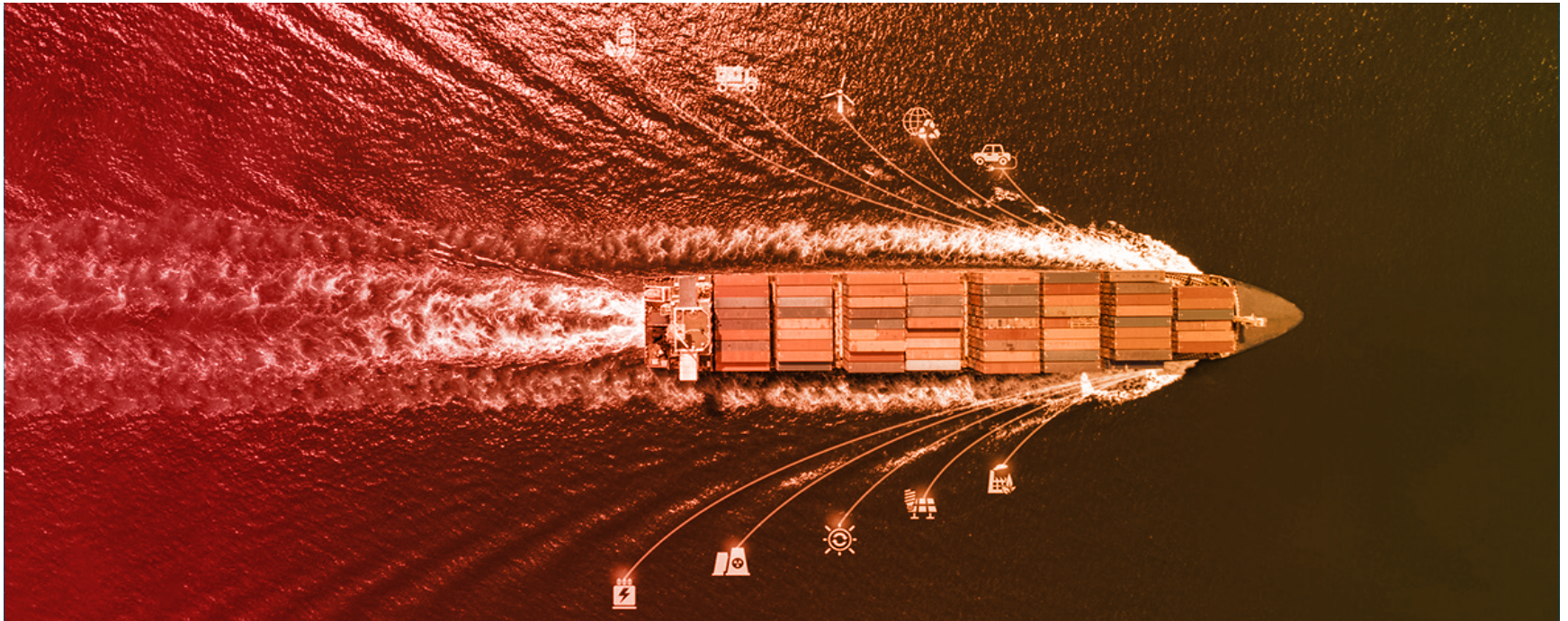
- Medium to Extra-Large Flake - **75% of overall production** of gC.
- Very clean geochemistry, no deleterious elements, remaining impurities are quartz and alumina.

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



# At a glance... MRI offtake for 100% of Uley 2, Stage 1

- Binding offtake with global metal and minerals trading group, MRI Trading AG delivers peer leading financial strength and unmatched commercial coverage
- Near perfect alignment with MRI markets and key customers focus, i.e., Europe, Japan, Korea
- MRI's regional freight capabilities provide excellent logistics fit and ensure access to best pricing options
- Innovative price setting methodology provides MRI with flexibility to contract strategically and the Company the opportunity to maximise prices in tight markets (see announcements for details)



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**THE GRAPHITE  
MARKET -  
CRYSTAL BALL  
GAZING**

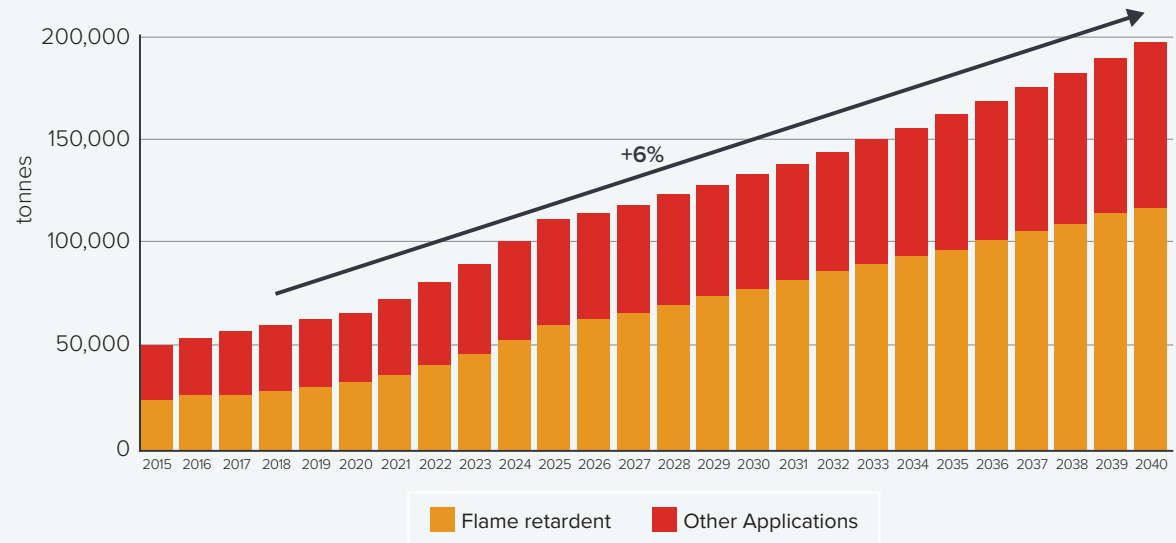
# Non EV Growth Segments... refractory, expandables, foils, etc.

- 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



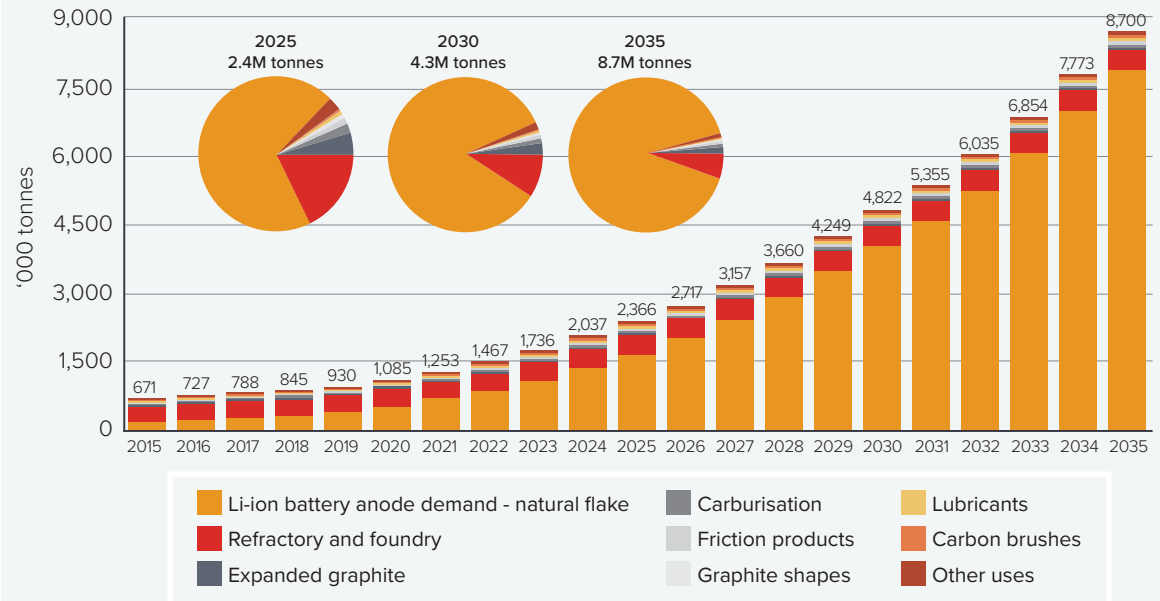
Source: Benchmark Mineral Intelligence

# 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



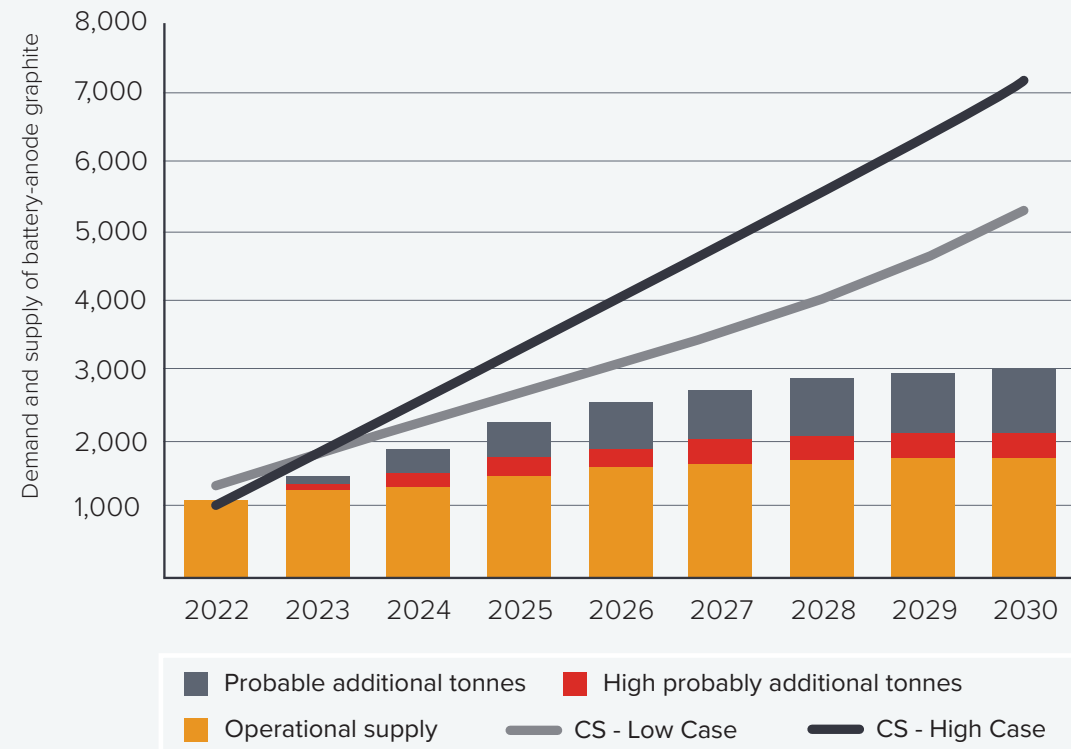
Source: Benchmark Mineral Intelligence

# 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

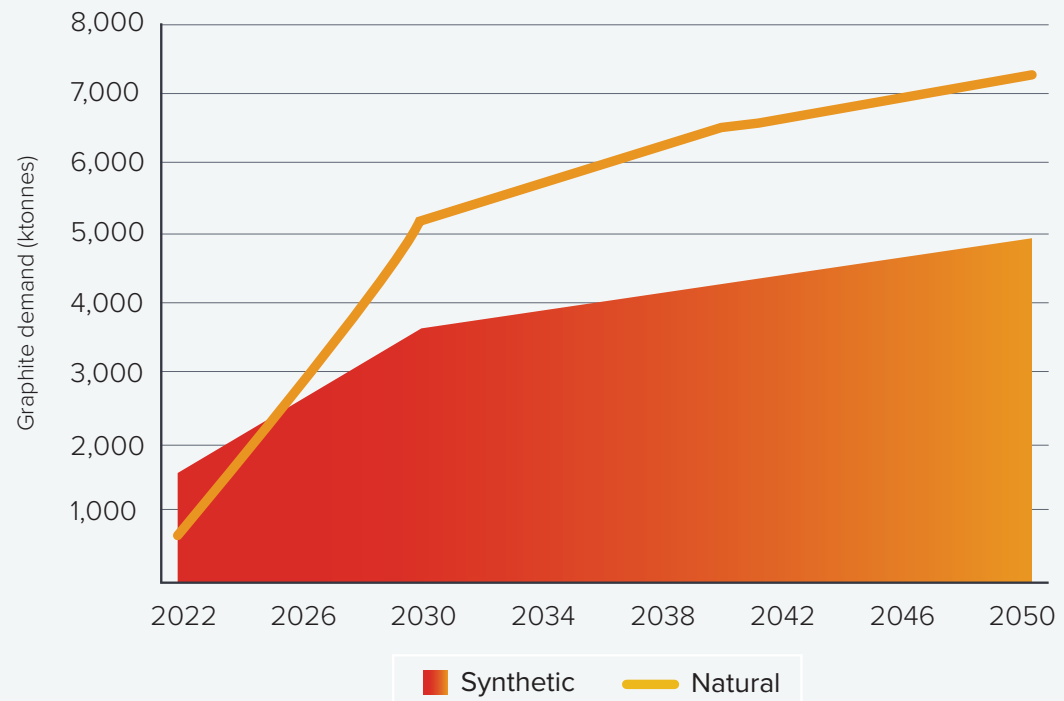


Source: Credit Suisse - Super Materials Demand Model; CS commodities

# 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



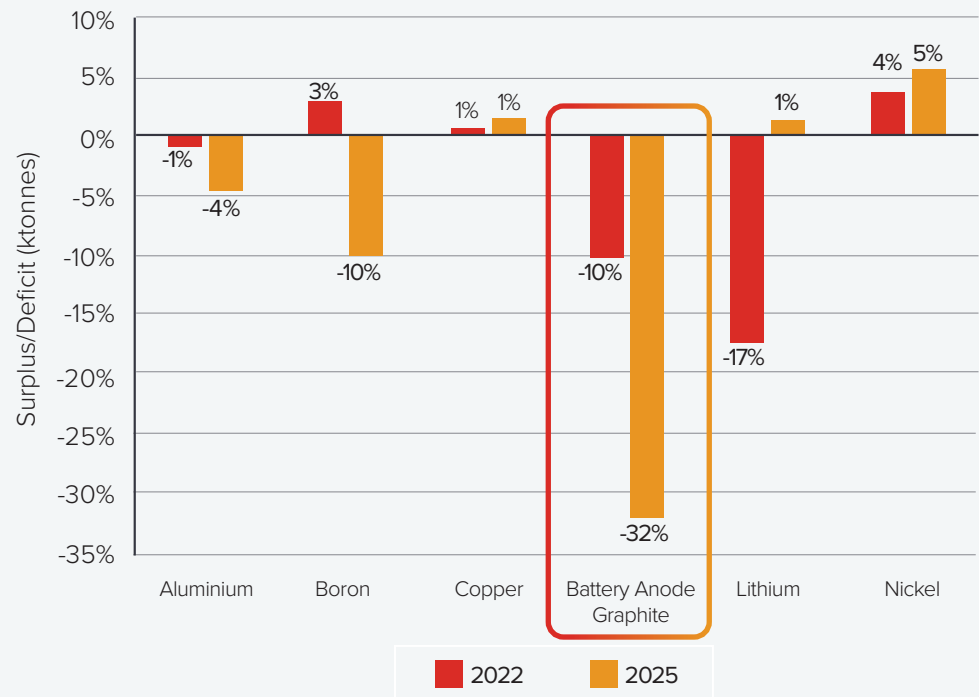
Source: Credit Suisse - Super Materials Demand Model

# 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

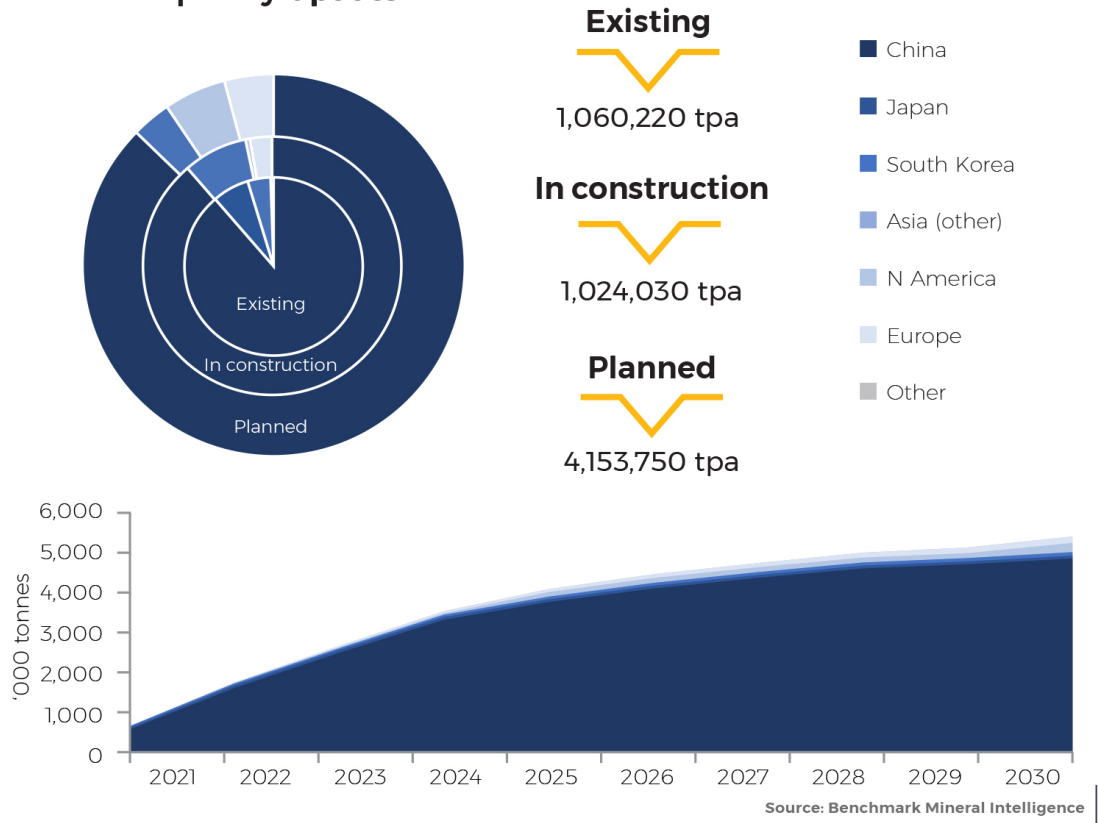


# CSPG, Anode production ex China... unlikely without partnerships

- 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



# 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

- Ex China strategy remains critical to exploiting flake graphite demand growth.
- Manufacture of CSPG (or anode!) by natural flake producers **is not an option**
- Development of key supply relationships with ex-China OEMs **is a short term priority**
- Development of downstream partnerships with alternative technology owners **is a medium term strategic priority**
- **Ensure execution readiness of mine expansion strategy**



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

# Crisis, transition, winners and losers...

OPINION ENERGY

## Why it's hard to join the dots in Australia's energy puzzle

Jennifer Hewett

Jun 20, 2022

Anthony Albanese and the Energy Security Board are determined to get the states' agreement on a capacity mechanism to provide backup power. But that requires allowing Victoria to exclude coal and gas from any payment.

Germany's decision to pass emergency laws to reopen mothballed coal mines is "bitter but essential", according to its economic minister, Robert Habeck.

That Habeck is a member of the Green Party in coalition with the Social Democrats demonstrates the political contortions in a global energy transformation suddenly desperately short of fossil fuels.

Even Australia's recent energy woes are only a mild version of the trauma threatening to cripple the German economy as Vladimir Putin further reduces supplies of Russian gas to a needy Europe. The price of Angela Merkel's deadline for shutting Germany's nuclear power and coal generation to rely on Russian gas and renewables is now stark.



The Albanese government is determined to avoid imposing such direct costs on Australian consumers and businesses despite supporting a much faster shift to more renewable energy as part of its 2030 emissions reduction target.

That balancing act is more difficult at a time of soaring global prices for coal and gas, and with no relief likely this year.

But as the past few weeks have proven, the practicalities of Australia's national energy transition and timetable are more complicated than suggested by the embrace of renewables. Energy security has become a much more important focus of public debate.

# 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

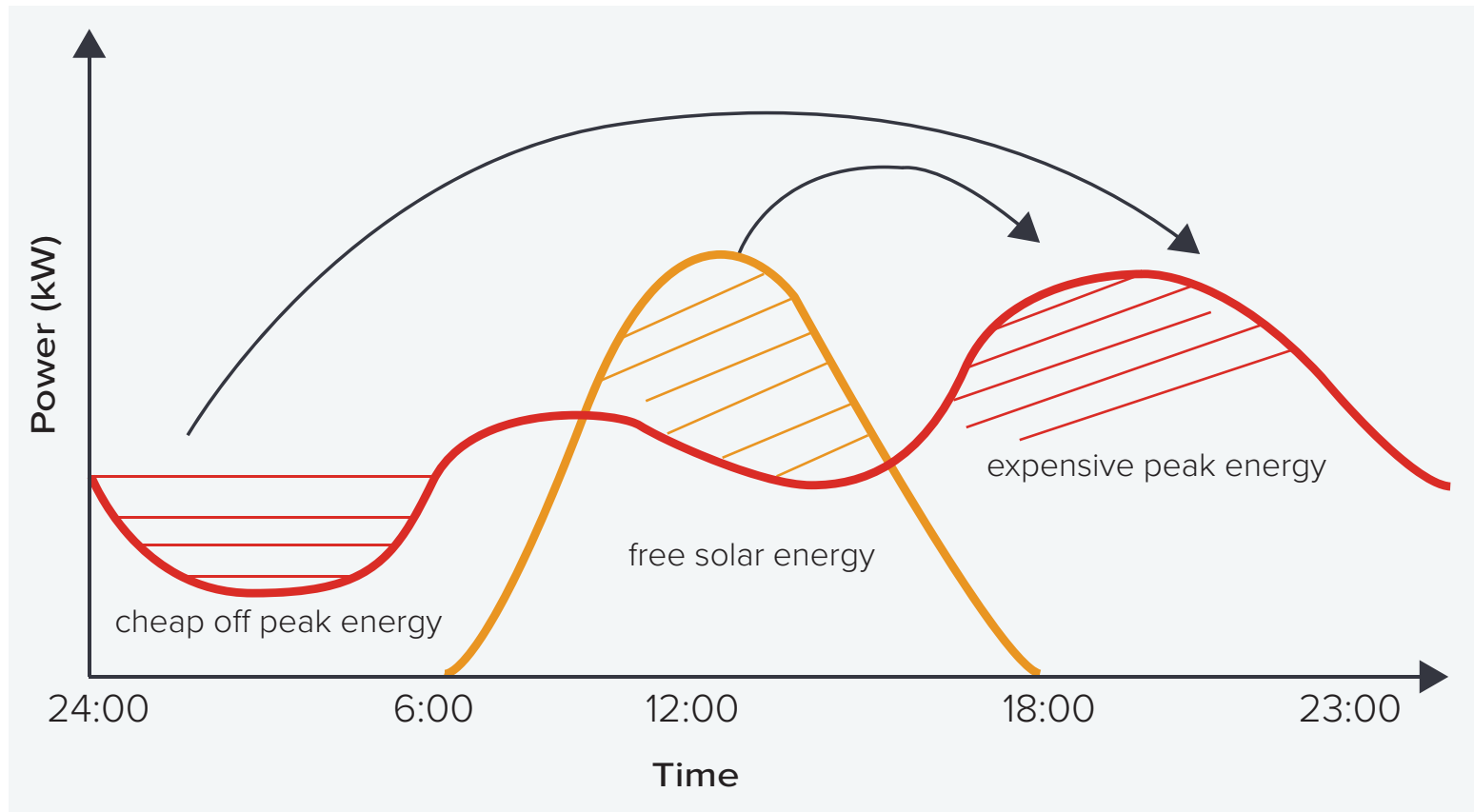
- Coal fired generators provide >40% of the NEM's base load and substantially all its inertia.

**BUT**

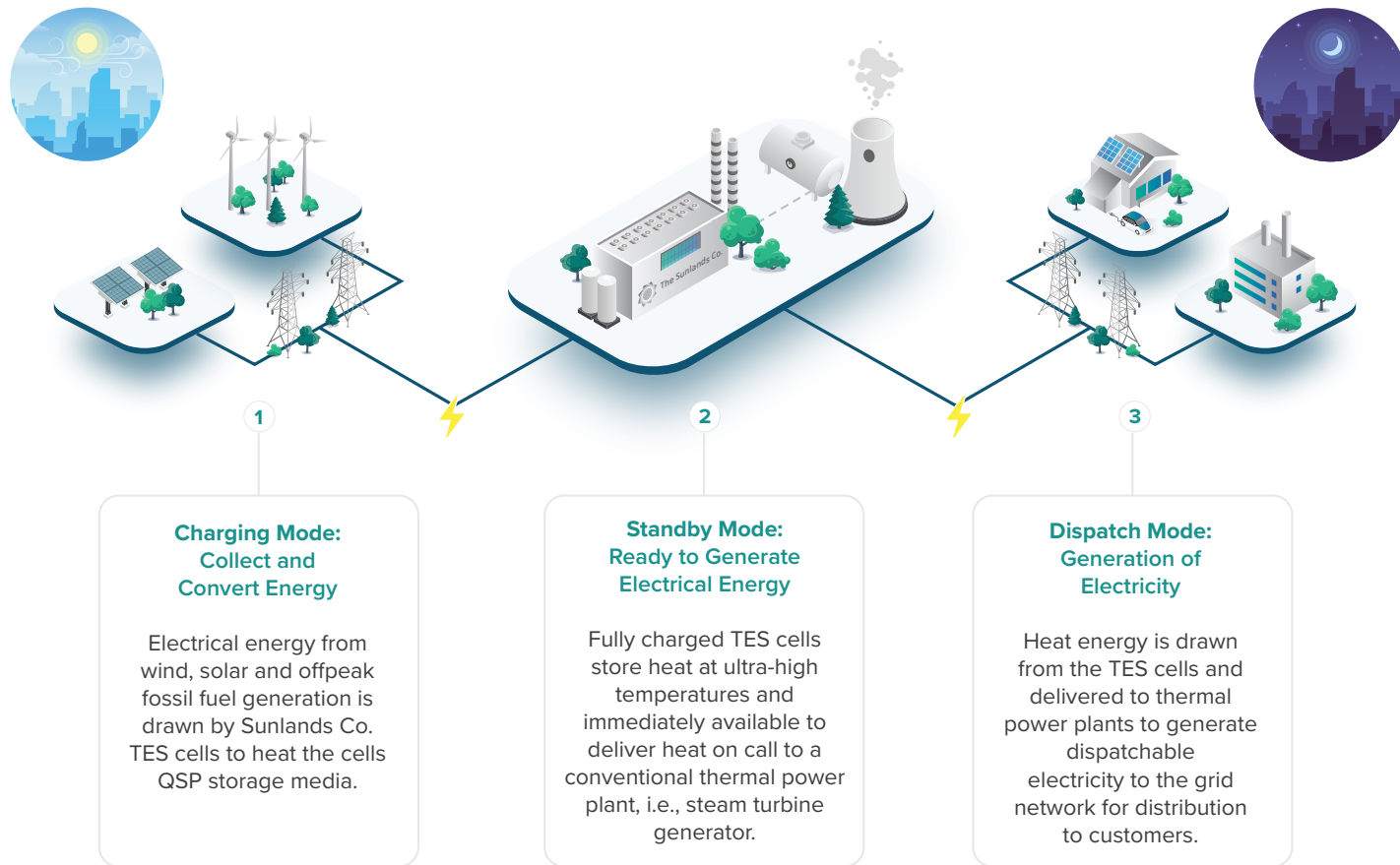
- Most of these facilities are scheduled to close within the next 7-15 years and solutions to replace the loss of inertia and dispatchability remain illusive.

# The Solution... long duration storage and the magic of time shifting

- Practically this is how long duration storage works



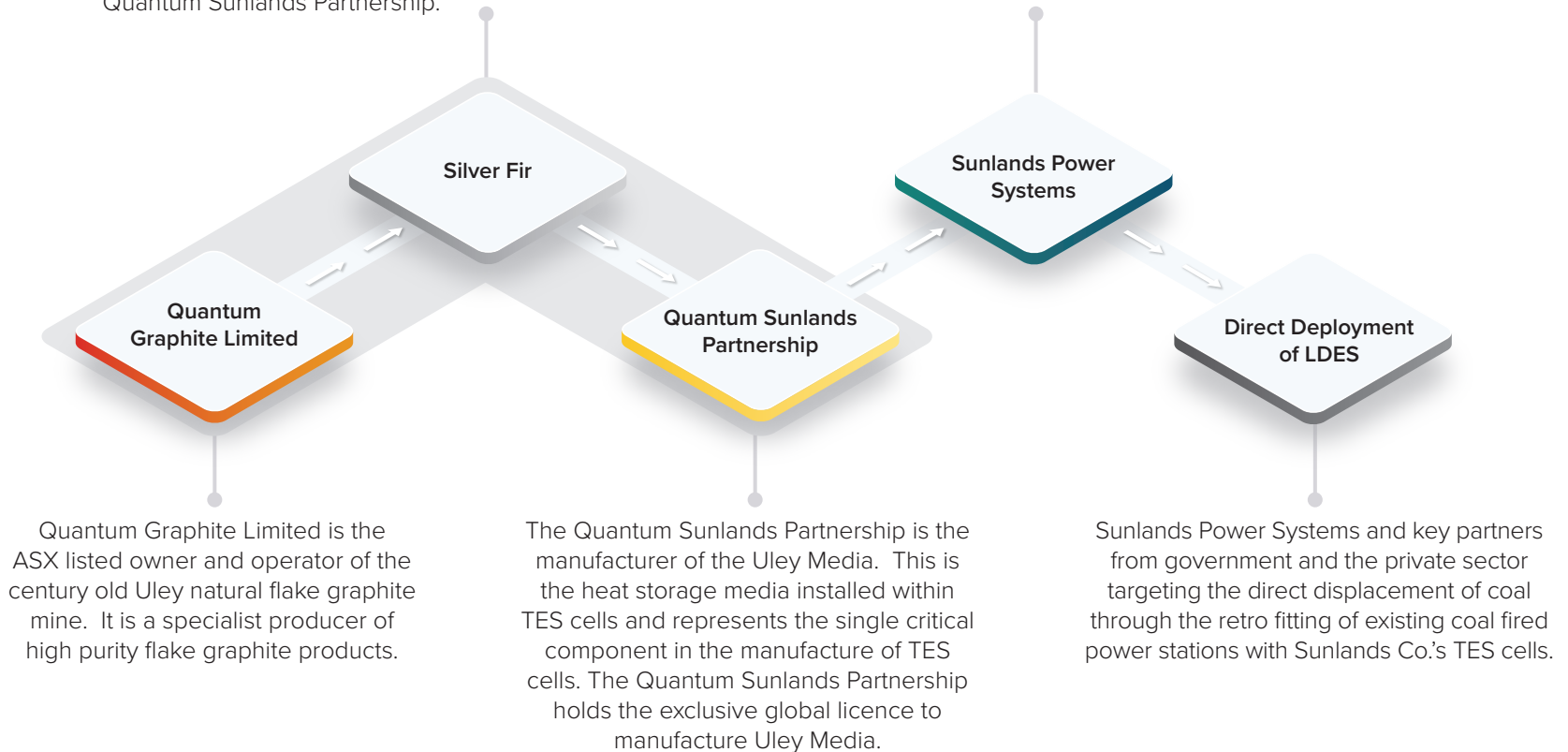
# The Solution... the grid and long duration energy storage (LDES)



# LDES supply chain... complete Australian solution

Silver Fir undertakes trading and commodity management services within the Chimaera Financial Group. It is responsible for the management of the flake products inventory including certification of all products and meeting the delivery schedules established by the Quantum Sunlands Partnership.

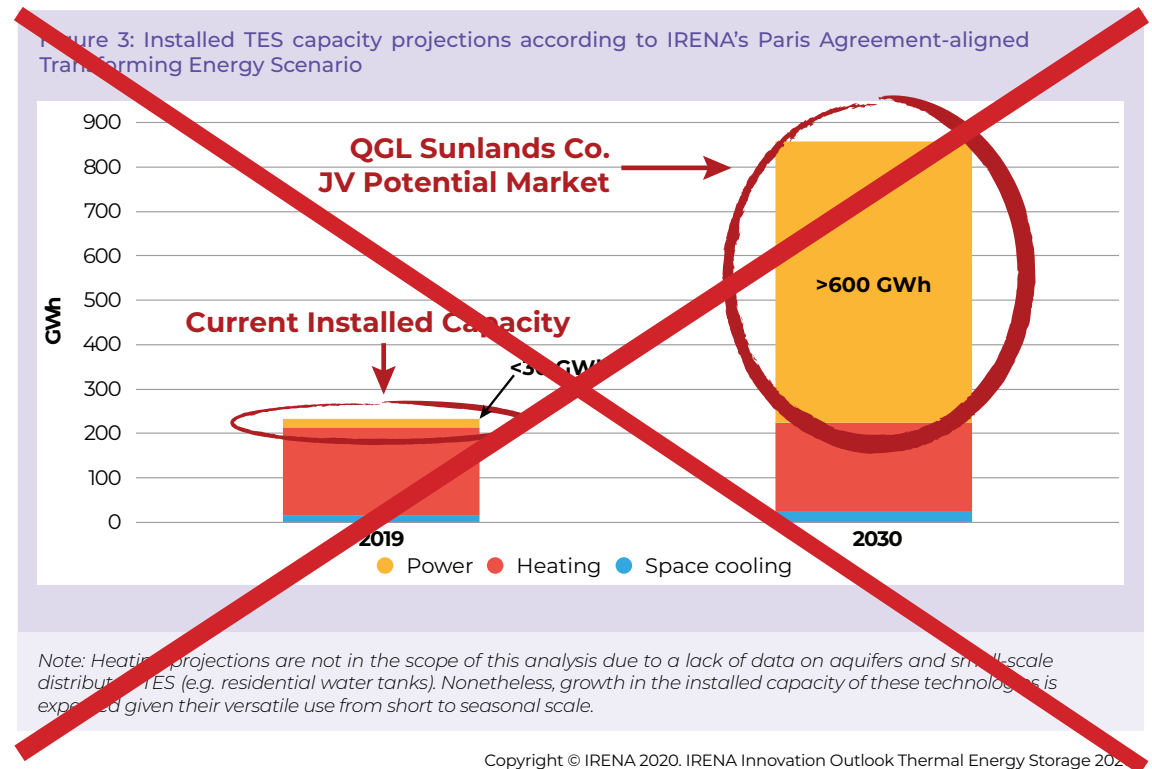
Sunlands Power Systems is responsible for the deployment and integration of TES cells within existing coal fired power plants or the complete greenfields installation of TES Generations Systems (i.e., TES cells and the thermal power plant).





# Long Duration Energy Storage... size of the market is getting bigger

- IRENA estimates the market to grow 20x within the decade
- Following Glasgow (COP 26) and Sharm El-Sheikh (COP 27) this estimated growth has 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



# Quantum Sunlands Partnership... economics

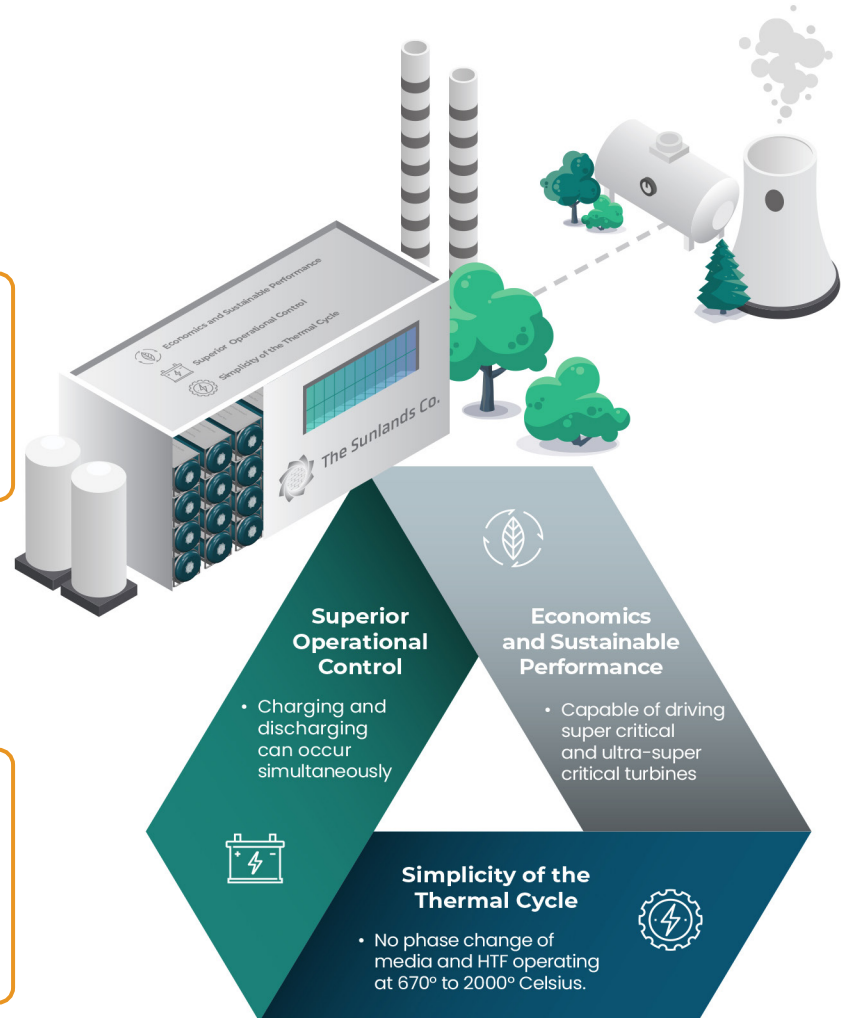
- The Quantum Sunlands Partnership (QSP) is the exclusive manufacturer of the natural flake thermal storage media required by Sunlands Co.'s energy storage cells

- 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

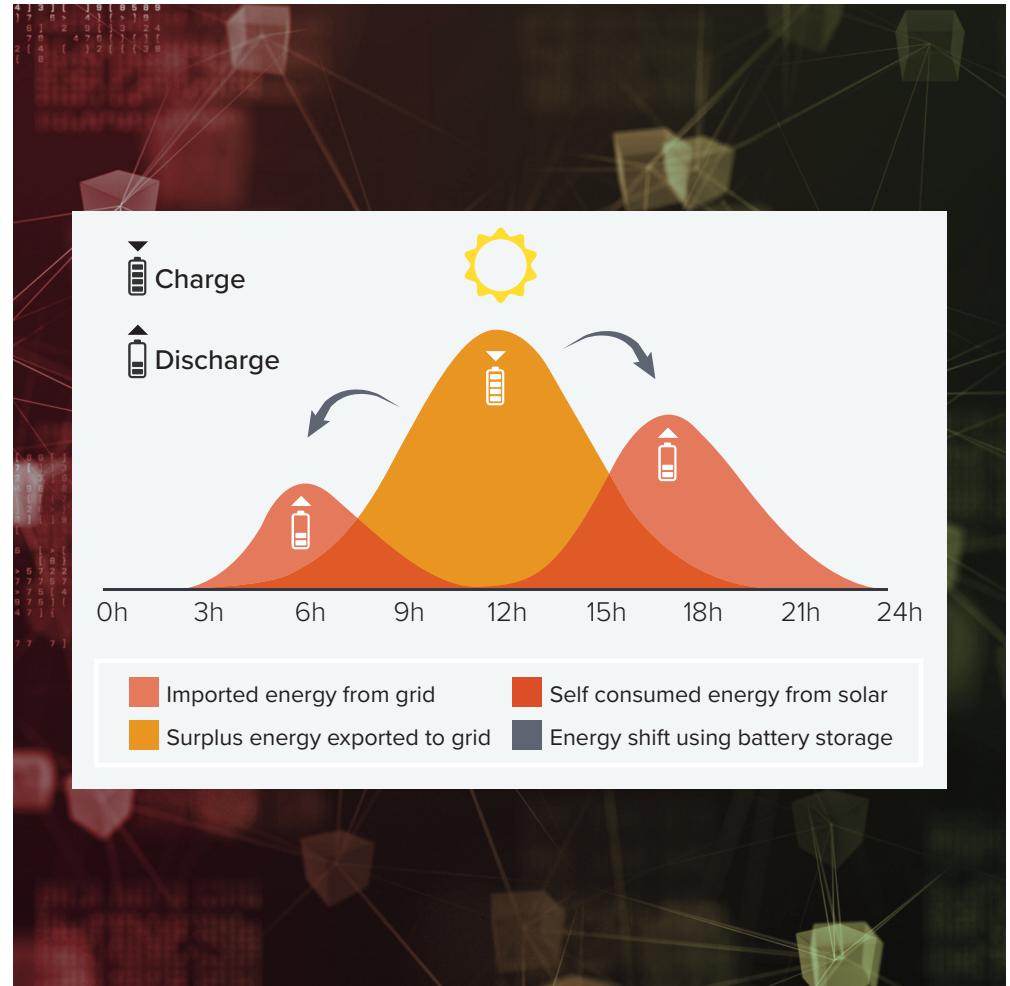
- QGL's estimated EBIT margin on every tonne sold to QSP (i.e., includes net contribution from its share of the JV) is estimated at US\$1,650 subject to completion of TU Freiburg (INEMET) final test work program



# The Technology... unique capability, ticks all boxes

- 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





# NEXT STEPS

# Where to from here...

## Quantum Graphite Limited

- Complete financing of Uley 2 including funding options for near term mine expansion (In progress)
- Upgrade feasibility to encompass Phase 2 production expansion (In progress)
- Ongoing resource definition and increase in reserves Uley 3 ✓ Completed

## Quantum Sunlands Partnership

- Complete TU Freiburg test work ✓ Completed
- Undertake feasibility for the construction of media storage facility ✓ Completed
- Construct energy storage cell pilot (FEED in progress)



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**QUESTIONS...**

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