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Shaw and Partners Global Graphite Conference

June 2023

[www.quantumgraphite.com](http://www.quantumgraphite.com)

[www.sunlandsc.com](http://www.sunlandsc.com)

**The Future of Graphite™**

# Background

In May 2022, QGL announced its innovative offtake agreement with MRI Trading AG for 100% of Uley 2 production for 5 years. This agreement contains a framework for collaboration between the parties to ensure that QGL maximises its economic yield per tonne of production sold to MRI.

The elements of this framework are:

- the advanced processing and refining of Uley 2 flake graphite for the key market segments considered strategically important to the parties; and
- the provision of ongoing technical support to MRI and its global customer base

This presentation summarises QGL's commercialisation strategy and the important target markets for its production, i.e.,

- supplying high purity graphite for the manufacture of anode material for Li-ion batteries
- supplying leading manufacturers with coarse flake for thermal management and engineered products
- supplying its joint venture partner with high purity graphite for the manufacture of thermal energy storage media and the construction of TES Graphite Cells



# Agenda

01

**EV Market Fundamentals**

**Why the Fuss?**

**Natural Flake vs Synthetic**

**Uley 2 Flake... Perfectly Pure**

02

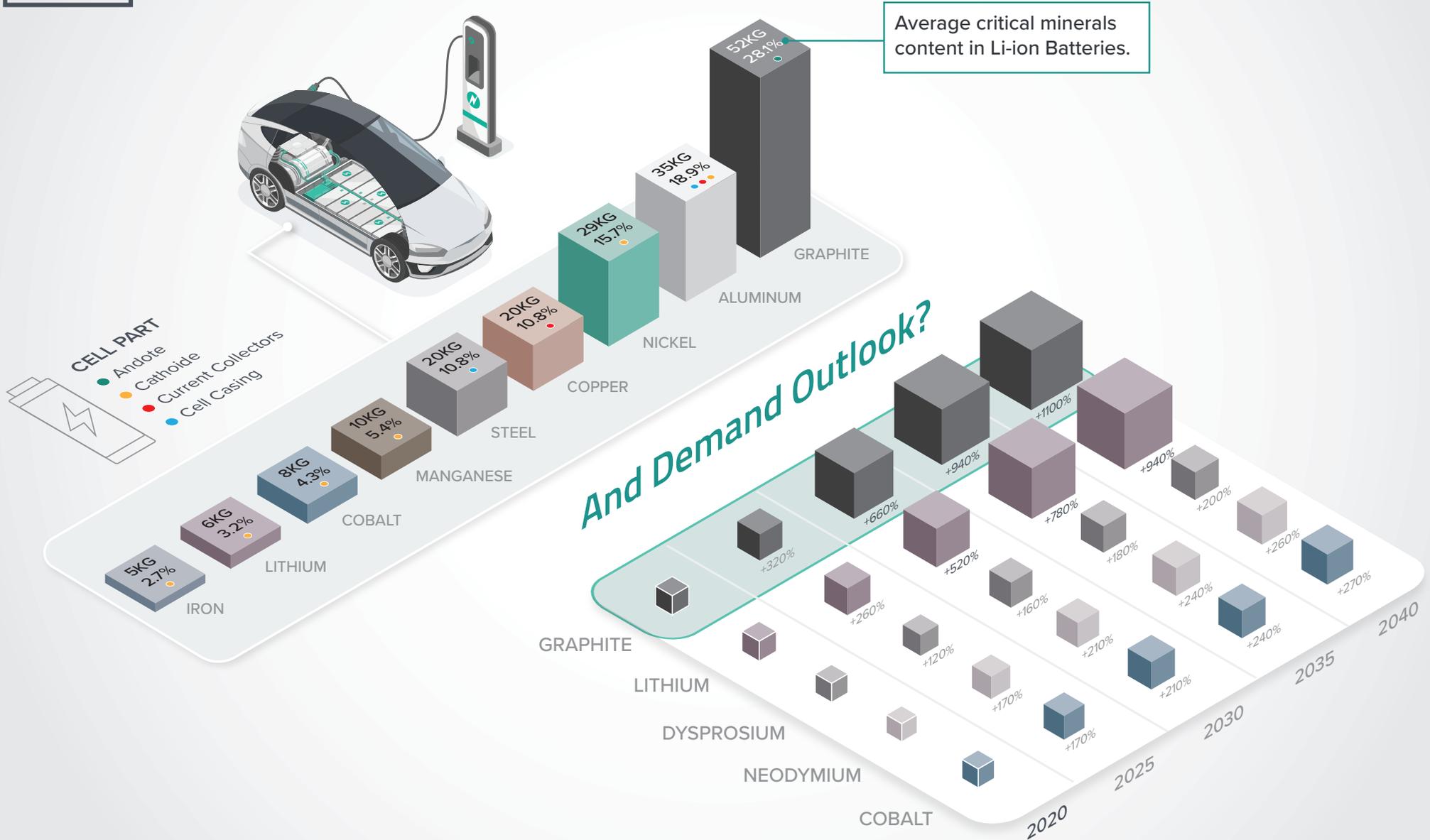
Industrial Use Growth

03

Long Duration Energy Storage



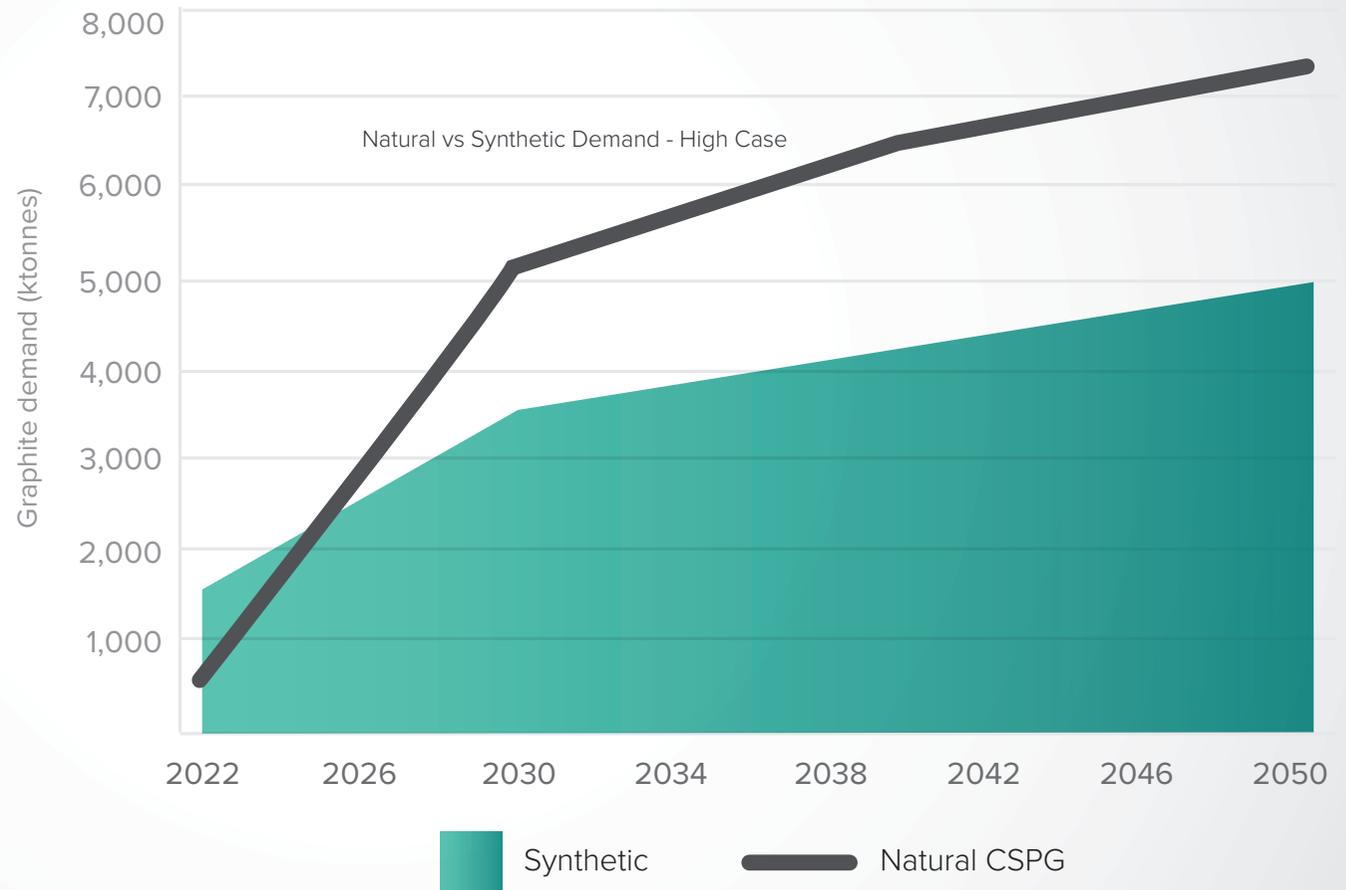
# Graphite - Why the Fuss?





## And watch this! Natural Flake CSPG v Synthetic

- Consensus demand forecast for natural flake is doubling every 5 years but the key relationship to watch is relative share of anode market of each of natural flake and synthetic
- Anode raw material synthetic to natural flake CSPG\* market share currently set at 2:1
- Over the next 12-18 months natural flake CSPG will increase from 1/3 anode market share to more than 50%
- From 2025 onwards, natural flake CSPG dominates anode raw material



Source: Credit Suisse - Super Materials Demand Model

\*Coated spheroidal purified natural flake graphite



## Uley 2 Flake... Perfectly Pure

Uley Flake Sample	Thermal Treatment Temperature					
	No thermal treatment	2,200°C	3,000°C Impurity Removal Efficiency*			
			80%	85%	90%	95%
<b>+195</b>	95.3%	97.7%	99.5%	99.6%	99.7%	99.8%

\*Predicted Graphite Purity after Thermal Treatment at 3,000°C

- Uley 2 flake's clean geochemistry makes it an ideal feed stock for anode production
- It responds beautifully to thermal purification utilising Sunlands Energy Company's technology
- First Phase of thermal treatment at 2,200°C eliminated 95% of all impurities and achieved purity across all Uley 2 flake products of 97.7% (see market announcement of 23 March 2023)
- Next and Final Phase of thermal treatment at 3,000°C completed and results due for market release in the next 7 days
- Based on First Phase of thermal treatment, projected purity is estimated to achieve at least 99.8%

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01

EV Market Fundamentals

02

**Industrial Use Growth**

**Growth forecasts for Refractory,  
Expandables, Foils**

**Uley 2 Flake Proven Performance**

03

Long Duration Energy Storage

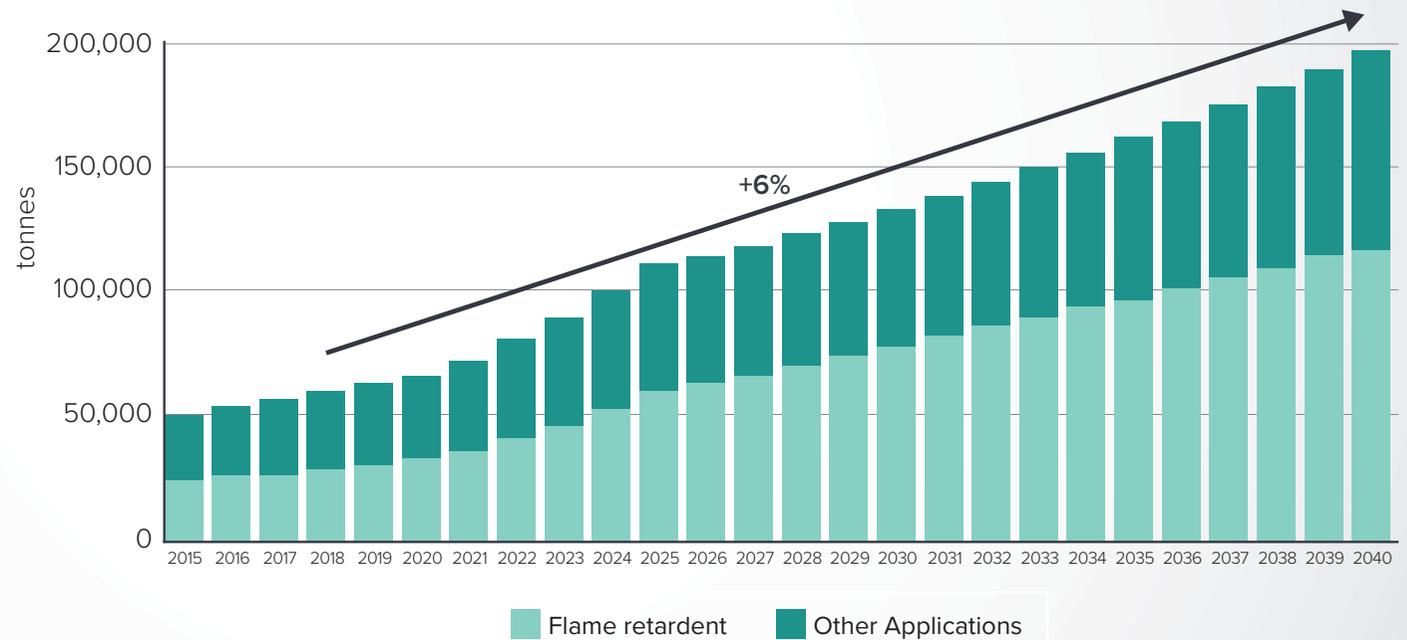


# Industrial Use... higher growth for refractory, expandables, foils, etc.

- 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



# Uley 2 Coarse Flake Proven Performance

- Uley flake product mix ideally suited to industrial applications, coarse flake represents more than 78% of Uley flake production
- Coarse Uley flake has an extensive history in thermal management products and engineered products
- Proven performance of Uley flake underpinned by clean geochemistry and excellent thermal properties



## Thermal Management Products

Geothermal, Refractories, Crucibles, Hot Metal Toppings, Foundry, HMF- Dispersions



## Engineered Products

Pencils, Lubricants, Friction, Powder Metallurgy, Drilling Fluids, Graphite Foils



# Uley 2 Coarse Flake Proven Performance

- Uley coarse flake has been prequalified with a number of major companies in both the thermal management and engineered products market segments

## Prequalifications

- RHI Magnesita – Europe
- Krosaki AMR – Spain
- Orient Refractories – India
- RASA – Japan
- Kelsen – Spain
- Nippon Crucible – Japan
- Zircar Crucible – India



# Agenda

01 EV Market Fundamentals

02 Industrial Use Growth

03 **Long Duration Energy Storage**

**The Biggest Game of All**

**The Sunlands Energy Co. Technology**

**LDES Economics**

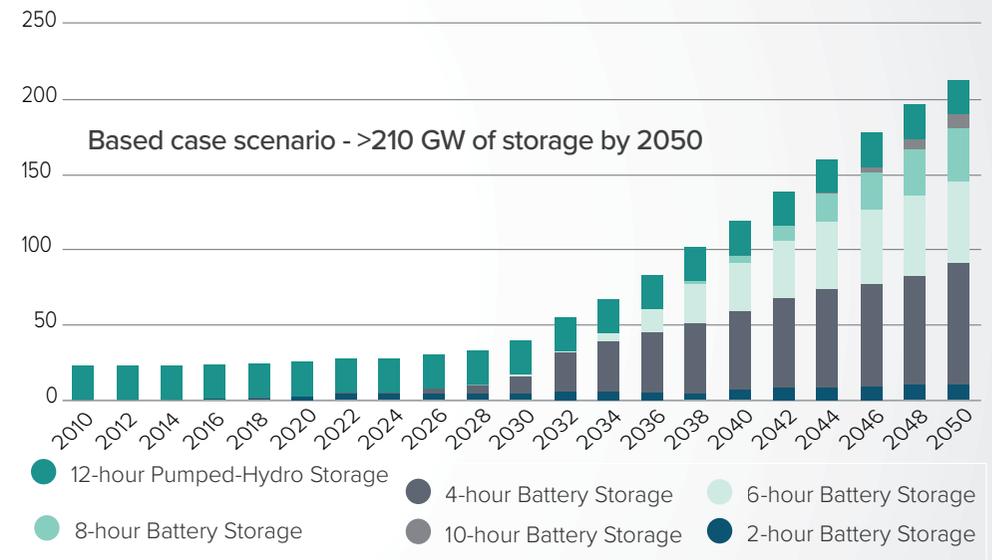
**LDES Delivery Platform**



# Thermal Energy Storage - Biggest Game of all

- In 2020 IRENA estimated the market to grow 20x within the decade
- Following Glasgow (COP 26) and Sharm El-Sheikh (COP 27) this estimated growth has increased significantly
- [Sunlands Power's independent Australian electricity market study \(see announcement of 10 March 2022\)](#) concluded that:
  - [Australia alone will require in excess of 10 GW of storage](#)
  - [Each GW of average requires 100,000 tonnes of natural flake graphite](#)
  - [Australia's storage needs have the potential to consume all of QGL's Uley 2 deposit](#)

**QGL's focus is the biggest game of all - the generational transformation of our grid network and the critical need for thermal LDES technologies**



Source: NREL, USA

**Together with our joint venture partner, our LDES solution delivers >12 hours of daily storage for days at a time without charge.**

## ABOUT LDES

A scalable energy storage system that can store energy predominantly from renewable sources for more than 12 hours and up to days at a time delivering dispatchable, inertia restoring energy to grid networks as required especially when renewables generation is not available. LDES is the critical solution underpinning the decarbonisation of grid networks.

## ABOUT THERMAL ENERGY STORAGE

Thermal energy storage (TES) is a type of energy storage that stores heat typically from the conversion of renewables electricity generation.

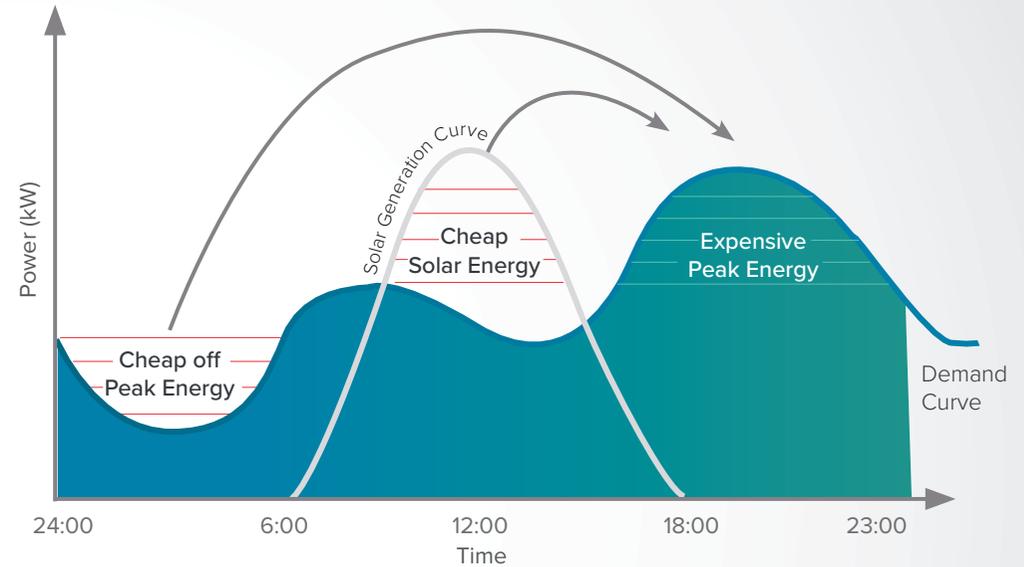
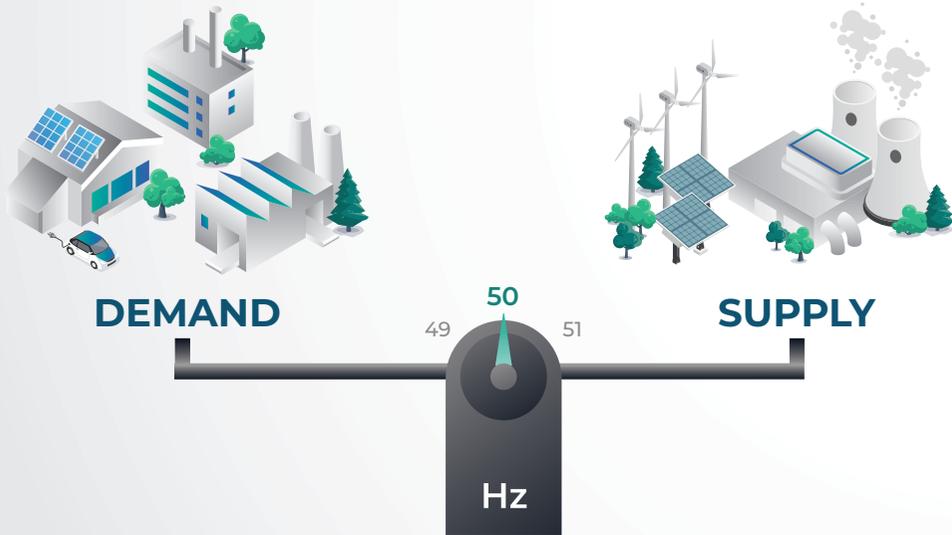


# Sunlands Energy Co. LDES Technology - Utilising Natural Flake to Deliver the Ultimate Decarbonisation<sup>++</sup> Solution



## <sup>+</sup>The Time Shifting Game

At periods of low demand (ie. off peak periods) and surplus generation (ie. excess solar PV) TES Graphite Cell facilities can be charged cheaply. Surplus renewable generation is often delivered to the grid at zero or negative prices and represents a massive pool of cheap power to charge TES Graphite cells.



## <sup>+</sup>Without Inertia The World Falls Apart

High levels of asynchronous generation = loss of inertia and frequency volatility = unstable grid networks. Sunlands TES Graphite Cell facilities deliver dispatchable generation that restores inertia and balance to the system.

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# Sunlands Power... economics



- Sunlands Power is the exclusive manufacturer of the natural flake thermal storage media and TES Graphite 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 - Sunlands Power transfer price assumptions based on sale of natural flake at the basket price of US\$919 and sale of manufactured thermal storage media at a price of US\$3,500 to US\$4,000
- QGL's estimated EBIT margin on every tonne sold to Sunlands Power (i.e., inclusive of minimum net contribution from its share of the JV) is estimated at US\$1,650



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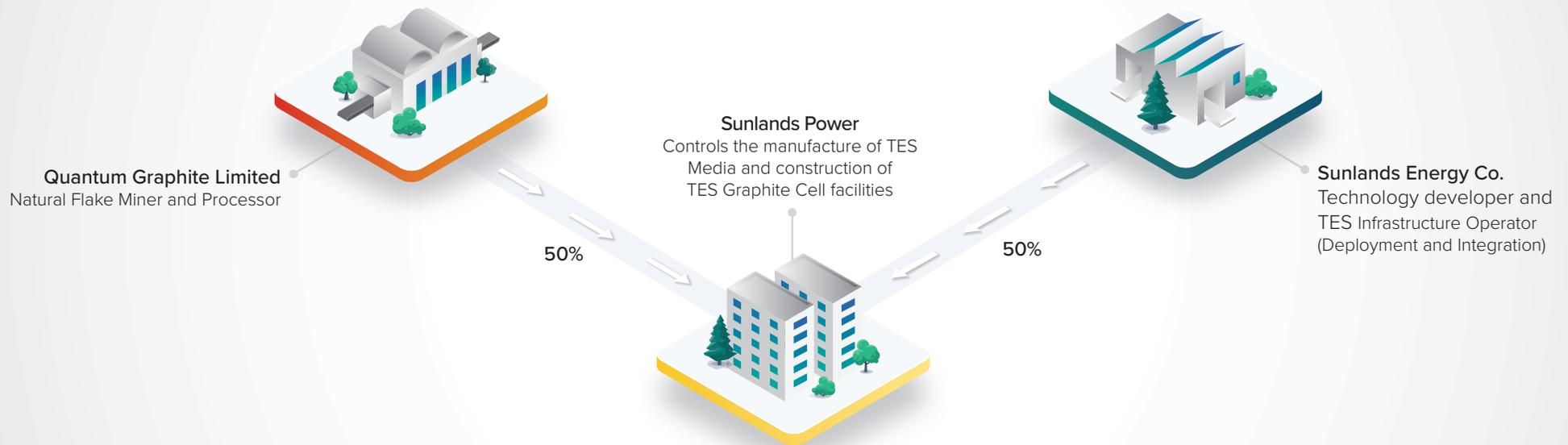
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# Sunlands Power - Delivering a Global LDES Platform



## Integrated Operational Platform



The critical raw material processing and supply of flake graphite, the manufacturing of TES Media and the construction of TES Graphite Cell facilities complete the LDES global delivery platform.

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