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MEDIA RELEASE
For Immediate Release
17 December 2025

Presentation delivered at the 2025 Singapore Scientific Conference

The Company and its joint venture partner, Sunlands Energy Co, were invited to deliver a presentation at the recent Singapore Scientific Conference. The conference showcases developing technologies in the area of science and sustainability. The presentation was delivered by company director, Michael Wyer, and is attached.



FOR MORE INFORMATION PLEASE CONTACT:
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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, quantumgraphite.com

ABOUT SUNLANDS ENERGY CO.

Sunlands Energy Co. is the leading developer of thermal energy storage technology (TES Graphite Cells) designed to drive commercial, industrial and utility-scale steam turbine generators. The company's TES Graphite Cells are capable of restoring baseload generation, delivering critical synchronous support to grid networks and eliminating the large-scale curtailment of renewables generation. For further information, www.sunlandsco.com

ABOUT THE SINGAPORE SCIENTIFIC CONFERENCE 2025

The Singapore Scientific Conference 2025 offers a global platform to discuss the latest scientific advancements and foster collaborations to address pressing sustainability challenges in energy, environment, health, and manufacturing. For further information, singaporesciconf.org

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QUANTUM GRAPHITE

Sunlands Energy Co.

Sunlands Energy Co. TES Graphite Cells

Scalable Long Duration Energy Storage



Singapore Scientific Conference

December 2025

Synopsis

- LONG DURATION ENERGY STORAGE (LDES) does not mean 2-hours storage and dispatch. It does not mean 4-hours. It means at least 10-hours storage and dispatch, and it also means you should be able to do that every day of the year.
- OPERATING TEMPERATURE RANGE: The single most critical feature of our technology is an operating temperature range that enables it to be paired with the leading, most efficient turbine technology available. This capability, typically reserved for large fossil fuel or nuclear-powered generation, underpins the potential to deliver dispatchable electricity to existing grids and sustain system inertia
- UNLIMITED CYCLES: Our technology can generate ultra-supercritical steam from intermittent power for 24 hours a day, 365 days a year. Unlimited cycles and 60+ year life
- INERTIA: Our technology can restore baseload generation and critical inertia to grid networks. This means much of the existing generation and transmission infrastructure can be retained, substantially cutting the costs of decarbonisation.
- VARIABLE RENEWABLE ENERGY: Intermittent or asynchronous generation has created dysfunctional grid networks and pricing arbitrage opportunities especially storing energy during peak renewable production and releasing it during peak demand
- AI DATA CENTRES have come from left-field as a super-user of 24/7 power workloads that poses risks for any grid which is heavily reliant on variable renewable energy. Sunlands can provide 100MW dedicated power modules to large-scale data centre campuses

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Agenda

01 Who Are We?

02 What is a Thermal Battery?

03 How does a Sunlands TES Graphite Cell work?

04 Use cases

05 Commercialisation runway

06 Appendices

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1. **Who Are We?** A Technology and Critical Minerals Partnership

CRITICAL MINERALS PARTNER

QUANTUM GRAPHITE



Exclusive graphite mineral source

TECHNOLOGY PARTNER

Sunlands Energy Co.



Proprietary TES battery technology

Sunlands Power

50%

50%



TES Graphite Cell

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2. What is a Thermal Battery? The Thermal Storage Media is Key

Let's look at several of the "thermal batteries" which are in the market today and the storage media

1. Kraftblock
(steel slag)



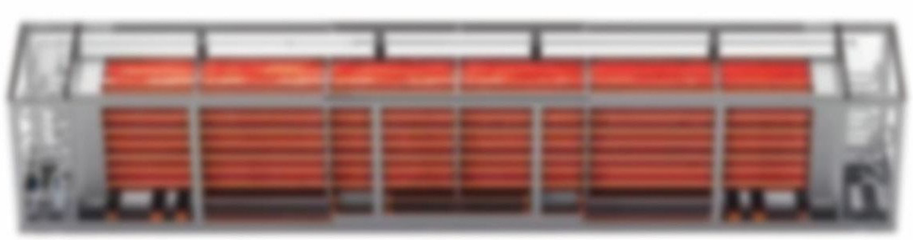
2. Rondo Energy
(bricks)



3. Antora Energy
(recycled carbon)



4. Brenmiller Energy
(crushed rocks)



5. The Sunlands Energy Co.
(graphite)

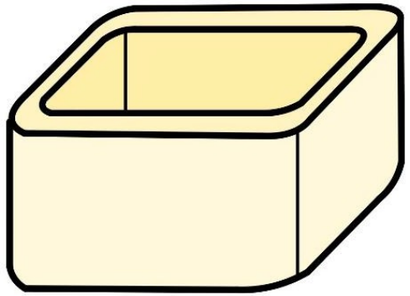


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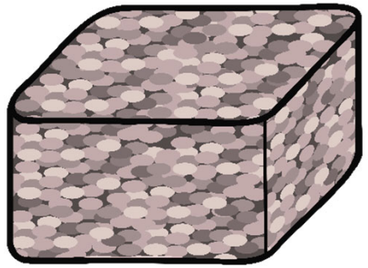
2. What is a Sunlands TES Graphite Cell?

A **TES Graphite Cell** is made up of a number of Internal Storage Modules (ISMs). These modules comprise of three major components:

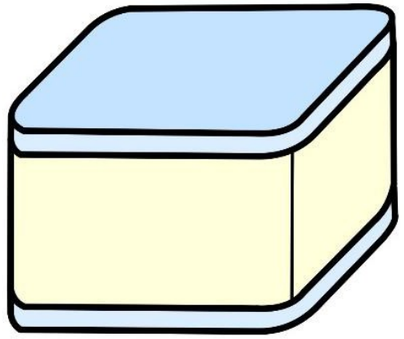
1. "Housing" component - high-end refractory material



2. "Storage Media" component - the flake graphite-based media which sits inside the Housing



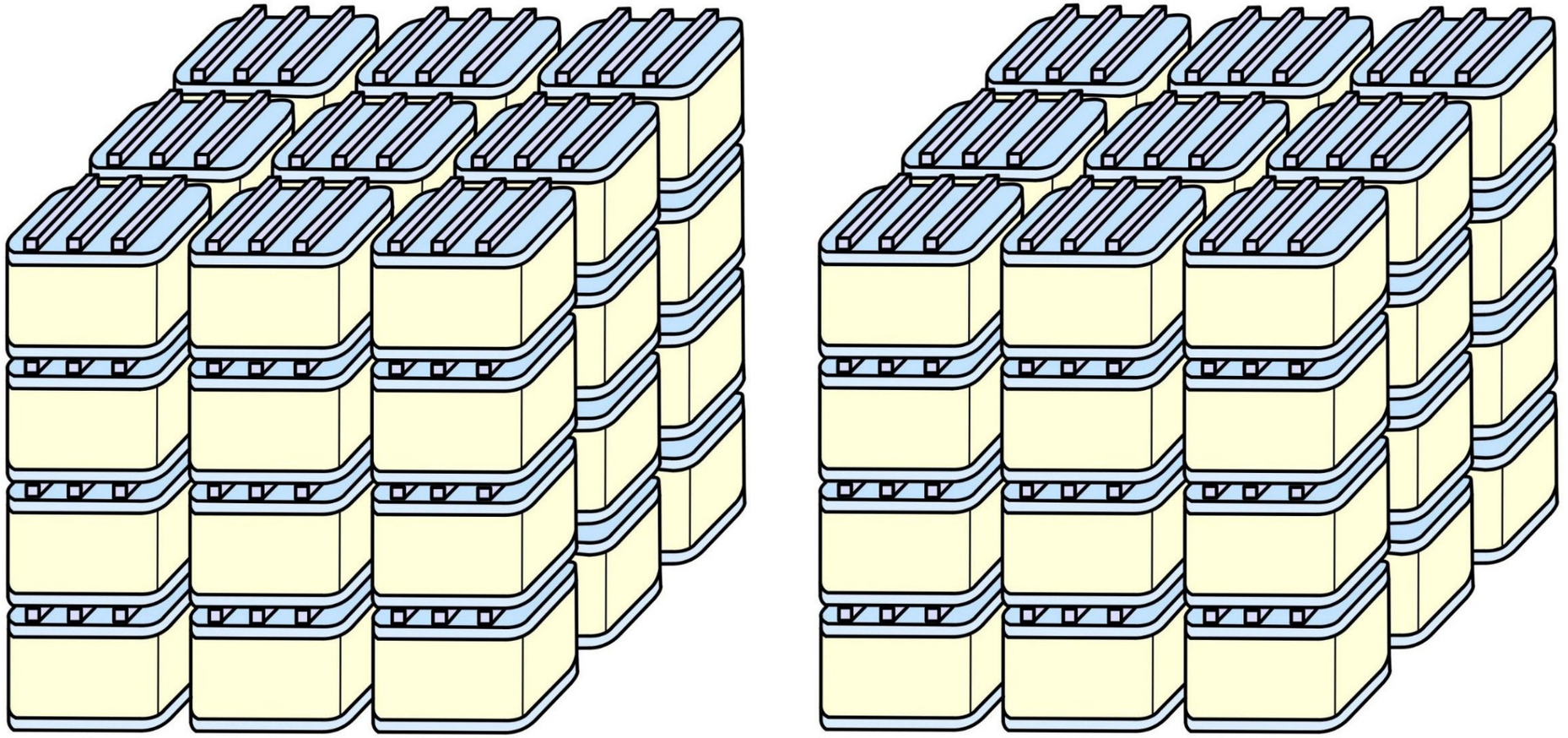
3. “Electrodes” component – two solid isostatic graphite plates that sandwich the Housing and Storage Media



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2. What is a Sunlands TES Graphite Cell?

ISMs are stacked and separated by electrodes.

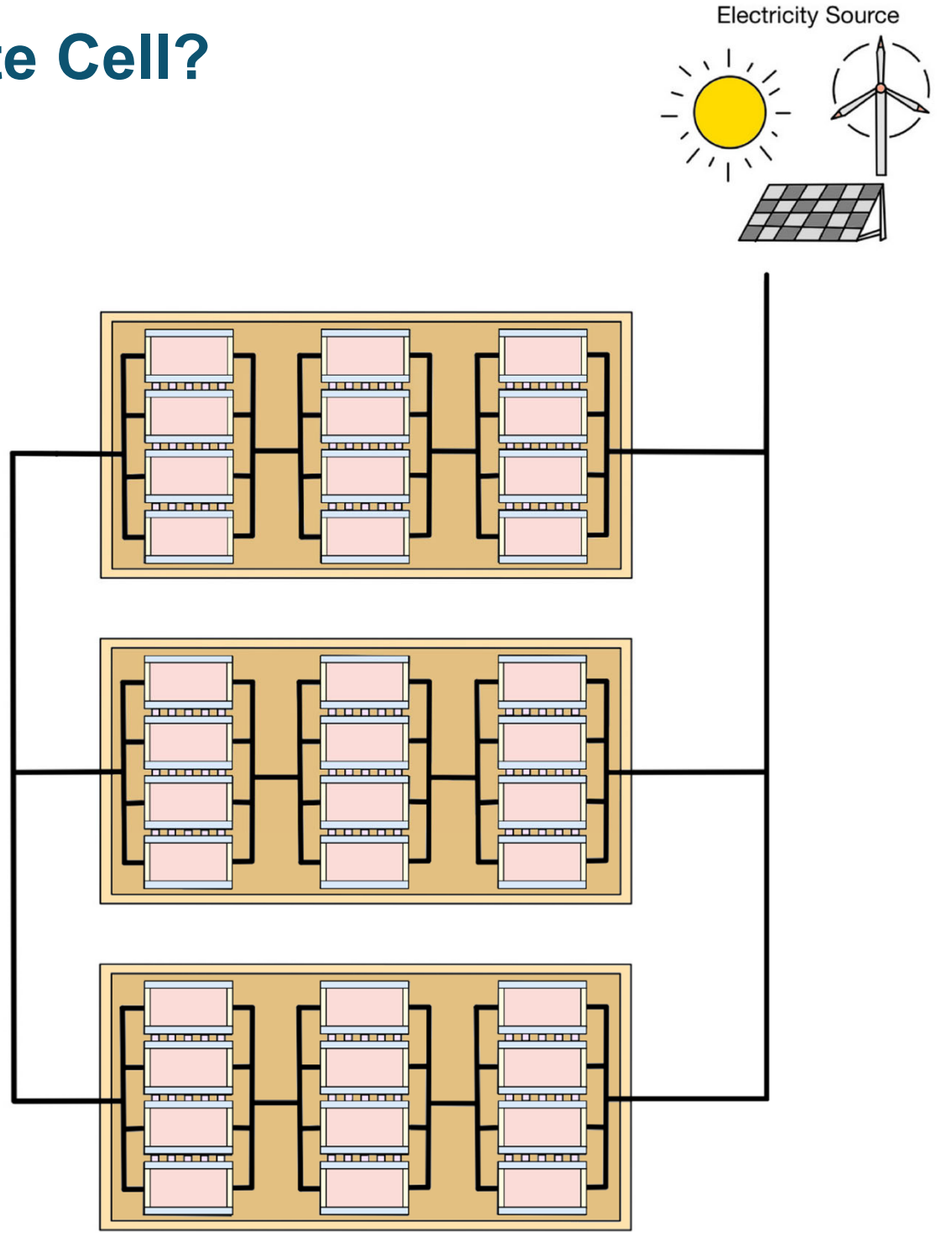


STACKED ARRAYS OF INTERNAL BATTERY MODULES

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2. What is a Sunlands TES Graphite Cell?

- ISMs are essentially scalable thermo-electric circuits
- Arrays of ISMs are grouped as parallel circuits connected in series.
- To power this circuit, each TES Graphite Cell is connected to an external electricity source (e.g. a renewable source).



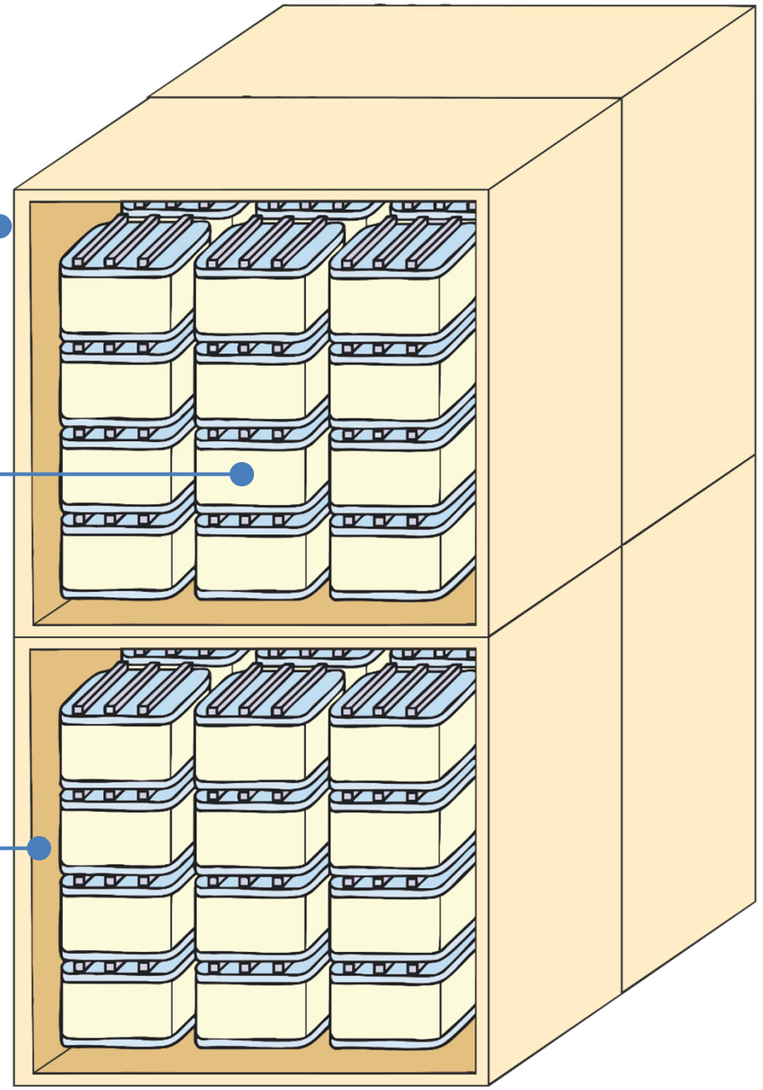
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2. What is a Sunlands TES Graphite Cell?

The chamber encloses the stacks

Arrays of ISMs are contained in a refractory chamber

A **heat conductive fluid** flows within the chamber and is the principal means for the transfer of heat to the thermal power plant



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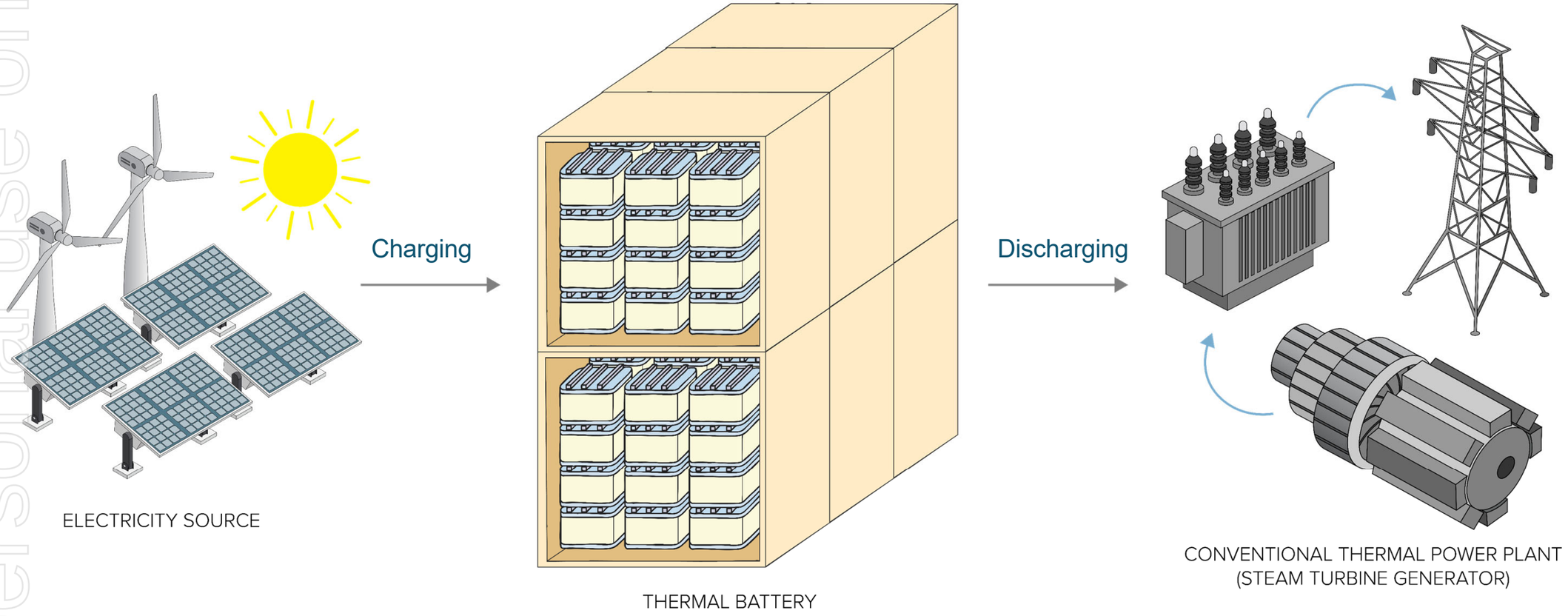
05 Commercialisation runway

06 Appendices

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3. How Does a Sunlands TES Graphite Cell work?

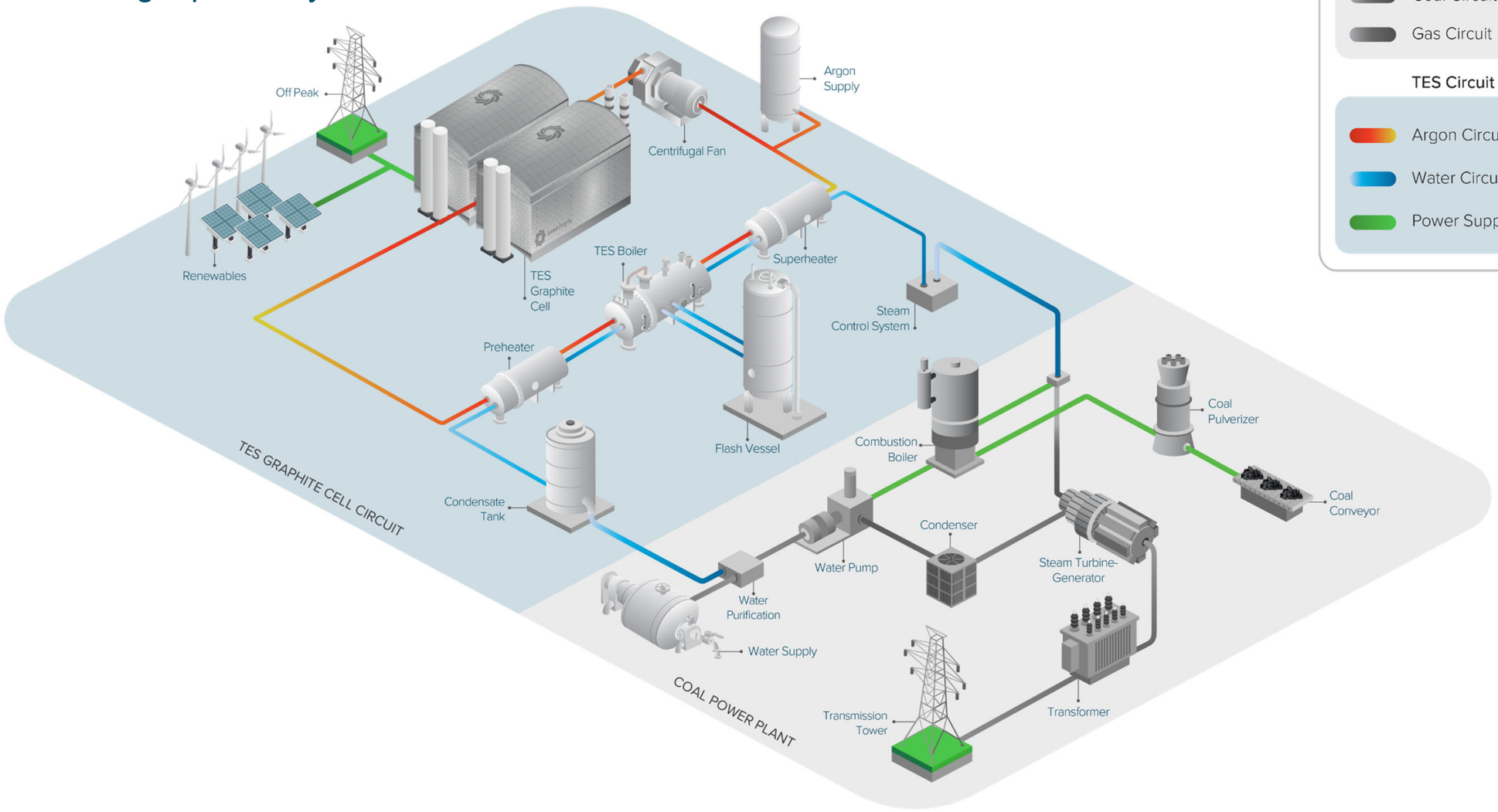
The Charging / Discharging Cycle



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3. How Does a Sunlands TES Graphite Cell work?

Retrofitting Optionality – Coal Plant



LEGEND

Existing Thermal Circuit

- Coal Circuit
- Gas Circuit

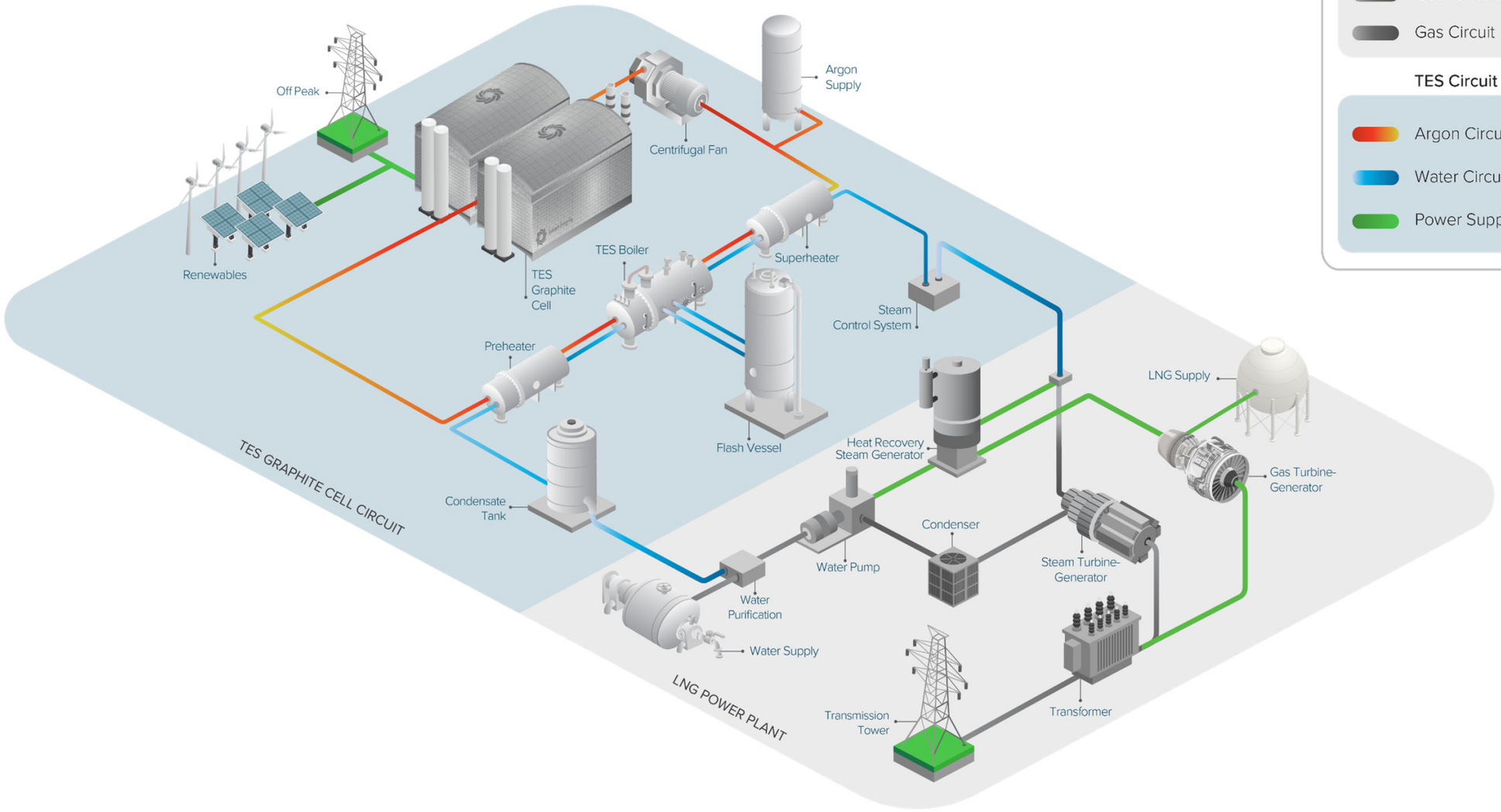
TES Circuit

- Argon Circuit
- Water Circuit
- Power Supply

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3. How Does a Sunlands TES Graphite Cell work?

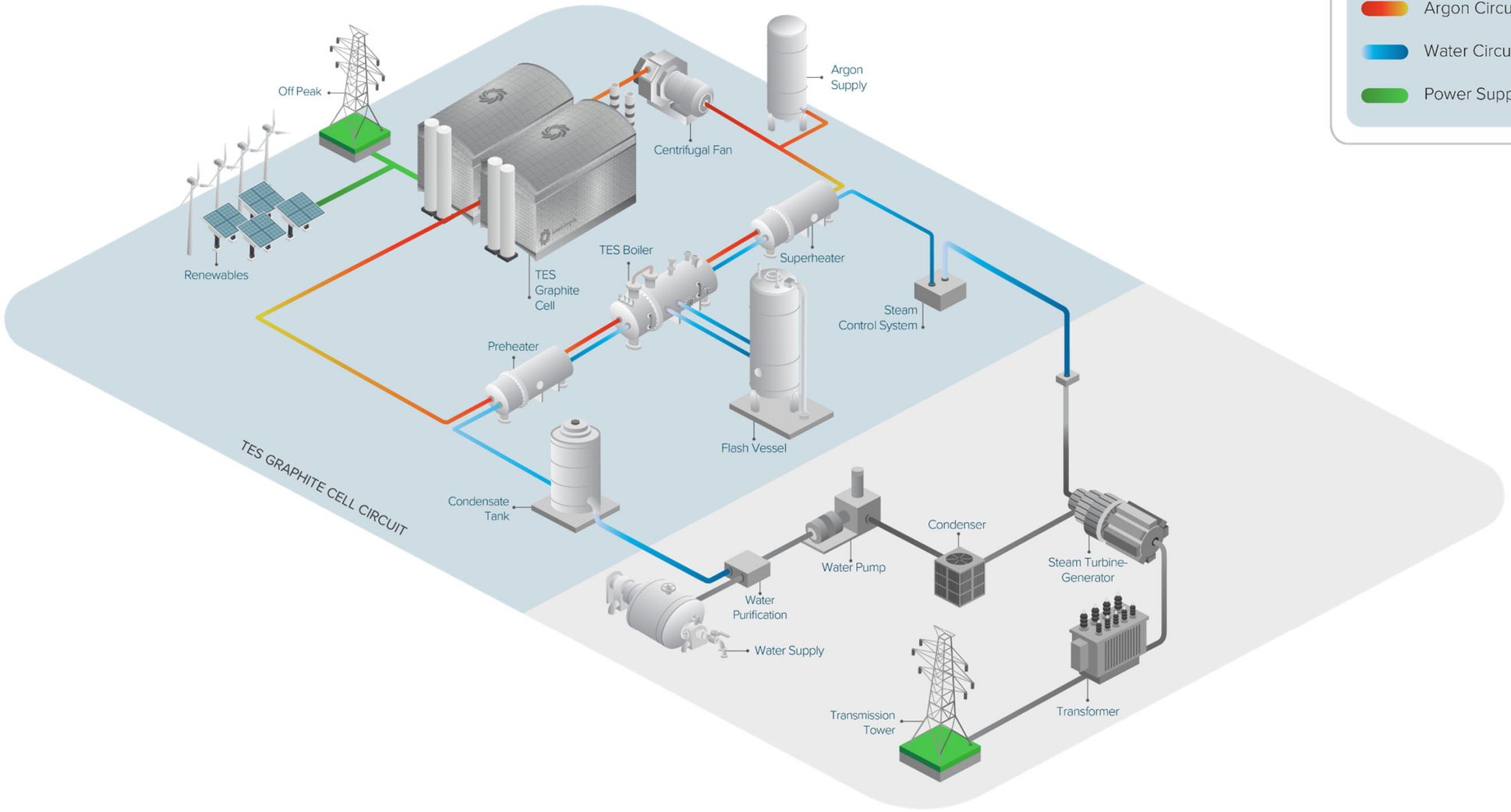
Retrofitting Optionality – Gas Plant



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3. How Does a Sunlands TES Graphite Cell work?

Greenfields Installation



LEGEND

TES Circuit

- Argon Circuit
- Water Circuit
- Power Supply

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4. Use Case – Retrofit coal power plant: 500MW

TES Graphite Cells can be deployed in stages and operate effectively as the transition solution to zero CO_2 emissions.

100% Coal

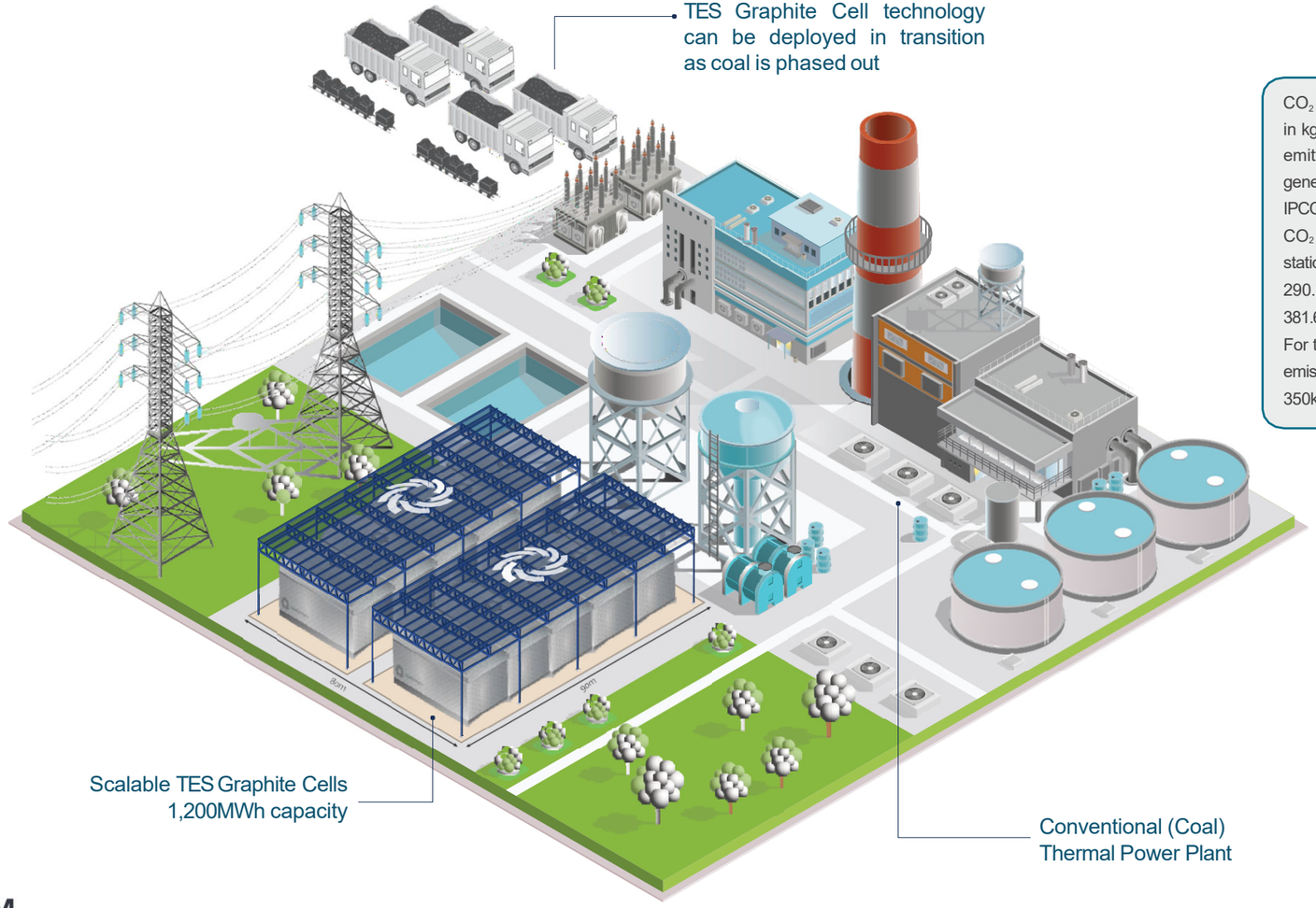
BEFORE Installation of TES Graphite Cell
Coal Consumption 2.30 million tonnes per annum
CO_2 emissions 1.50 million tonnes per annum

50% Coal

In Transition 250MW TES Graphite Cell
Coal Consumption 1.15million tonnes per annum
CO_2 emissions 0.75 million tonnes per annum

0% Coal

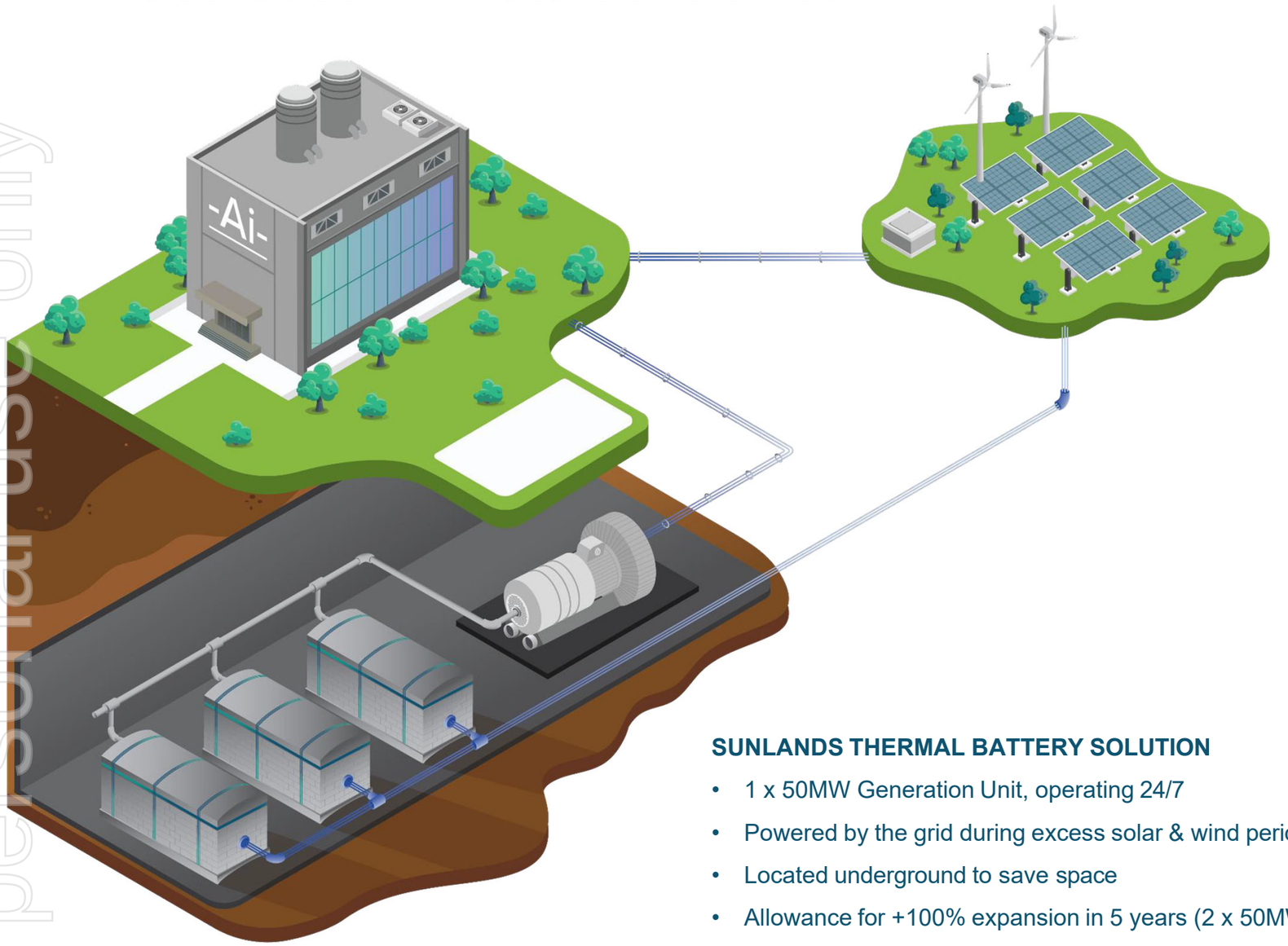
AFTER Installation of 500MW TES Graphite Cell
Coal Consumption 0 million tonnes per annum
CO_2 emissions 0 million tonnes per annum



CO_2 emission calculations are measured in kg/MWhr, i.e., kilograms of CO_2 emitted per megawatt hour of electricity generation. Based on the IPCC's Emission Factor Database (2023), CO_2 emissions from coal fired power stations range from approximately 290.52kg/MWhr (Bitumen) to 381.6kg/MWhr (Peat).
For the purposes of this illustration a CO_2 emissions factor of approximately 350kg/MWhr has been adopted.

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4. Use Case: AI Data Centre 100MW



THE PROBLEM

- A 100MW data centre (US$1billion) demands a significant and reliable power supply on a 24/7 basis
- GPU-intensive workloads (NVIDIA chips) built for parallel processing in AI training consume 10x more power than conventional servers
- The high power density of AI hardware generates immense heat, making traditional air-cooling solutions inadequate.
- Cooling infrastructure must now match the intensity of the workloads it supports.
- Data centres urged to bring their own wind, solar and batteries so they don't trip the grid

SUNLANDS THERMAL BATTERY SOLUTION

- 1 x 50MW Generation Unit, operating 24/7
- Powered by the grid during excess solar & wind periods
- Located underground to save space
- Allowance for +100% expansion in 5 years (2 x 50MW)

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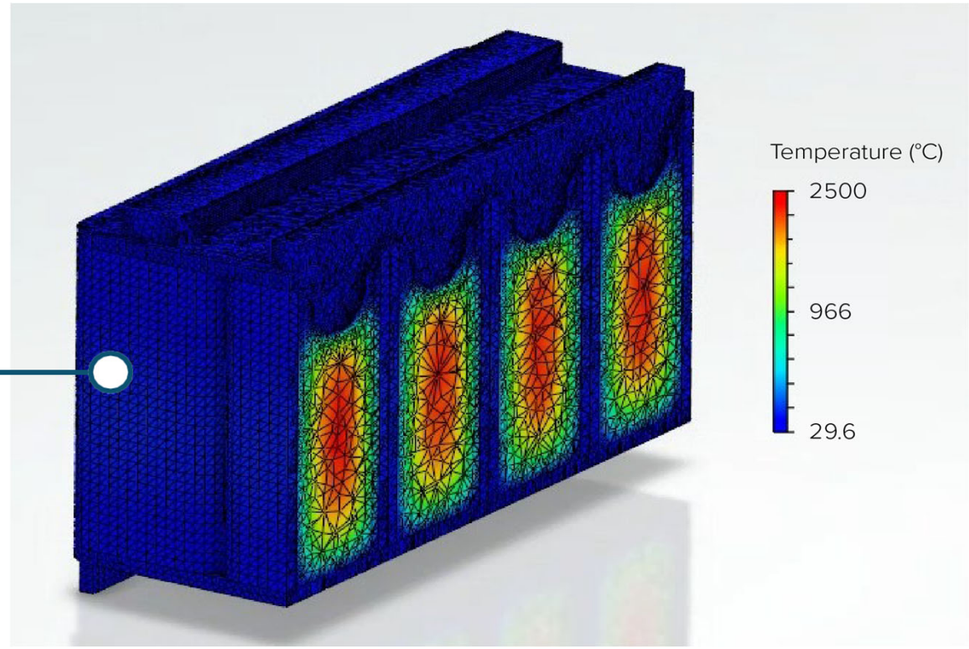
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5. Commercialisation runway

PILOT PLANT ⟶ DEMONSTRATION PLANT ⟶ DEPLOYMENT

- We have built a pilot plant and conducted detailed materials testing and thermal dynamics testing
- We are building a 5MWh Small Scale Plant in Australia (250kW @ 20 hours per day)
- In discussion with Singapore's EPGC (Electrification and Power Grids Centre) to build a larger Mid Scale Plant at the EPGC test facility at Jurong, Singapore
- Singapore Institute of Technology (SIT) engaged to undertake Simulation Modelling to benchmark charge cycles and discharge cycles

Battery Stack Charging Simulation Model, SIT



Maximum temperature of 2500°C, which is close to the expected range for graphite media

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Appendices

I. Market Overview – Retrofit

II. Peer Comparison – LDES

III. 50+ Years Graphite Supply

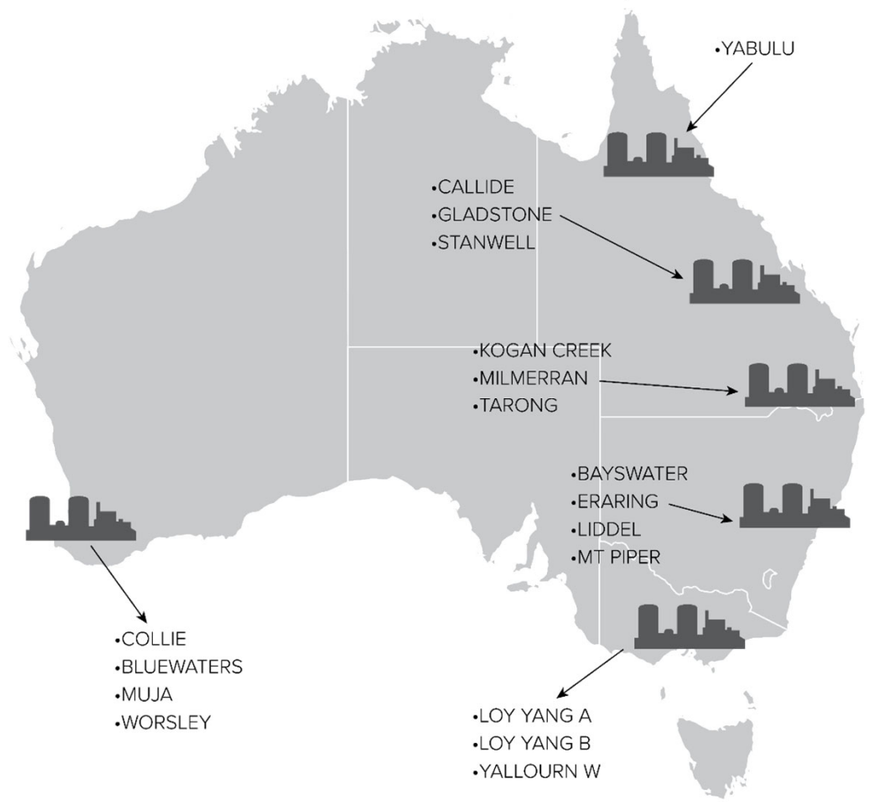
IV. Speaker Biography & Contact Details

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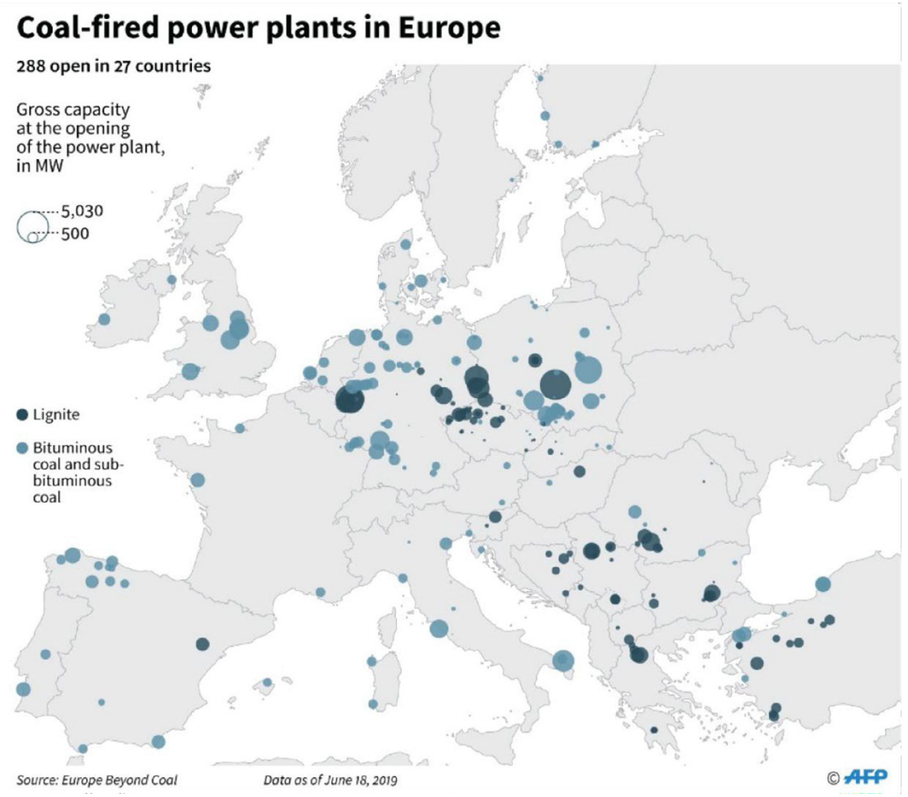
Appendix I: LDES market potential demand for flake graphite is massive

Demand for retrofitting coal-fired power plants

- Australia has approximately 10GW generation capacity of coal-fired power plants
- Australia thermal power plants burn more than 70 million tonnes of coal each year



- Eight EU countries plan to phase out coal by 2030
- Each of these markets represent an even larger opportunity than Australia
- Total generation capacity exceeds 400GW
- The aggregate coal consumed each year exceeds 300 million tonnes



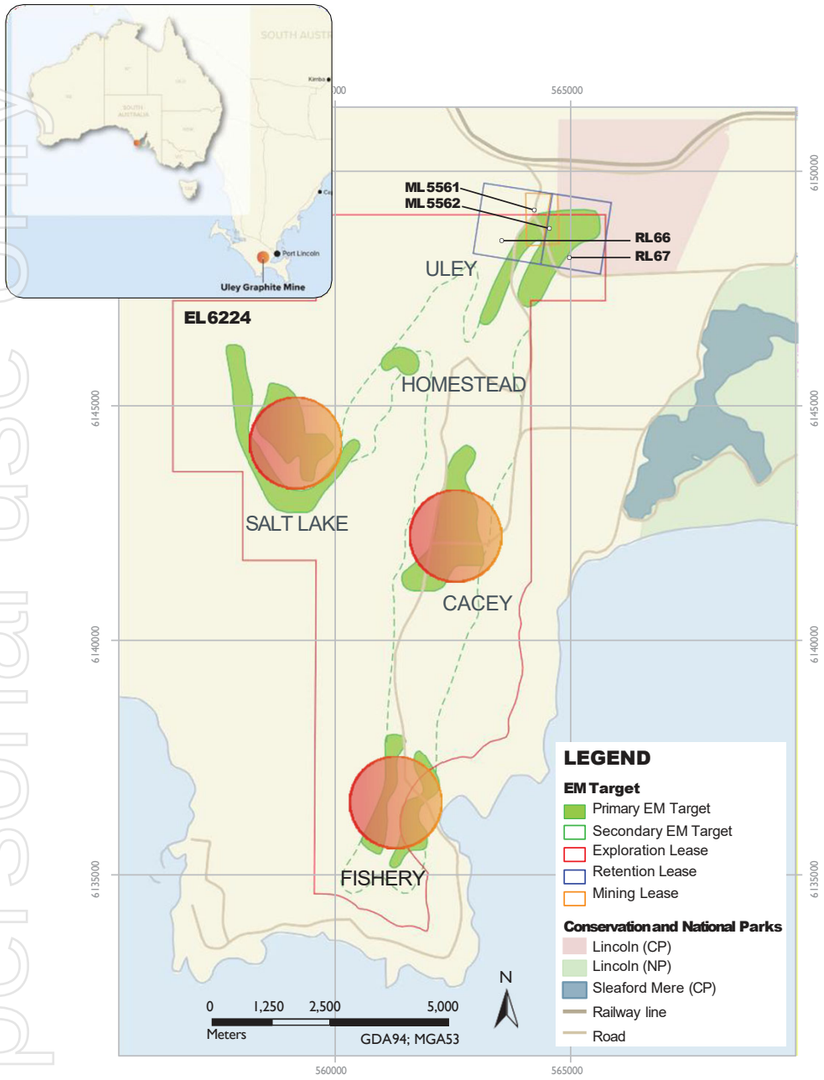
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Appendix II: Peer Comparison

	SUNLANDS ENERGY CO.	KRAFTBLOCK	BRENMILLER	ENERGY NEST	FOURTH POWER	ANTORA ENERGY	RONDO ENERGY	MGA THERMAL
MAXIMUM SINGLE CELL DISCHARGE	>10MWh	1MWh	1MWh	2MWh	1MWh	10MWh	20MWh	5MWh
MAXIMUM CYCLE	>14 Days	48hrs	48hrs	48hrs	100hrs	100hrs	24hrs	48hrs
CYCLE LIFE	Unlimited	15,000	10,000	20,000	10,000	Unlimited	Unlimited	Not Available
PLANT LIFE	>30 years	>30 years	30 years	50 years	30 years	>30 years	40 years	30 years
ELECTRICITY TO HEAT EFFICIENCY	99%	98%	97%	93%	Not Applicable	98%	98%	93%
OPERATING °C RANGE	550 - 2,550	350 - 1,400	20 - 650	20 - 450	1,900 - 2,400	20 - 1,500	80 - 1,500	400 - 700
HEAT LOSS PER DAY	<1% Per Day	1 - 3%	Not Available	3%	1%	1%	1%	1%
SUPERCRITICAL STEAM CAPABILITY	Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
GRIDSCALE/C&I ELECTRICITY GENERATION	Available	Limited	Limited	Limited	Under Development	Under Development	Not Applicable	Not Applicable
MAIN COMMERCIAL APPLICATION	Electricity Generation	Industrial process heat and steam to 1,300°C Small scale electricity generation (ORC)	Industrial process heat and steam to 400-700°C. Small scale electricity generation (ORC)	Industrial process heat, steam and mobile to 1,300°C. Small scale electricity generation (ORC)	Industrial process heat and steam. Small scale electricity generation (ORC)	Industrial process heat and steam to 300°C	Industrial process heat and steam to 530°C	Industrial process heat, steam and waste recovery to 400°C

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Appendix III: Dedicated Supply of Graphite for > 50 years



- Miners, including Rio Tinto drilled the Eyre Peninsula from 1920's – 1980's
- Recent electromagnetic surveys by QGL have been completed in order to verify the old Rio Tinto findings
- The immediate mining sites (Uley 2 through to Uley 6) are denoted by the green 'horse-shoe' at the top of the map. The horse-shoe represents roughly only 10% of all of QGL's potential graphite supply

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Appendix IV: Speaker Biography & Contact Details

- Michael Wyer has over a decade of board-level experience with listed companies and more than 30 years experience in global banking, global commodities, heavy industry, mining & trading industries.
- Current Positions Include:
    - Director of ASX listed Quantum Graphite Limited
    - Managing Director or Chimaera Capital Management (SG)

Contact Details

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  Tower 1, Singapore 018960

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