



**ASX ANNOUNCEMENT**

**FOR IMMEDIATE RELEASE TO THE MARKET**

**Li-S Energy Limited – ASX Code: LIS**

**Thursday 15 December 2022**

**Market Update and Newsletter**

Li-S Energy Limited (ASX Code: LIS) is pleased to provide the following Market Update and Newsletter.

This announcement has been authorised by the Board

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# NEWS

DECEMBER 2022



## SKY NO LONGER THE LIMIT

MagniX has signed an MoU with Li-S Energy to test the potential of our lithium sulfur and lithium metal cell technology for e-Aviation applications.

In aviation applications weight is critical — there is a reason why airlines have baggage limits! In e-Aviation the weight issue is even more acute, as the battery can be the heaviest component of the plane. Every kilogram Li-S Energy can save on battery weight increases range and payload, potentially making the difference between a successful electric aircraft and one that never leaves the runway.

MagniX, based in Washington State, USA, delivers a range of revolutionary electric aviation propulsion solutions which have already been flight tested in passenger aircraft including the eBeaver, eCaravan and most recently a Robinson r44 helicopter.

MagniX is one of only two companies chosen by NASA to demonstrate electric aircraft propulsion technologies and was awarded US\$74 million of funding in the electrified aircraft propulsion (EAP) project. The NASA EAP Project forms part of NASA's broader Electric Powertrain Flight Demonstration (EPFD) program that will rapidly mature EAP technologies through ground and flight demonstrations.

For us, the magniX relationship is a key partnership in the e-Aviation space; MagniX is a true aviation pioneer. With systems already in flight and the credibility of e-aviation projects for NASA, we could not wish for a better partner as we drive our technology forward in this rapidly emerging market.

Find out more about magniX at [www.magnix.aero](http://www.magnix.aero)

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CEO Dr Lee Finnear conversing with a shareholder at the AGM

## '22 IN REVIEW AT THE AGM

2022 was an exciting year for Li-S Energy and we were pleased to be able to share our positive results with all of you at the AGM.

Highlights for the year include our achieving — and exceeding — the goals we set for ourselves despite a challenging pandemic and geopolitical environment, including:

- lithium sulfur battery optimisation and production of multi-layer cells
- li-nanomesh anode protection for a range of battery chemistries
- cell production at Deakin University facilities in our new Phase 2 facility
- retrofitting batteries into products, exemplified by the drone flights utilising our cells
- Modelling and simulation is ongoing to better understand the performance of our batteries and reduce testing times, critical for OEM support

Full details of our 2022 summary and the CEO's presentation is available on the [Investor Resources](#) page of our website.

## GET TO KNOW THE CTO

As Chief Technology Officer, Dr Steve Rowlands plays a very important role at Li-S Energy. Day-to-day he directs all of our laboratories and research including the scientists, engineers and technicians working across different teams, campuses and technologies.

Steve has been with the Li-S Energy team for nearly two years and brings a wealth of international experience. In his previous workplace projects he has pioneered real-world solutions such as lithium sulfur battery packs for High Altitude Pseudo Satellites. He has published research papers on topics including CNT sulfur composites for Li-S batteries and solid state supercaps. At Li-S Energy, Steve is focussed on scaling up our technology to a commercial scale.

When he's not in the lab, Steve directs our engineering team designing and building our Phase 3 2MWh automated production facility.







# PHASE 2 FACILITY

## READY TO GO

We are thrilled to share that our Phase 2 facility has now been installed. This purpose-built resource encompasses five new labs, new offices and two full production bays.

Even more exciting is the arrival of key equipment which automates our test cell production process. This automation will allow us to deliver test cells more quickly and with much greater precision and consistency.

Our next step? We have secured the buildings for our 2MWh Phase 3 facility and dry room equipment design and build is underway.



The wet coated cathode then enters the drying ovens before completing the coating process.



Phase 2 includes two roll-to-roll cathode coaters that precisely coat our unique cathode materials onto aluminium foil.



Completed cathodes are fed into our automated stacking, welding, pouching, electrolyte filling and sealing stations. These cells are tested and results analysed by our scientists.





## MAKING THE DREAM WORK

Last edition we shared the excitement of drone flight tests using our multi-layer lithium sulfur cells. Our R&D teams at Deakin University made this possible.

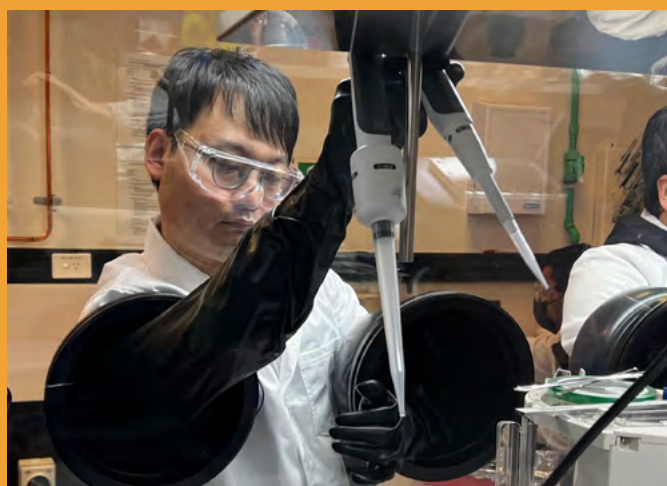
At Deakin we have two highly qualified scientific teams developing our technology toward commercialisation, each specialising in key areas of our technology scale up. One is in Geelong and the other is at BatTRI Hub 2.0 in Melbourne.

Our team at the Deakin University Campus in Geelong has just moved into our new, fully dedicated Phase 2 facilities and advanced laboratories. Led by Dr Baozhi Yu, under the direction of our CTO Dr Steve Rowlands, and with academic supervision from Professor Ian Chen, the team is now exploiting the new scaled up facilities to accelerate our

lithium sulfur cell production, performance optimisation and testing.

Baozhi and his team have spent the last 10 years building tremendous expertise in advanced functional materials, including 2D materials, metal and metal oxide nanomaterials, and organic polymers applied to energy storage systems.

Among their many successes in this field, the team are credited with discovering that BNNT can improve the cycling stability of lithium sulfur batteries – a key patent now owned by Li-S Energy. With over 40 peer reviewed scientific journal papers to their name, the team continues to contribute to the science of nanomaterials and energy storage through their pioneering work at Li-S Energy.



### MEET BAOZHI - LEAD RESEARCHER

Dr Baozhi Yu is a research fellow at the Institute for Frontier Materials. He has been researching functional nanomaterials and energy storage systems for over 10 years – the last six with Deakin University.

His key specialties include developing ultra-stable lithium anodes and solid-state electrolytes/interlayers for lithium-based batteries including Li-metal batteries, Li-S batteries, and Li-O<sub>2</sub> batteries. He has published over 25 papers in high-impact scientific journals including Advanced Functional Materials, ACS Nano and Advanced Materials.

# LI-S ENERGY CO-FOUND'S AMBC

The Advanced Materials and Battery Council was formed in July 2022 to both lead and represent the multi technology advanced materials and battery industry in Australia. It was officially launched by Queensland Energy Minister Mick de Brenni at Parliament House in October.

AMBC will enable industry, government and academics from across the value chain to share, collaborate, and

promote opportunities and policies aligned with the rapid development of these successful new industries.

Li-S Energy is proud to be a founding member of such an important initiative and have Dr Lee Finniear as a founding Director on the Board.

## ENERGY CHARGED FIRST EVER INAUGURAL AUSTRALIA BATTERY DAY

Late September saw the first inaugural Australia Battery Day, hosted by AMBC, held at the University of Queensland. We were honoured to have Glenn Butcher, Queensland Minister for Regional Development and Manufacturing, launch the event and share his insights on the role Queensland can play in the race to power our future.

The morning was filled with presentations from some of the industry's best minds covering battery technology research, advanced material development, and commercialisation challenges and advice. Guests were then lucky enough to hear from two panels: firstly a collection of industry leaders developing new batteries and other future technologies, followed by six Queensland Government panelists outlining their departments' objectives for the future and how industry and government can collaborate to achieve commercial and net carbon zero goals.

The Q&A sessions proved the passion we all have for sharing ideas and collaborating to deliver an Australian Clean Energy Industry.



Minister Glenn Butcher, Graphene MG Managing Director Craig Nicol and Li-S Energy CEO Dr Lee Finniear discuss the future of the industry.



THE PIONEERS OF THE AMBC



MINISTER DE BRENNI PROUDLY  
LAUNCHING THE AMBC

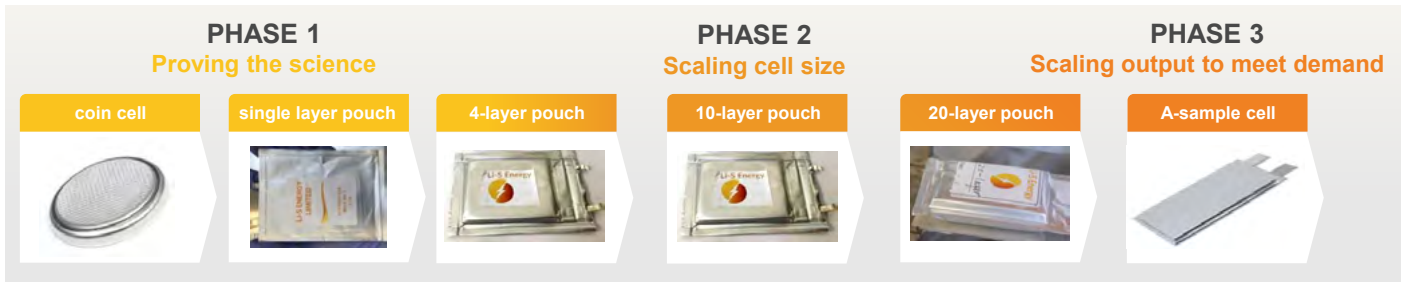


A DRIVING FORCE OF THE AMBC:  
UQ'S DR LYNETTE MOLYNEUX



# Batteries 101<sup>+</sup>

NEW TO THE INDUSTRY OR NEED TO BRUSH UP ON YOUR KNOWLEDGE? THERE'S A LOT OF 'TECH TALK' IN THE BATTERY WORLD, SO OUR COLUMN **BATTERIES 101** WILL HELP US ALL BY DETAILING KEY COMMON BATTERY TERMINOLOGY AND CONCEPTS.



Over the last year, Li-S Energy has been heavily committed to cell optimisation and scale up. But what exactly does that mean?

The first thing to be aware of is scaling up is more complex than just making cells bigger. Our first step was to prove up the basic science using coin cells and single layer pouch cells.

Then we scale up to multi-layer pouch cells to optimise the materials, composition, electrolytes and the battery cell construction to increase performance.

Finally – we progress to what we call our A-sample cell – this is the commercial sized test cell for our key partners.

## PHASE 1

- lab-based cell assembly: cells built by hand in the lab
- great for small cells as the process is very flexible
- so far all our cells have been built in this way

## PHASE 2: MICRO-PRODUCTION FACILITY

- allows us to achieve the consistent quality and greater volume needed for large multi-layer cells (where every electrode must be identical)
- automation with: cathode coaters, automated electrode stacking and pouching

## PHASE 3: 2MWH FACILITY

- currently in design and procurement
- intended to scale our high-quality cell output to meet demand for full user trials. For example, an eAviation partner could need 10,000 matched cells to perform a full trial

## IN THE NEWS



In 2021 sales of EVs in Australia was 1.57% compared to 75% in Norway, 10.7% in the UK and 6.2% in China<sup>2</sup>



Queensland government wants 50 per cent of new passenger vehicle sales to be zero-emission by 2030<sup>1</sup>

<sup>1</sup> [https://electricvehiclecouncil.com.au/wp-content/uploads/2021/08/EVC\\_annual\\_report\\_-V3-Aug-13th-1.pdf](https://electricvehiclecouncil.com.au/wp-content/uploads/2021/08/EVC_annual_report_-V3-Aug-13th-1.pdf) <sup>2</sup> [brisbanetimes.com.au/politics/queensland/help-for-power-bills-and-interest-free-loans-for-drivers-to-go-electric-20220910-p5bh17.html](https://www.brisbanetimes.com.au/politics/queensland/help-for-power-bills-and-interest-free-loans-for-drivers-to-go-electric-20220910-p5bh17.html)