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## Corporate dashboard

Lithium Australia NL (ASX: LIT, 'the Company') continues its significant progress towards integrating the processes that will enable a circular economy for battery metals. This includes evaluation of primary resources (lithium and vanadium), production of lithium chemicals, cathode powder production (at pilot scale), production of lithium-ion batteries ('LIBs') for research purposes, and the recycling of battery materials.

### HIGHLIGHTS

- **Drilling for vanadium metallurgical test samples completed at Youanmi.**
- **Significant lithium minerals intersected in exploration drilling at Youanmi.**
- **Improved lithium refining techniques by the production of lithium phosphate.**
- **Next stage process development for recycled battery material underway at ANSTO. Pilot plant design commenced.**
- **Lithium phosphate generated from spent LIBs.**
- **Cathode powder regenerated using lithium recovered from spent LIBs.**
- **Business plan completed for battery supply into the Australian market.**

## Raw materials

The Company has an option to acquire the full rights and titles to three exploration licences at Youanmi in Western Australia ([announced 2 October 2018](#)) and is nearing completion of two drilling campaigns as part of its assessment programme.

### Lithium

The focus of the Company's lithium drilling at Youanmi has been the down-dip extensions of outcropping lithium-bearing pegmatites. Until the end of shift on 10 July 2019, 882 m had been drilled in 22 holes. Most of the holes drilled display visible lithium mineralisation in the form of lepidolite, which can be processed using the Company's proprietary SiLeach® process. Said process has been used at pilot scale to generate lithium phosphate from lepidolite recovered from mine dumps in the WA Goldfields. The lithium phosphate generated in this way has been used as direct feed for the production of cathode materials, and subsequently LIBs, in the Company's VSPC plant in Brisbane, Queensland.

### Vanadium

Lithium Australia's Youanmi agreement covers not only lithium pegmatites but also a large, layered mafic complex that hosts abundant vanadiferous magnetite. Much of the complex is weathered, resulting in vanadium-bearing minerals that are acid-soluble (i.e. roasting is not required to recover the vanadium). On [22 May 2019](#) the Company announced a maiden resource of 185 Mt @ 0.33% V<sub>2</sub>O<sub>5</sub>.



A drilling programme, now completed, has generated samples for metallurgical testing. The programme comprised four drill holes for 252 m. Samples have been dispatched for chemical analysis in Perth and metallurgical testing at the Australian Nuclear Science and Technology Organization (ANSTO) Sydney, Australia.

## Lithium chemicals

The Company has developed a number of extraction processes, which, when combined with its patented VSPC cathode powder production technology, allow the production of cathode powders directly from lithium phosphate, without the requirement of an intermediate lithium hydroxide or carbonate. This potentially reduces the number of process steps required to generate cathode active materials used in LIBs.

Patent applications have been lodged for various parts of the lithium phosphate precipitation and refining process and the Company has been advised that the means by which this has been achieved is novel and thus eligible to receive patent protection.

However, a broader global market for lithium hydroxide is very robust and to capitalize on this opportunity, as lithium hydroxide commands a premium on lithium carbonate, LIT has been investigating the conversion of lithium phosphate directly to lithium hydroxide. Test work has been initiated at ANSTO, with vendor assistance for this unit process.

LIT has also developed a cheap and simple means of removing impurities from lithium phosphate to improve quality and consistency of product. This refining process is also subject to patent applications. Test work at ANSTO, has demonstrated orders of magnitude reduction in impurities such as sodium, potassium and sulfur. This refining step is equally applicable to lithium chemicals produced by the Company's SiLeach® or LieNA® technologies.

The Company continues to advance the development of LieNA®, a caustic digest technology that provides an alternative to the thermal conversion of spodumene concentrates for the production of lithium chemicals. The LieNA® technology was recently presented at the AusIMM International Lithium and Battery Metals Conference 2019 held in Perth. A preliminary feasibility study has been commenced targeting the optimisation of leach, impurity removal and product recovery process conditions.

## Batteries and cathode materials

Lithium Australia is the sole owner of VSPC Ltd, a company with three families of patents that cover novel processes for the production of LIB cathode powders. At VSPC, lithium iron phosphate ('LFP') cathode materials have been successfully synthesised from lithium phosphate recovered from mine waste and end-of-life LIBs.



Lithium Australia/VSPC have entered into an agreement with DLG Battery, a major Chinese battery manufacturer, to:

- commercialise VSPC cathode powders in China, and
- develop a battery distribution business in Australia.

Significant progress has been made towards implementing the Company's plans with respect to DLG. In particular, formal business plans – including objectives, goals and budgets – have now been completed. DLG and Lithium Australia will meet in Perth in July to further develop the corporate structure required to implement these plans.

Meanwhile, VSPC will amend its current scoping study for the production of LFP cathode powders, to better reflect the anticipated outcomes of the DLG partnership. Testing of VSPC cathode materials continues at DLG Battery and customers in Japan and India, and initial results are expected in August.

## Recycling

The Company is accelerating its R&D programme for the recycling of LIBs and has awarded the next module of test work to ANSTO. The programme is treating recycled battery material produced in Australia and will finalise a practical metallurgical flow sheet for the recovery of all battery metals from spent LIBs, including lithium. Design of the pilot plant has commenced. Most of the world's recyclers fail to recover lithium from the batteries, so this is significant. The processes being developed will recover the lithium as lithium phosphate, which can then be used directly in the regeneration of LFP cathode materials or converted to lithium hydroxide should market conditions demand such a product.

Lithium Australia recently increased its equity in Melbourne-based LIB battery recycler Envirostream Australia Pty Ltd ([announced 20 June 2019](#)). That equity investment has facilitated planning for an increase in processing capacity. With critical items of equipment already delivered, a plant upgrade to a design capacity of 1000 tpa has commenced. This placed Envirostream in a strong support position for the national roll-out of a stewardship programme for all batteries and Victoria's ban on consigning spent batteries to landfill.

Moreover, an extra 50 collection points have been added to those already established by Envirostream. This expansion has materialised through partnerships with LG Chem and Milwaukee, among others.

### Comment from Lithium Australia MD Adrian Griffin

"The activities being undertaken by the Company place us in a unique position to provide sustainable solutions to the battery industry and the components that supply that industry. We are passionate about improving the utilisation of resources and reducing negative impacts on the environment as we do so."

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**About Lithium Australia NL**

Lithium Australia aspires to 'close the loop' on the energy-metal cycle in an ethical and sustainable manner. To that end, it has amassed a portfolio of projects and alliances and developed innovative extraction processes to convert *all* lithium silicates (including mine waste) to lithium chemicals. From these chemicals, the Company plans to produce advanced components for the lithium-ion battery industry. The final step for Lithium Australia involves the recycling of spent batteries and e-waste. By uniting resources and the best available technology, the Company aims to establish a vertically integrated lithium processing business.

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**Competent Person Statement**

*The information in this report that relates to Exploration Results together with any related assessments and interpretations is based on information compiled by Mr Adrian Griffin, Managing Director of Lithium Australia NL. Mr Griffin is a Member of the Australasian Institute of Mining and Metallurgy and has sufficient experience relevant to the styles of mineralisation under consideration and to the activity being reported to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves.*