

A vision for the future

PAYDIRT'S 2018
**BATTERY
MINERALS**
CONFERENCE
14 - 15 March – Perth, Western Australia

Lithium
Australia^{NL}

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ASX: LIT

Sustainability in the energy-metal cycle

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COMPETENT PERSON'S STATEMENT

The information in this report that relates to reporting of Exploration Results is based on and fairly represents information and supporting documentation prepared by Adrian Griffin, a member of the Australasian Institute of Mining and Metallurgy. Mr Griffin is a shareholder in, and managing director of, LIT and has sufficient experience relevant to the style of mineralisation and type of deposit under consideration. He is qualified as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Griffin consents to the inclusion in this report of the matters based on information in the form and context in which it appears.

Sustainability – the key to battery mineral supply

- 1. What's in that battery?**
- 2. Process improvements for sustainability:**
 - low emissions
 - low cost
 - product recycling.
- 3. Disruptive technologies that 'close the loop'.**
- 4. From mine waste to lithium-ion battery cathode materials.**
- 5. Creating the ideal battery cathode mineral.**

Battery metals

Battery type	Battery metals – weight % of battery (including casing)										
	Fe	Mn	Ni	Zn	Hg	Li	Ag	Cd	Co	Al	Pb
Lithium (primary)	50	19	1			2					
Li-ion (LCA)	22					3			18	5	
Alkaline	24.8	22.3	0.5	14.9							
Zinc-carbon	16.8	15		19.4							0.1
Mercury-oxide	37	1	1	14	31						
Zinc-air	42			35	1						
Silver oxide	42	2	2	9	0.4		31				
Nickel-cadmium	35		22					15			
NiMH	20	1	35	1					4		
Lead-acid											65

Batteries consume a wide range of metals, both structural and electro-chemical. Some are toxic (red in the table above) and some considered critical elements (green). The trend is towards lithium batteries with wide-ranging chemistries, which are more environmentally sensitive than many of their predecessors.

Toxic though they may be, lead-acid batteries enjoy embedded recycling stewardship incomparable with any other consumer product, with global recycling rates of about 90%. For lithium-ion batteries (LIBs), with only a 10% recycling rate, immediate product stewardship protocols are necessary to conserve our finite and critical resources.

Comparison of portable power storage

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Competing LIB chemistries differ in both their critical metal compositions and cathode mineral structures. The lithium iron phosphate (LFP) battery has an olivine crystal structure, which provides superior stability and longevity and is less prone to thermal runaway. It is the '**safe**' LIB.

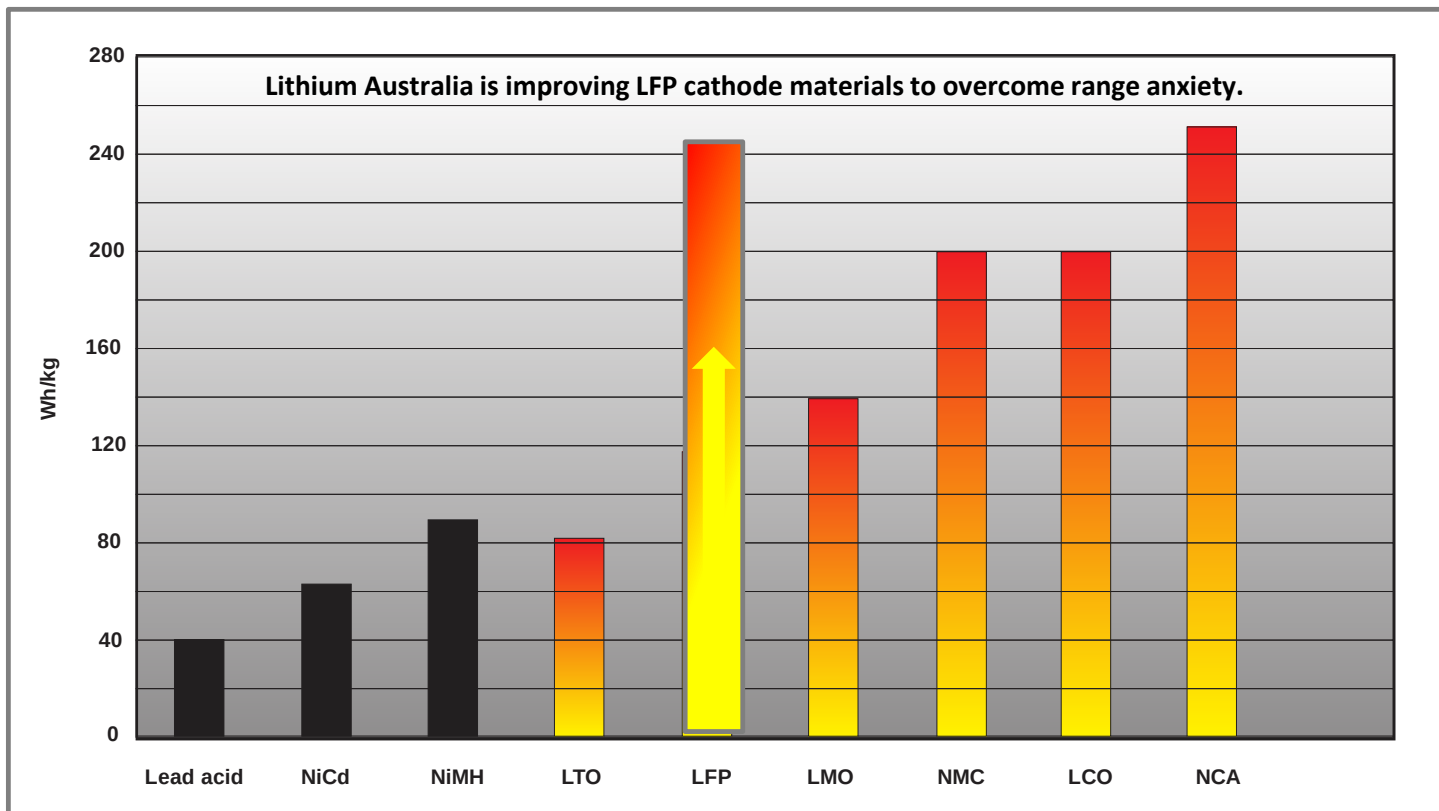
	Graphite	Co	Ni	Al	Li	Fe	P	Total	Mineral	Energy density
NCA	64	8	20	1	7	0	0	100	Spinel	High
LFP	42	0	0	0	5	35	18	100	Olivine	Moderate

The relentless pursuit of increased energy density, however, has driven LIB technology towards spinel structures, which generally contain cobalt. The unintended effects are reduced safety, higher cost and a reliance on critical metals that the LIB industry itself may drive into a state of severe supply shock. Despite this, **range anxiety** reigns supreme! High-performance, lightweight vehicles require batteries with a high energy density and high-cobalt compositions do the job, albeit strongly supported by a battery management system that alters the utilised battery capacity over time! It not only ensures greater safety but also allows the manufacturer to provide an 8-year warranty by dropping off capacity and replacing it during the lifecycle of the battery.

LFP batteries utilise design capacity better over the life of the battery, but at present their lower energy density restricts their use to larger vehicles (trucks and buses), stationary power applications and power tools. That said, things **are** changing and **Lithium Australia** is at the **forefront of LFP cathode development**.



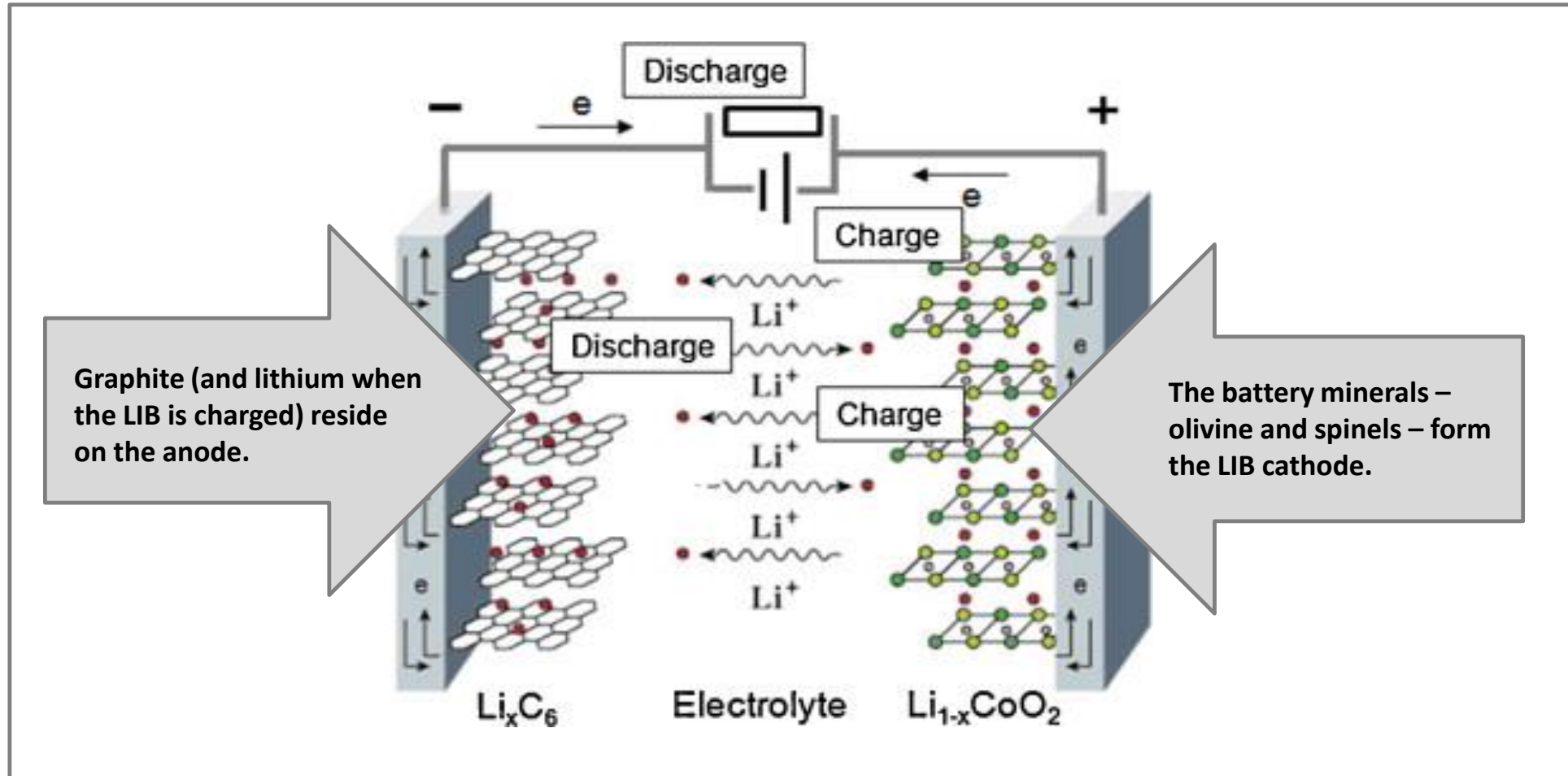
Range anxiety reviewed



In many applications, the theoretical high energy density of cobalt-based LIBs can only be achieved at the expense of longevity; ever wondered why your EV battery lasts 8 years and you're ready to trade your smart phone (with its diminishing performance) after 3?

Changes in the chemistry of olivine-structured LFP batteries may be the antidote to range anxiety without requiring long-term intervention by a battery management system.

Where are the main battery minerals?



How are battery minerals made and what's in the arsenal?

Lithium Australia has been developing disruptive technologies to enhance the sustainability of the burgeoning LIB industry. These technologies are capable not only of processing a wide range of feed and producing, ultimately, battery cathode materials but also of rebirthing spent batteries by digesting the battery minerals and regenerating the cathodes.

Technologies available to Lithium Australia include the following:

- SiLeach® (100% owned) – acid extraction of lithium from all silicates without roasting.
- LieNA® (100% owned) – caustic recovery of lithium from spodumene.
- VSPC (99.7%) – the world's most advanced cathode powder technology.
- LMax® (owner Lepidico Ltd) – exclusive right of use in Western Australia, and other locations
- RCARC (a subsidiary of Lithium Australia) – critical metal recovery from spent batteries.

Battery minerals (LIB cathodes) contain critical metals that can be derived from two sources:

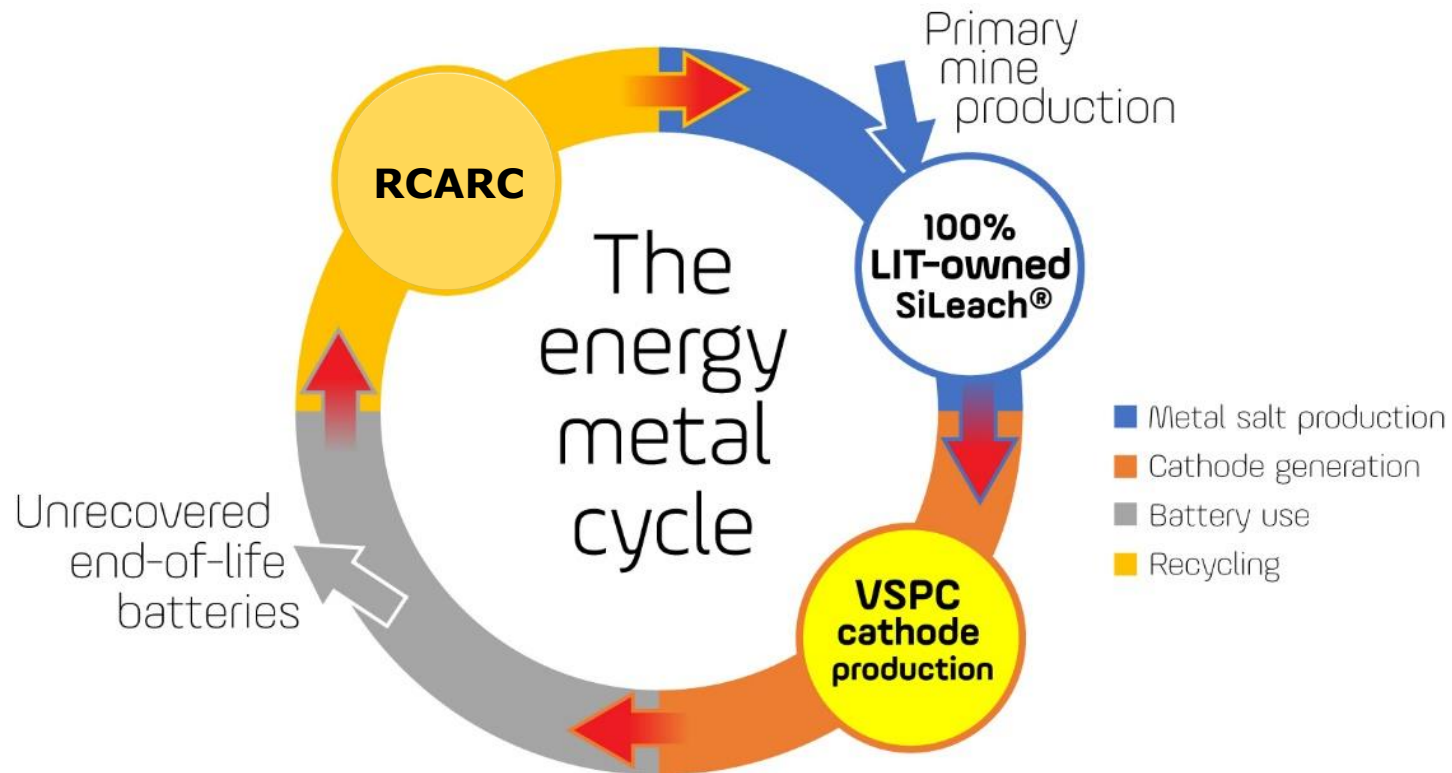
- primary resources (first generation concentrates and mine discharge materials), and
- spent batteries.

To make battery minerals, the critical metals must first be dissolved, then precipitated as synthetic minerals.

Lithium Australia's preferred route is the use of SiLeach® to generate lithium chemicals, followed by application of VSPC technology to transform those chemicals into cathode powders. RCARC technology provides the means by which spent batteries can be dissolved and the cathodes rebirthed.

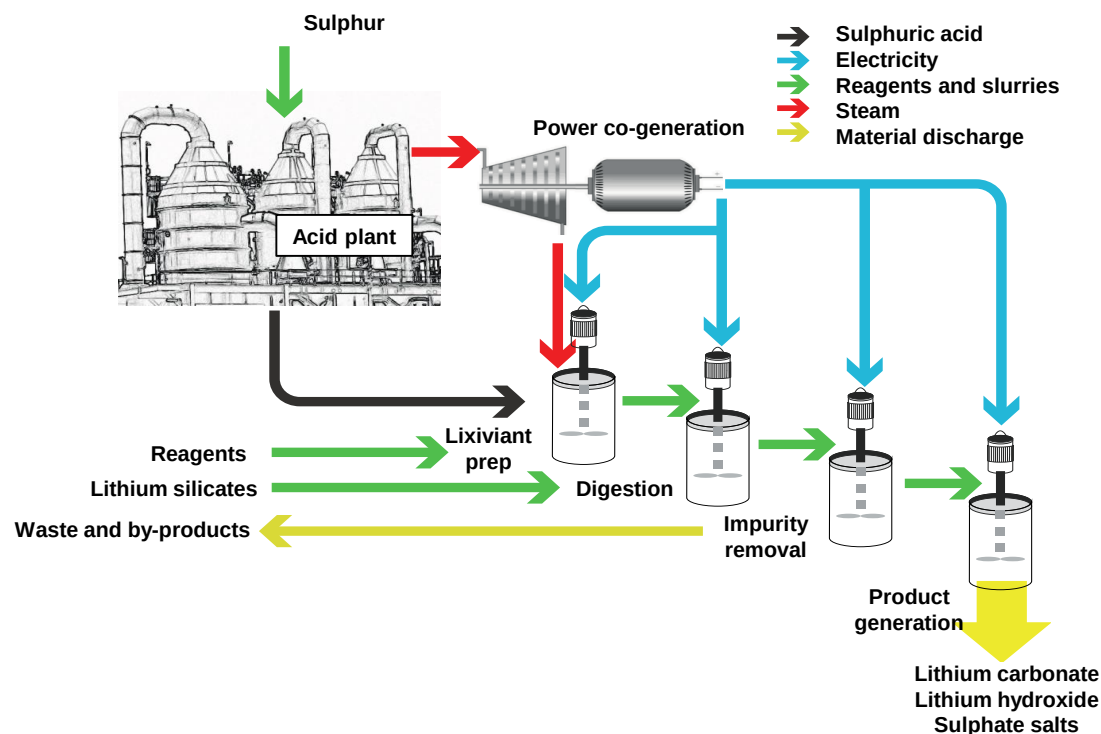
Sustainability in a cycle short of supply

Lithium Australia NL (ASX:LIT) aims to 'close the loop' on the energy-metal cycle, improving the sustainability of energy metals.



SiLeach[®] – superior processing technology

SiLeach[®] is designed to rapidly digest *any* silicate mineral



The SiLeach[®] process

- No roasting
- Low-energy footprint
- Complete dissolution of all silicates
- Diverse by-product credits
- Low operating cost
- Battery-grade chemicals
- Pilot tested

It's happening where, and when?

Lepidolite Hill, near Coolgardie (WA) identified as one feed source:

- abundant waste dumps
- positive ore-sorting results.

Currently negotiating acquisition of additional lepidolite feed sources (WA), as well as access to infrastructure-supported plant site (location to be advised):

- power
- water
- rail
- road
- tailings disposal.

Completion of front end engineering and design for the large scale pilot plant, 2018.

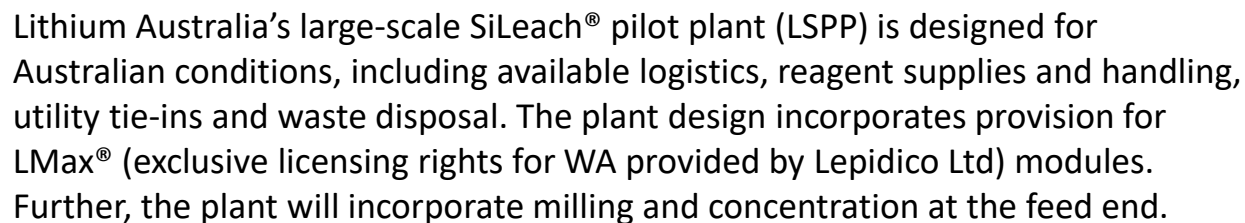
First lithium chemical production scheduled for 2020.

On going assessment for the location of a full scale production facility of about 25,000 tonnes per annum lithium carbonate equivalent.



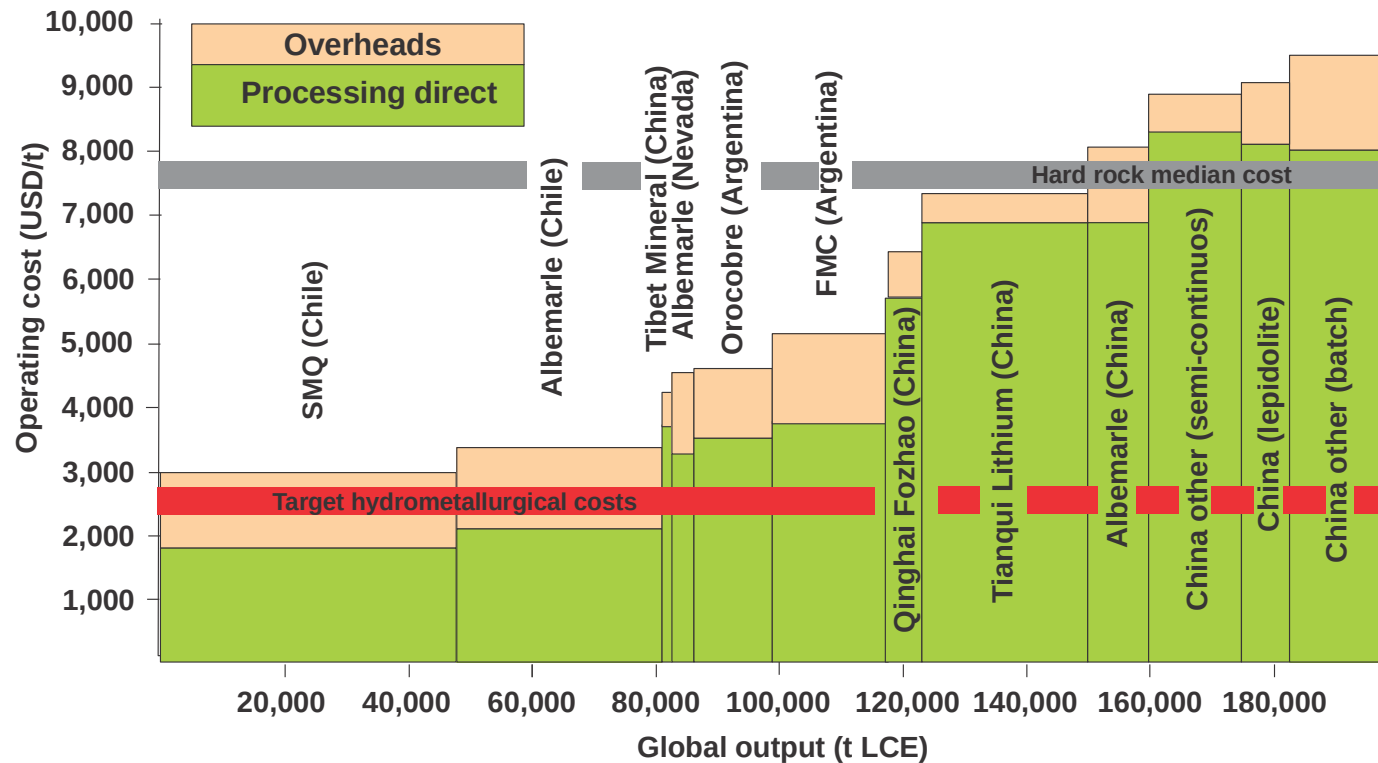
Thick pegmatite exposed within the walls of the Lepidolite Hill quarry, 520 km east of Perth, Western Australia.

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Aspirational statement

SiLeach[®] has the potential to alter the cost curve for hard-rock lithium production.

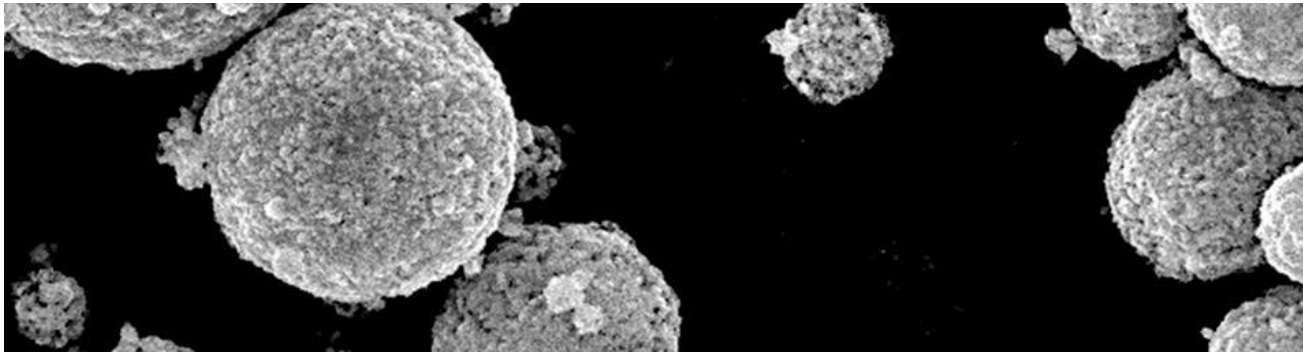


Cumulative 2016 production of LCE (t)

Global lithium carbonate operating costs (after Roskill, 2017) and target hydrometallurgical costs.

VSPC – superior battery cathodes

The Very Small Particle Company Limited (VSPC) – a subsidiary of (99.7% owned by) Lithium Australia – excels in the production of advanced cathode materials.



Advantages of VSPC:

- innovative, patent-protected chemical process;
- delivery of very precise chemistry to complex metal oxides (cathode materials), and
- **a fast track to commercialisation of superior cathode production.**

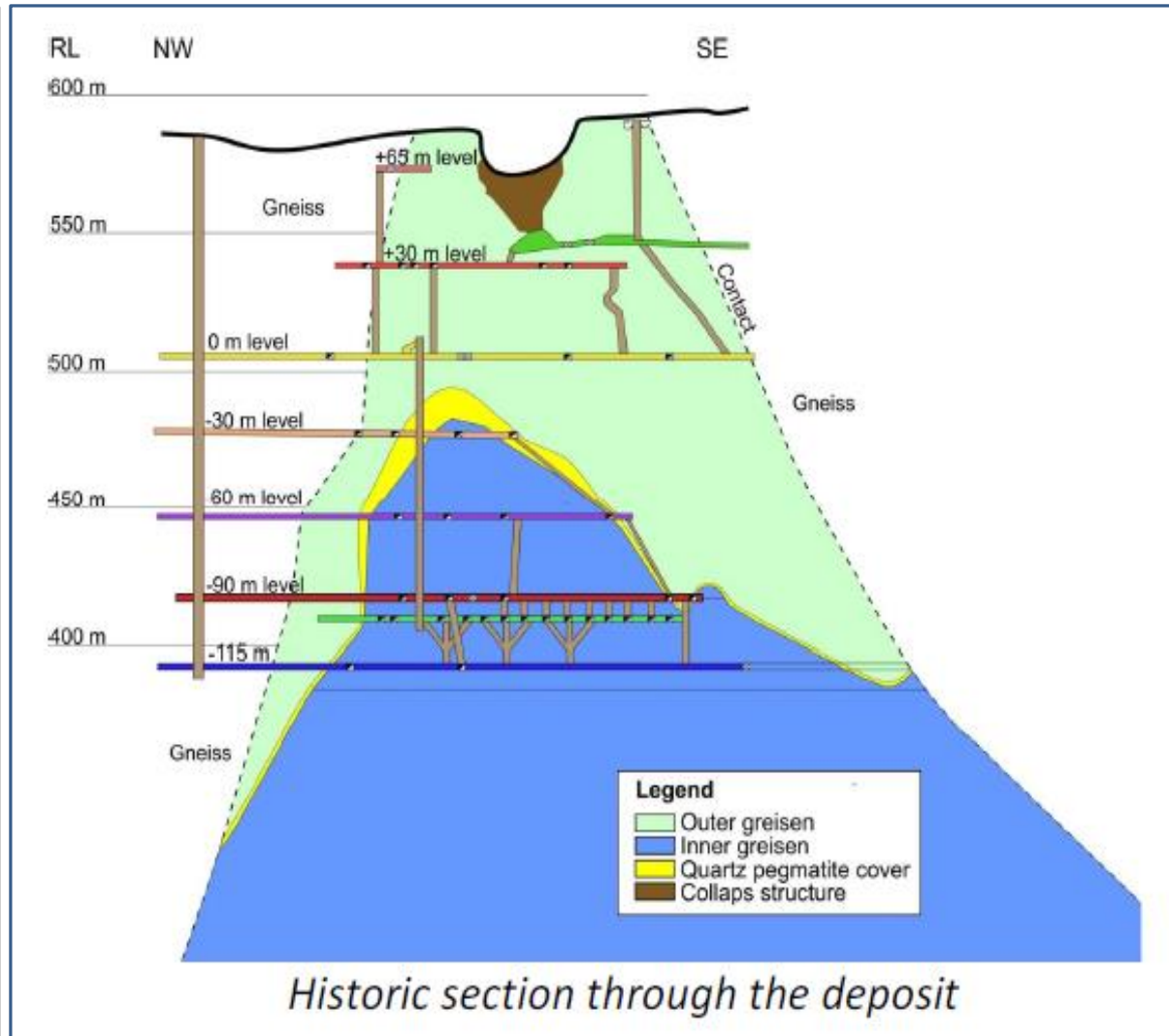
Integrating VSPC technology with that of SiLeach® and RCARC creates the ability to process waste materials and generate new cathodes for the battery industry. This will not only lead to an unprecedented uplift in value beyond the production of lithium carbonate but also advance the sustainability of energy metals.

RCARC – keep batteries out of landfill and the loop is closed!

- Recycling of LIBs wholly inadequate.
- Ability to produce refined metal compounds with high concentrations and high value.
- Strong parallel with standard base-metal refining.
- Processing compatible with VSPC technology.
- First-mover advantage:
 - available supply
 - growing market
 - lack of competition.
- Technical partnership with Murdoch University.
- Test case designed around the most abundant battery chemistries.

Sadisdorf – resource sustainability (the European example)

- Tin mineralisation as veins in greisen.
- Pervasive lithium mineralisation.
- Commercial success =
 - low-cost processing
 - recovery of all metals.
- Conventional processing for Sn, W.
- SiLeach® on the tail to recover:
 - lithium
 - potassium
 - silicon
 - aluminium
 - caesium
 - Gallium.
- Diversity: breathing life into Sadisdorf and feeding the European battery industry = **resource sustainability in action.**
- Integration with VSPC may provide the opportunity to develop a new cathode material business.



The sweet spot in the value chain

SiLeach® can generate lithium carbonate from waste materials:

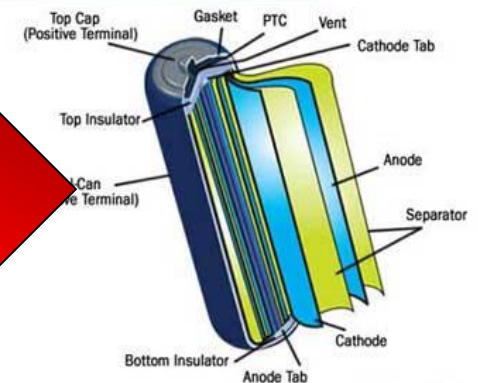
- 1 tonne of lithium carbonate = \$10,000/tonne
- 1 tonne of lithium carbonate = 5 tonnes cathode material (LFP)
- Each tonne of LFP = \$20,000 to \$35,000
- Value uplift ~ 15-fold.

The production of cathode materials provides the highest uplift in the energy-metal cycle.

Only Lithium Australia has the technology to transition from mine waste to LIB cathode materials.



Cylindrical lithium-ion battery



Lithium Australia – a vertically integrated lithium company



- ✓ **Contributing to a sustainable, low-emission lithium future through:**
 - **extraction of metal from waste minerals**
 - **recycling of energy metals from spent batteries**
 - **high-quality cathode production.**
- ✓ **Developing SiLeach[®] – world-first (100%-owned) processing technology.**
- ✓ **Incorporating VSPC – world-leading cathode materials.**
- ✓ **Implementing full process integration – a world first.**
- ✓ **Forming strategic partnerships and alliances globally.**
- ✓ **Deploying an experienced and committed management team.**

Lithium Australia – corporate snapshot

FSE-listed: ticker 3MW
ASX-listed: ticker LIT, LITCE
ACN 126 129 413

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BOARD OF DIRECTORS



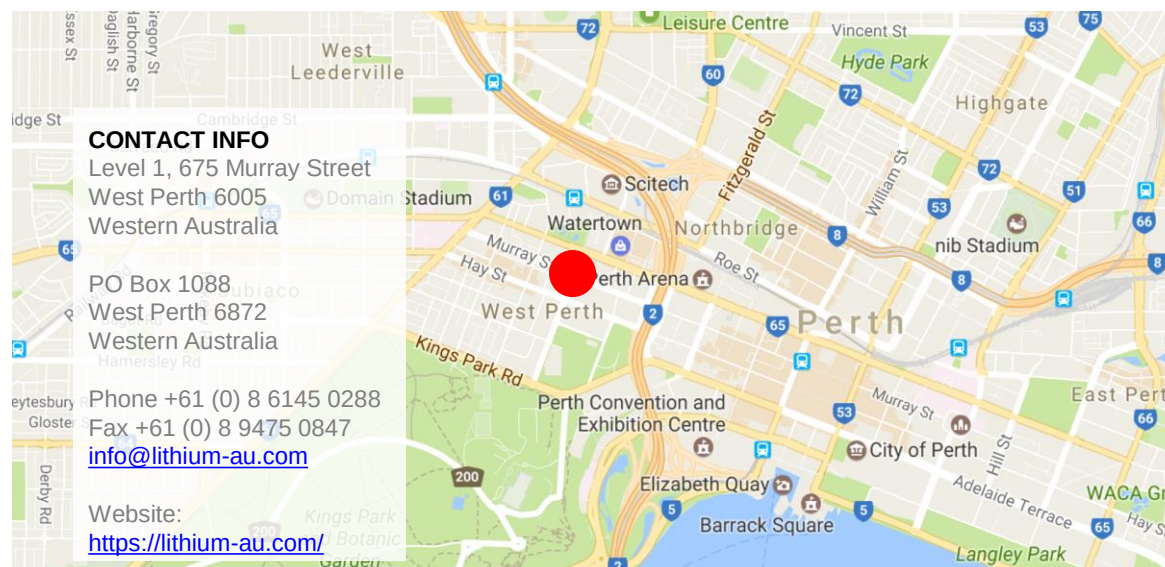
George Bauk
(non-executive chairman)
Expert in specialty metals, particularly rare earths – project management, marketing and financing.



Adrian Griffin
(managing director)
Exploration, production, mine management, processing technology.



Bryan Dixon
(non-executive director)
Corporate, finance, mine development.



Price (AU\$) as at 13/3/18	0.17
Market capitalisation (AU\$)	70 M
Shares outstanding (LIT)	410M
Partly paid shares (LITCE)	163M
Cash position at 13/3/18 (AU\$)	18 M
Debt position at 13/3/18 (AU\$)	3M

Top 10 holders at 12 March 2018	24.73%
JP Morgan Nominees	5.59
Accuity Capital Investment Mgmt	3.66
HSBC	2.82
Citicorp Nominees	2.58
Neil Griffin	2.40
Adrian Griffin	2.09
Parkway Minerals NL	1.79
Resource & Land Management P/L	1.49
MCN Investments P/L	1.37
BNP Paribas	0.94