

# Proactive Investors Australia

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## Lithium outlook uncertain amid growing demand, oversupply and potential disruptive technologies

Lithium prices during 2018 suffered heavy losses as major miners lifted production and China slowed its burgeoning new energy vehicle market.

Demand fundamentals remain secure but the prospect of oversupply until at least 2022, and the uncertainty around potential disruptive technologies in the medium-term, have stymied lithium's decade-long price hike.

Prices in China dropped to US\$13,000 a ton in August from a peak of \$24,750 in March, according to Benchmark Mineral Intelligence.

While demand is expected to be maintained through 2019, lithium carbonate prices are also expected to remain under pressure as global supply continues to grow.

### Supply growing faster than demand

Fastmarkets BM head of research base metals & battery materials William Adams said lithium supply was expected to grow at a faster pace than demand once again.

He noted most of the price weakness in 2018 was due to the lithium supply response and exponential growth from the electric vehicle sector and lack of supply will see prices spike again by 2025.

Orocobre Limited (ASX:ORE) chief executive Richard Seville expressed reluctance to provide guidance on pricing but said it was not feeling strong.

He said: "We are not expecting a rebound in pricing at this point in time."

The lithium carbonate producer's share price lagged in late December after announcing prices it received for lithium output dropped in the December 2018 half-year.

An average of \$10,800 per tonne on about 2,850 tonnes of lithium was received by Orocobre in the fourth quarter, representing an 8% decline on the previous half and more than 26% lower than the \$14,699-per-tonne the company received in the preceding quarter.

### Share Information

**Code:** .

**Listing:** ASX

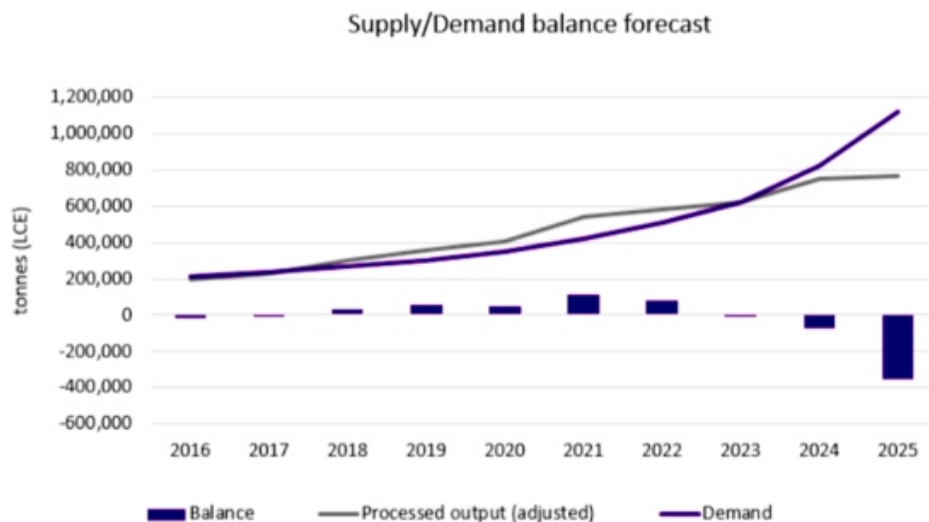
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Source: Fastmarkets

### Diversification of lithium sector

A key uncertainty in lithium's medium-term outlook is the growing diversification of the sector and evolving structure of the industry.

Analysis from Moody's noted that the industry had gone from "a few majors producing battery-grade lithium from low-cost brine in Chile and Argentina and low-cost ore from the Greenbushes rock mine in Australia, to a more diverse industry structure".

The new structure includes rock-based entrants mining ore in Australia and selling spodumene to China, as well as new rock and brine-based suppliers in Brazil, Canada and the US.

Moody's vice president & senior credit officer Joseph Princiotta said the 2020-22 period would be particularly oversupply due to a concentration of new and conversion start-ups.

The Moody's analysis expects the battery industry to drive mergers and acquisitions in the lithium space while also anticipating evolving technologies in the longer-term.

### Perth a potential new energy hub

Attention fell on Western Australia's potential downstream processing industry in 2018 with Perth hosting the 15th annual Technology and Low Emission Minerals (TLEM) Conference in November.

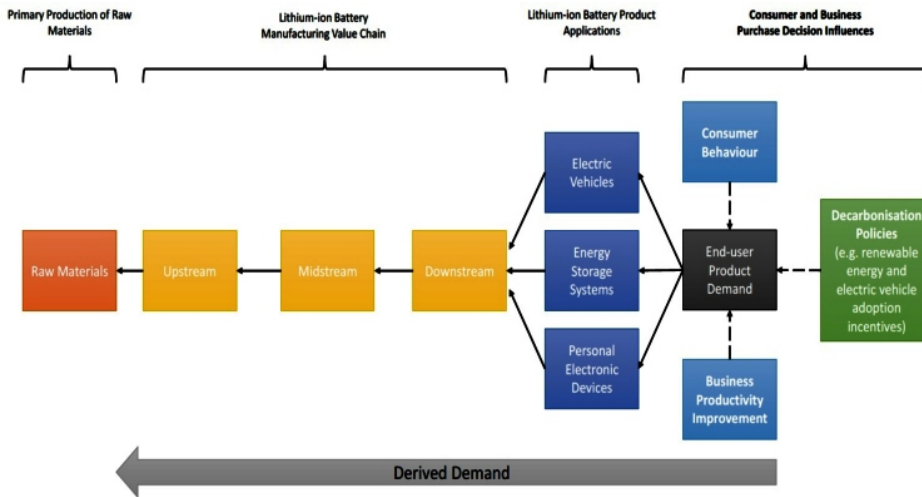
Keynote speaker the Hon Bill Johnston MLA, WA Minister for Mines and Petroleum, told the conference that Western Australia, with its abundance of battery metals and technological know-how, can take advantage of future opportunities in emerging battery-related industries.

He noted that along with a focus on best practice, Western Australia has low sovereign risk and world-class resources, with three of the four best hard-rock

lithium projects in the world.

The state is the world's leading producer of lithium - 44% of world supply in 2017 came from WA's seven operating lithium mines.

All other minerals used in battery components are mined, including globally significant nickel resources across 87 deposits and eight operational mines.



Source: WA Chamber of Commerce and Industry

### Lithium still leading WA battery minerals

Since 2017, investment in lithium mining and downstream processing in WA has seen projects worth \$4 billion completed, under construction or planned.

This includes the Tianqi lithium plant nearing completion in Kwinana's industrial area, which will be the largest lithium hydroxide plant in the world.

Speaking at TLEM, Argonaut Limited director of metals, mining & energy research Matthew Keane provided a market update, stating that battery metals had all sold down heavily in the second half of 2018.

Keane said: "In terms of small resources, it's been a very challenging half-year.

"The impact of trade wars, the US dollar strengthening, it has had a large impact."

Despite the price sell-down, Keane said the next wave of lithium projects was approaching, along with a number of Western Australian companies expanding their production.

Keane noted Pilbara Minerals Ltd's (ASX:PLS) 800,000-850,000-tonne expansion of its Pilgangoora Lithium-Tantalum Project, which went from first drill hole to production in four years.

He also listed Mineral Resources Limited's (ASX:MIN) spodumene concentrate expansion to 750,000 tonnes and Kidman Resources Ltd's (ASX:KDR) Mt Holland joint venture which has increased production to 315,000 tonnes

spodumene concentrate and 45,000 tonnes lithium hydroxide.



A 3D overlay of plans for stage II at Pilgangoora

### **Battery mineral predictions**

Making a prediction on the future of battery metals, Keane said that we are on the cusp of an electric vehicle minerals boom and the uptake of disruptive technology was exponential not linear.

Keane said that medium-term lithium prices were likely to move closer to US\$10,000 per tonne of lithium carbonate before returning up to US\$20,000 per tonne.

He said we will see more active upstream investment from the US and Europe as electric vehicle manufacturers compete with China, as well as increasingly focusing on supply chains outside of China.

As markets balance, Keane expects to see a higher focus on quality, potentially moving from direct shipping ore (DSO) operations to those producing high-purity concentrates.

Cobalt will remain critical for charge-discharge moderation in lithium-ion batteries and will attract premium pricing for non-African supply.

Battery demand for nickel will move towards 15-20% of the total nickel market by 2025, accelerated by advancements in refining and processing nickel sulphates.

### **READ: Technology and Low Emission Minerals Conference hears WA ready to leverage battery power revolution**

A number of Australian lithium developers are advancing work on projects both at home and abroad, aiming to produce both lithium hydroxide and carbonates.

### **READ: American Pacific Borate & Lithium highlights strong financials of 'low-risk' US project**

**American Pacific Borate & Lithium Ltd** (ASX:ABR) released a definitive feasibility study (DFS) last year for its Fort Cady Borate Project in California.

The DFS has evaluated mining of the Fort Cady borate deposit to produce a high purity (99.99%) boric acid (H<sub>3</sub>BO<sub>3</sub>) product along with sulphate of potash (SOP).

Importantly, the DFS forecasts an unlevered, post tax net present value of US\$1.25 billion (\$1.7 billion) and an internal rate of return (IRR) of 41%.

The study models a project where borate acid could be solution-mined below ground then brought to the surface to be upgraded with a solvent extraction and crystallisation process.

The company would produce gypsum as part of its extraction process, and sulphate of potash during processing, with hydrochloric acid then being a by-product credit to be used to again mine the project's borate resources.

### **READ: Argosy Minerals confirms strong economics for Rincon Lithium Project in Argentina**

**Argosy Minerals Ltd** (ASX:AGY) continues to fast-track the development of its flagship Rincon Lithium Project in Argentina.

The company achieved a key milestone in the September quarter in producing a successful and scalable chemical process solution to produce battery-grade quality lithium carbonate (LCE).

About 500 kilograms of LCE product has been produced to date.

Argosy believes the exclusive chemical process technology is effectively proven for utilisation of future development stages at the Rincon Lithium Project.

### **READ: Core Lithium boosts lithium inventory with maiden Carlton resource**

**Core Lithium Ltd** (ASX:CXO) is developing the Finnis Lithium Project near Darwin and last year lodged an application for a mining lease at the Grants prospect with the NT Government.

A definitive feasibility study focused on mining and production of high-grade lithium concentrate at Finnis is currently underway and on track for completion later this quarter.

Core completed a pre-feasibility study for Finnis in June 2018, indicating the project would be a low-capex lithium concentrate operation with globally competitive cash costs, high operating margins and rapid capital payback.

The Grants deposit is expected to generate a net present value (NPV) of \$140 million pre-tax with an internal rate of return (IRR) of 142% at an average concentrate price of US\$649 per tonne.

### **READ: Galan Lithium receives drilling permits for Candelas Lithium Brine Project in Argentina**

**Galan Lithium Ltd** (ASX:GLN) is defining the Candelas prospect within its Hombre Muerto Lithium Project in Catamarca Province, Argentina, also known as the 'lithium triangle'.

Galan has been de-risking the project through soil sampling and geophysics and has made plans to drill test defined targets.

Recent survey work conducted over the project's western basin targets delineated new discoveries of lithium-bearing brines, adding to the project's potential scalability.

The company expects to post a maiden JORC resource before the end of the financial year.

### **READ: Infinity Lithium scoping study supports lithium hydroxide operation**

**Infinity Lithium Corporation Ltd** (ASX:INF) is leveraging growing market demand for lithium hydroxide in the production of cathode batteries as it develops processing routes for its San Jose Lithium Project ore.

Last year the company expanded its lithium hydroxide scoping study at the Spain-based project to include further hydroxide as well as lithium sulphate flowsheet development.

The expanded study comes after the company identified the hard-rock San Jose resource has a natural advantage over brine producers due to a straight conversion process via a lithium sulphate transitional pathway.

Infinity is advancing its lithium hydroxide study in direct response to the evolving battery chemicals market, with lithium hydroxide demand continuing to grow faster than lithium carbonate.

Most of the recent global investments in lithium chemical plants have been in lithium hydroxide production as lithium-ion battery makers move towards higher-energy density and nickel-rich cathodes.



Looking east over ioneer's Rhyolite Ridge south basin

### **READ: ioneer's high-grade lithium-boron drill results indicate potential to improve cash flow**

**ioneer Ltd** (ASX:INR) released a pre-feasibility study (PFS) for its flagship Rhyolite Ridge Lithium-Boron Project in the US state of Nevada last year, modelling a 30-plus-year mine life.

The PFS put forward a notable low cost for producing lithium equivalent, due to the high volume and value of the boron by-product it would produce along with lithium carbonate.

ioneer's study put the Rhyolite Ridge project's after-tax net present value (NPV) at US\$1.8 billion at a 7% real discount rate.

The after-tax internal rate of return (IRR) was 27.7%, making the payback period on the 30-plus-year mine a short 4.1 years.

Initial capital expenditure (capex) was US\$426 million including indirect costs and contingency plus \$173 million for a lump-sum turnkey sulphuric acid plant.

## **READ: Lithium Australia finalises option over Youanmi Lithium Project**

**Lithium Australia NL** (ASX:LIT) has designed disruptive technologies to furnish the lithium battery industry with ethical and sustainable supply solutions.

Through its SiLeach and LieNA lithium extraction processes, along with quality cathode material production from wholly-owned subsidiary VSPC Ltd, the company seeks to establish a vertically-integrated lithium processing business.

Stage II processing trials of SiLeach are ongoing at a facility in Sydney, with the objective of using the processing technology to convert mine waste into lithium-ion batteries.

The company is also reassessing the pilot plant location to optimise technical and financial benefits.

This process will take into account the principal financial considerations together with intangibles such as the ability to manage research & development in offshore jurisdictions.

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