Lithium Special Report

Fastmarkets’ 11th Lithium Supply and Markets conference 2019
Santiago, Chile

This PDF includes full coverage of the lithium industry’s premier annual event
BUILDING A SUSTAINABLE FUTURE TOGETHER

Lithium partner

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Table of contents

5  Lithium price table
6  Seven things we learnt at the lithium conference
9  Lithium demand could outpace supply due to low prices, few projects
11  Flexibility is key for lithium industry, executives say
12  Fastmarkets-LME partnership will pave way for lithium futures contract, says exchange
13  Govt push for EV output to shift from subsidies to regulation
15  Price forecast
HOW CAN YOU ACCELERATE GROWTH IN LITHIUM POWERED ENERGY?

ASK YOUR SEPARATION SPECIALIST

As the world’s electric car fleet expands exponentially, imagine what this means for lithium producers. At ANDRITZ, this is exactly what we’ve been doing for more than 50 years. By developing leading batch and continuously operating filtration centrifuges for superior purity, moisture content, and energy efficiency. And delivering full dewatering and drying solutions including centrifuges, filters, thickeners, and dryers to the top global producers, accounting for half the world’s battery-grade lithium production. Together with the industry’s highest throughput processing line for lithium car battery cases produced with Schuler machines, this makes ANDRITZ a vital enabler of one of the 21st century’s fastest growing opportunities.

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Get deeper insights here!

<table>
<thead>
<tr>
<th>LITHIUM CARBONATE</th>
<th>Contract prices</th>
<th>Price 24/04/2019</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<tr>
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</table>

<table>
<thead>
<tr>
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<th>Price 6/06/2019</th>
</tr>
</thead>
<tbody>
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Seven things we learned about the lithium market

Fastmarkets has identified seven main takeaways on the lithium market from Fastmarkets’ 11th Lithium Supply and Markets Conference in Santiago.

1. New investments are key

A scarcity of capital in the lithium sector is a concern for many market participants given the expected growth of downstream demand.

Although consumption of lithium carbonate equivalent is on track to grow to 1 million tonnes by 2025 from just below 300,000 tonnes last year, new projects may fall short of this increased demand, depending on the pace of growth in the electric vehicle (EV) market.

Global output should approach 1.5 million tonnes per year in 2027, according to calculations from Chile’s ministry of mining, but it sees this as the sector’s maximum capacity taking into account all current exploration projects.

New investment in the domestic lithium sector totals $1.81 billion, minister of mining Baldo Prokurica said, “[but] “the world will need more lithium and we need more projects than today,” vice minister Pablo Terrazas added.

“We want state and privately owned companies mining lithium in Chile,” Prokurica said.

Although the EV sector is growing rapidly while automakers from the United States, Europe and China invest in higher capacity, upstream investment is falling short, Anthony Tse, chief executive officer at Australia’s Galaxy Resources, said.

“We are still lacking some $2 billion a year, still dwarfed by the amount of investments on downstream,” Tse added. “We can’t wait to invest in 2025 as the projects will take a couple of years to build.”

2. Chinese state subsidies for new EVs will evolve into supportive legislation

Government funding for automakers will continue to fade while regulations on carbon emissions become stricter.

The latter will be supportive of increased production of NEVs in the coming years, market participants said at the conference.

3. Flexibility in production of lithium carbonate and hydroxide essential for survival

Lithium carbonate remains the most widely used lithium compound in lithium-ion batteries and is set to remain so the coming years.

This is despite market participants anticipating lithium hydroxide overtaking lithium carbonate usage once production and adoption of nickel-rich cathodes such as nickel-cobalt-manganese NCM 622 and 811, which typically use hydroxide, ramp up.

Producers Albemarle, SQM and Tianqi were among those in attendance.
at the conference that agreed that flexibility in production remains vital for addressing diverse industrial and technological challenges.

4. Nickel-rich batteries to dominate in the next few years

Conference attendees agreed that lithium-ion batteries with higher nickel content will dominate over the coming years.

Despite the increasing use and production in the short term of lithium-iron-phosphate (LFP) and lithium-manganese-oxide (LMO) batteries in China, the world’s largest single market for batteries, production and use of more advanced nickel-rich NCM 622 and 811 batteries are set to increase.

5. Industry increasingly moving away from cobalt

Social and supply issues are prompting the battery sector to look to reduce cobalt usage. Higher-nickel batteries are already seen as the next step to lowering cobalt content but the metal is still needed for reasons of safety and energy capacity.

“The industry is getting a lot of pressure from end-users after child labor in the Democratic Republic of the Congo was exposed,” Yuan Gao, chief executive officer at Pulead Technology Industry, said.

Social awareness is driving the development of new chemistry in li-ion batteries, ESK Consulting lead consultant Jaime Alée added. NCM811 batteries (80% nickel, 10% cobalt and 10% manganese) are already in production; cobalt demand growth has receded, he added. While lithium demand growth will more than triple over the next six years, cobalt usage in batteries will grow at a slower pace to 110,000 tonnes in 2025 from 50,000 tonnes currently, according to Pulead’s estimates.

As well as child labor issues, supply disruptions caused by political instability are also a factor in looking to substitute cobalt with other metals in battery chemistry.

“The industry would love to depend more on manganese than cobalt,” McKinsey & Co leader for EVs Ken Hoffman said.

6. Chile reshaping its regulations

Chile’s ministry of mining was planning to unveil new regulations for the lithium mining industry in the country that it hopes will attract private and public investment in the sector.

The country considers lithium to be a strategic material, having been designated as such by the Augusto Pinochet administration in 1979. This is why SQM and Albemarle are in control of most domestic reserves, according to Chile’s Terrazas.

This new “national lithium policy” should garner interest in the mineral from state-owned Codelco and Enami - both companies are already planning on exploiting their existing resources.

“We already have a modern comprehensive mining code that protects investment,” minister Prokurica said. “We are aware of the boom in electromobility and its value chain, and want Chile to take part on it.”

7. Varied reactions to Fastmarkets-LME partnership to develop lithium price benchmark

Market participants at the conference largely gave a qualified welcome to news of the partnership between the LME and Fastmarkets to develop the lithium price benchmark.

Vivian Wu, the president of Tianqi Lithium, the largest producer of lithium compounds in China and which also has a 23.77% stake in SQM, said such a contract would be helpful to the company and to the industry more broadly.

James Calaway, chairman at Ioneer Ltd said it will be extremely constructive for the industry to have symmetrical, unbiased price discovery and forecasts. The price will provide emerging market participants with more transparency and a new financing and hedging alternative, he added.

Among other participants at the conference, José de Castro - manager for lithium operations at Lithium Chile - acknowledged that establishing any price as a benchmark would be a challenge but that it would be good to serve as a useful starting point in negotiations for lithium prices.

And Frontier Lithium CEO Trevor Walker said he was not surprised that the LME selected Fastmarkets as its partner to develop the benchmark because of Fastmarkets IM’s legacy. Walker emphasized that this price will help financing, hedging and attracting the new entrants to the market.
CHANGING THE WORLD WITH LITHIUM

Listed on the Shenzhen Stock Exchange (stock code: SZ.002466), Tianqi Lithium is a global new energy materials company, with lithium at its core. Tianqi Lithium has world leading positions in its major businesses of lithium resource investment, lithium concentrate extraction and the production of advanced lithium specialty compounds. With resource and production assets located in the pre-eminent lithium regions of Australia, Chile and China, our fully vertical-integrated businesses ensure the Company is optimally positioned to partner with our international customers to support the long-term sustainable development of lithium-ion battery technologies for application in the electric vehicle and energy storage industries.
Global lithium demand could outpace supply in the coming years, with the number of new projects expected to fall short of expected consumption amid doubts on capital availability and low prices, market participants said at the conference.

Still, major companies in Chile and Australia seem to be best positioned to increase capacity. As a result, new supply could come from low-cost producers rather than marginal-cost producers.

“The market seems to be in capital starvation. The question is if it is so deep that supply won’t be as great as expected going forward,” McKinsey & Co leader for electric vehicles Ken Hoffman said.

“New projects, at least conceptually, would be coming from producers at the lower end of the cost curve, particularly from Chile,” Morgan Stanley managing director Javier Martinez de Olcoz Cerdan said. “They have [virtually] unlimited resources [and capacity increases would come at] low cost, low capex.”

Chile, for example, aims to maintain its current share of global output, at around 32%. The country’s ministry of mining estimates current projects around the world are enough to bring global production to 1.5 million tonnes per year from 2027 onward.

“We will need new supply after 2027 if demand expectations do not materialize,” Chilean vice minister of mining Pablo Terrazas said. “Chile is the main lithium producer in South America; we need to take the lead and sustainably increase output.”

This could mean that original equipment manufacturers (OEMs) will want to get more involved, granting capital needed for this supply increase, Fastmarkets head of battery raw materials research William Adams said.

“The environment is looking so constructive demand-wise for many decades and low prices and depreciated equity markets could mean there is not enough money coming to the industry at a time when it is needed,” he said.

The Chilean ministry of mining currently has three different scenarios for world lithium demand and in most of them supply would be tight.

A base-case of “medium demand” would mean consumption hits 1 million tonnes by 2027-28, Terrazas said. In the bullish one, demand would total 1 million tonnes by 2024 and surpass 3 million tonnes in 2038. The bearish scenario contemplates 1 million tonnes in 2034-35, reaching around 1.1 million tonnes by 2038.

Fastmarkets’ latest price assessment for battery-grade lithium carbonate (minimum 99.5%) in China, Japan and main South Korean ports was $11-12.50 per kg cif on June 6, its lowest since at least August 2017. Prices were at $13-15 per kg on December 27.
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for growing markets

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- Sample Production for Customer Approval
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The flexibility to either produce lithium carbonate or hydroxide is essential to surviving in the lithium industry in the coming years, conference attendees agreed.

With lithium hydroxide continuing to grow in market share globally, participants expect the material to overtake lithium carbonate as the preferred choice of lithium compound used in lithium-ion (li-ion) batteries within the next decade.

But demand for lithium carbonate is expected to remain strong because the material is currently the most widely used lithium compound in li-ion batteries.

“We need to be prepared for either product the customer is demanding,” Pablo Altimiras, vice president of lithium and iodine business for SQM, said. “Hydroxide consumption is growing more rapidly than carbonate, but we will still have high levels of carbonate demand for many, many years.”

Producers agree that this flexibility comes from working closely with consumers because lithium products are effectively bespoke materials whose constitution varies according to the needs of the end user.

“Demand for this or that specific product will depend on the evolution of the battery market and of course what the customers are looking for,” David Ryan, vice president for corporate strategy and investor relations at Albermarle, said.

“Over time, we see a more significant shift to hydroxide, but carbonate will always be a great part of our portfolio,” Ryan added.

“There are going to be nuances in demand, regarding each particular market, the specifications of the material needed, and others. So, you have to be flexible and grow in relationship with your customers,” said Emma Hall, vice president for corporate development and marketing at Tianqi Lithium Co.

Fastmarkets’ lithium carbonate price index in China was last calculated at 74,458 yuan ($10,766) per tonne ex-works on June 6, from 74,686 yuan per tonne ex-works a week earlier.

Fastmarkets’ lithium hydroxide monohydrate domestic spot price assessment in China was 83,000-88,000 yuan per tonne ex-works on June 6, stable since May 23 but down from 85,000-90,000 yuan per tonne on May 16.

“China is a very important market and we are always closely watching what happens in the country, regarding different levels of qualities and different end uses, as it is also a supplier of batteries and electric vehicles to the rest of the world,” Ryan said.
Fastmarkets-LME partnership will pave way for lithium futures contract, says exchange

EV-inspired price volatility in lithium creates a need for risk-management tools, the London Metal Exchange said when announcing its partnership with Fastmarkets to develop a lithium benchmark price.

The London Metal Exchange is partnering with Fastmarkets to promote the uptake of a transparent and representative global lithium price, the exchange said.

The partnership will pave the way for the LME to launch a lithium futures contract.

“In recent years there has been unprecedented price volatility in the lithium market, driven particularly by explosive electric vehicle (EV) battery demand,” LME head of market development Robin Martin said in a press release.

“The LME has been approached by a number of industry players, including producers, end users and several leading automotive firms, to develop effective lithium price-risk management tools. We are delighted to be announcing the next step in that process today,” he added.

The exchange has been working closely with the global lithium industry over the past 18 months to meet the need for transparent and robust reference prices, it said.

In 2018, the LME requested proposals from several leading price reporting agencies (PRAs) - including Fastmarkets - with the objective of selecting the lithium market’s preferred price provider.

“The LME, on the basis of market views, selected Fastmarkets as its pricing partner due to their lithium prices being widely used across the industry combined with their leading pricing capabilities,” the LME press release said.

“Due to its chemical nature, lithium is not suitable for a physically delivered contract, and hence the LME, together with its advisory group, believe that partnership with a price reporting agency represents the best route to a tradeable contract,” it added.

The LME will continue to work with its advisory group and other industry participants to gauge appropriate timing for launch of a lithium contract.

This comes after the LME launched launch seven new cash-settled futures products on March 11 - it selected Fastmarkets to be the price provider for its aluminium duty-unpaid, alumina and cobalt contracts.

Fastmarkets has identified the ex-works China market as the most liquid spot market for battery-grade lithium at present.

Fastmarkets’ latest assessment of the price for Chinese domestic spot battery-grade lithium carbonate, min 99.5% Li2CO3 on June 6 was 72,000-77,000 yuan ($10,395-$11,117) per tonne ex-works on June 6. This was down from 74,000-78,000 yuan per tonne the previous week.
Govt push for EV output to shift from subsidies to regulation

Government incentives for electric vehicle (EV) production, which up until now have mostly been in the form of subsidies, are slowly starting to shift into supportive legislation for the sector.

Regulations on carbon emissions are becoming stricter and will contribute to the boost in EV production in the coming decades, sources said. Concurrently, government funding for automakers is fading away, with the most obvious example being in China, sources added.

“Chinese subsidies have so far been equal to or surpassing production costs, but from next year and going forward, they will be minimum to none,” the chief executive officer for electrochemical cathode materials producer Pulead Technology Industry, Yuan Gao, said.

“As EVs move to mass production and while government’s face fiscal constraints, subsidies cannot last long outside of China,” Adam Panayi, managing director at research firm Rho Motion, said. “Governments will have more impact through legislation.”

Most EVs producers in China may struggle to make a profit following the subsidy decline, the lead consultant for ESK Consulting, Jaime Alée, said. For now, the companies aim to increase the EV share of the auto market while generating losses most of the time, Alée added.

The China 6 emission regulation is a clear example of a government pushing for environmentally friendlier solutions in the vehicle industry via its legislation. This new legislation will further cut the maximum carbon and nitrogen oxide emissions per unit and will be implemented in two phases – one in July 2020 and the other in July 2023.

“The China 6 requirements are going to be more difficult to meet than the latest Euro 6, which were already hard,” Kevin Riddell, senior manager for consultancy LMC Automotive, said. “There’s a focus on lowering emissions all around the world, which will be nearly impossible to achieve without electrification.”

“Internal combustion vehicles are at the top of what they can achieve in emission reduction,” Panayi added.

Market participants think EV output will be the main driver of lithium demand in the coming decades due to the car’s lithium-ion battery usage. ESK, for example, estimates lithium consumption will total 382,000 tonnes in 2019, before rising to 1 million tonnes in 2025.

This comes at a time when the lithium market has been correcting downward, following large price spikes over 2017 and 2018 when much excitement surrounded the lithium and battery raw materials’ markets.

Fastmarkets most recently assessed the spot price for battery-grade lithium carbonate (99.5% Li₂CO₃) imported in China, Japan and Korea at $11-12.50 per tonne cif on June 6, stable since May 23 but down on the top end of the range from $11-13 per tonne on May 16.
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Santiago - Salta - Lima
Price forecast

Fastmarkets’ research team expects the carbonate cif CJK price to average $11.55 per kg in 2019. We also expect a slower uptake of high-nickel NCM batteries and increased use of lithium iron phosphate to boost demand for carbonate, since EV manufacturers are pushing cheaper NEVs now that subsidies have fallen. Conversely, with more hydroxide production reaching the market at a time when demand for hydroxide has not grown as much as anticipated, we expect hydroxide prices to come under further downward pressure in China and the gap between hydroxide and carbonate to narrow. Indeed, by late 2020 we expect hydroxide to be priced slightly lower than carbonate.

We expect the hydroxide price cif CJK to fall over the forecast period but not to trade at a discount to carbonate. We expect that the current consumers of hydroxide on the international market will prefer to stay with their suppliers, so prices are likely to be less supply-elastic. That may change in time.

So far in the second quarter, the carbonate price ex-works China has averaged 74,364 yuan per tonne. We still expect the price to move lower but, even in that scenario, our current second-quarter forecast looks a little low at 73,000 yuan.

Lithium projects

- **Company:** Himac Lithium
  **Operation:** Whabouchi Mine & Shawinigan Plant
  **Type:** Spodumene, Lithium hydroxide and carbonate
  **Capacity:** 295,000 tpy 6.32% Li2O
  **Profit:** 13,000 tpy LiOH and 15,000 tpy carbonate
  **Cost:** $2,811/t for LiOH and $3,403/t Lithium carbonate

- **Company:** Yahua Lithium
  **Operation:** Lijigou
  **Type:** Spodumene
  **Capacity:** 18,750 tpy
  **Profit:** 4,000 t in 2019, 10,000 t in 2020
  **Cash cost:** $2,671/t

- **Company:** Minmetals Saltlake
  **Operation:** Yiliping
  **Type:** Brine
  **Capacity:** 10,000 tpy
  **Production:** 4,000 t in 2019
  **Cash cost:** $2,885/t for LiOH and $3,403/t Lithium carbonate

- **Company:** Nemaska Lithium
  **Operation:** Whabouchi mine & Shawinigan Plant
  **Type:** Spodumene, Lithium hydroxide and carbonate
  **Capacity:** 213,000 tpy 6.25% Li2O
  **Profit:** 23,000 tpy LiOH and 11,000 tpy carbonate
  **Cash cost:** $2,811/t for LiOH and $3,403/t Lithium carbonate

- **Company:** Zangge Lithium
  **Operation:** Qarhan
  **Type:** Brine
  **Capacity:** 20,000 tpy
  **Production:** 9,000 t in 2019
  **Cash cost:** $2,671/t

- **Company:** Lithium Americas/Ganfeng
  **Operation:** Cauchari Olaroz
  **Type:** Brine
  **Capacity:** 25,000 tpy Carbonate
  **Profit:** 2019
  **Cash cost:** $2,695/t

Source: Fastmarkets
Chile’s next lithium mine

**DEVELOPING CHILE’S NEXT HIGH-GRADE LITHIUM MINE**

The Maricunga project is a joint venture in which Lithium Power Ltd owns 51%. The properties are 100% owned by the JV company, Minera Salar Blanco S.A. and not subject to leasehold-related negotiations impacting other Chilean operators. The Project is located within the ‘Lithium Triangle’ in northern Chile, home to the largest and highest quality lithium brine deposits.

### OUTSTANDING ECONOMICS

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<td>Operating Cost</td>
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<td>US$ 3,772/t</td>
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<td>After-tax</td>
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1. The battery grade lithium carbonate price expected to range from US$13,263/tonne in 2023 to US$17,616/tonne in 2032 in inflation adjusted terms.
2. After-tax IRR 26.7% assuming a 50% leverage. On a 100% Equity Basis, the pre-tax IRR of 23.8%, after-tax IRR of 21%.

### A COMPELLING INVESTMENT OPPORTUNITY:

- **Solid Team and Tier-1 Engineering companies** undertaking project development for low-risk development.
- **Definitive Feasibility Study** released. Maricunga is the most advanced project in South America.
- **Resource Measured and Indicated** 2.07 million tonnes at a mean concentration of 1.167mg/L.
- **Financing structuring and off-take discussions** underway.
- **High quality brine** resource in a stable mining jurisdiction.
- **Use of traditional and well proven** production processes.
- Working with worldwide leading engineering companies and equipment suppliers:
  - **Engineering:** WorleyParsons, MWH (Stantec)
  - **Production:** GEA, Veolia, Andritz, FLSmidth, and SGS

**ASX:** LPI  
www.lithiumpowerinternational.com