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# ASSESSING PRICES FOR LITHIUM CARBONATE, HYDROXIDE & SPODUMENE

## INTRODUCTION

Benchmark strives to create methodologies that accurately reflect the market dynamics of the industries we cover and allow for independent data collection, free of distortion or misrepresentation.

In the lithium market, we have identified 11 grades that best reflect the existing balance of trade and production in the market, a list of which are included in this document (see pg 5).

## PROCESS

Benchmark price assessments are collected by polling a cross-section of active market participants. Our team of analysts verify and substantiate this information through a range of primary and secondary sources.

This information is reviewed in monthly meetings,

during which our analysts collate all data received and agree on an independent range (high and low) for prices reflective of prevailing market trends.

The information received is weighted according to volume, grade, and the credibility of the information source in order for our analysts to set a price range reflective of the majority of material traded each month.

Where a single price point is published, it reflects the mid-point of the high and low range, unless otherwise stated.

Data published at the beginning of each calendar month relates to transactions from the previous month.

As the markets we cover are not exchange traded, all pricing data we receive is acquired privately from the market and logged internally.

Benchmark analysts continually seek to increase our pool of price points (contacts). Although the number of contacts for any one price point can vary, the insight and experience of our analysts ensure that all data published can be authenticated and supported by market intelligence.

If at any time the number of contacts for any one price falls to a point where data cannot be sufficiently verified, the grade is reviewed by the supervising editor.

Due to the rigid nature of the markets we monitor, price ranges are set on a monthly basis in order to allow for a sufficient number of trades to be completed to reflect a consistent market trend.

# COMPLIANCE & CONFIDENTIALITY

## COMPLIANCE

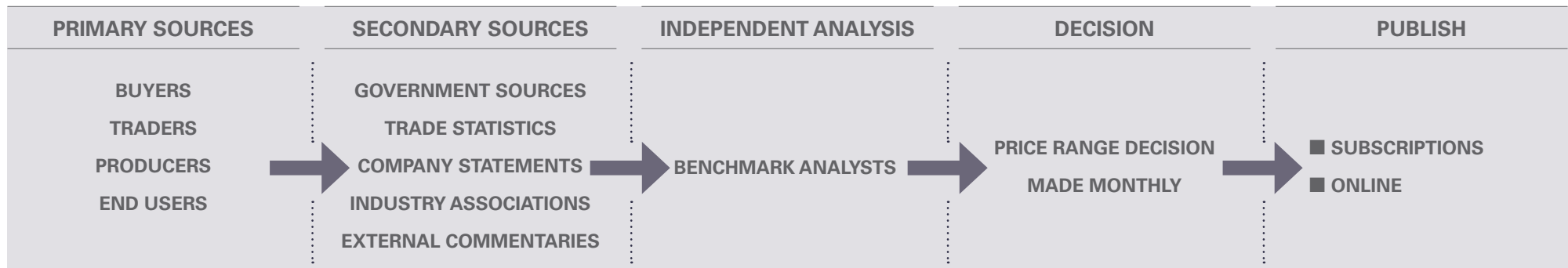
All Benchmark analysts are obligated to sign a code of conduct upon employment in relation to data collection and assessment, to ensure independence and credibility.

## CONFIDENTIALITY

As with all non-exchange traded raw material markets, deals are conducted privately between buyers and sellers.

As such, we treat the confidentiality of all our contacts and data with the utmost seriousness and information exchange is subject to Chinese walls within the company in addition to complete confidentiality outside of the company.

## PRICE COLLECTION FLOWCHART



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# TESTING OUR PRICE INTEGRITY

## SOURCE TESTS

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All information received during our data collection process is weighted upon the credibility of the information source.

Benchmark therefore judges the validity of the information received based upon:

- Proximity – the position of the source within the industry and in relation to the transaction being discussed
- Vested interest – the motivation of the source in discussing the information
- Track record – the previous reliability of information obtained from the source
- Date received – when the information was shared in relation to the date of publishing

## COMPARATIVE METRICS

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Often, the nature of surrounding markets can be used as a point of reference for contract negotiations between buyer and seller. Subsequently these data points are employed as comparative metrics in measuring the state of the market in question. Comparative metrics include:

- Comparison to the price of the same product in another area of the market
- Comparison to a slightly different specification product in the same area of the market
- Comparison to transactions completed for the same product in another relevant time period
- Comparison to the material's feedstock or primary derived product(s)
- Comparison to transactions for different volumes or trade routes

# THE LITHIUM GRADES WE COLLECT PRICES ON

## LITHIUM GRADES

Benchmark tracks 11 lithium chemical grades which reflect the bulk of traded material in the market. We categorise the grades primarily by end use/where it is consumed. These chemicals are:

### LITHIUM CARBONATE

Lithium Carbonate, FOB South America  
Lithium Carbonate, CIF North America  
Lithium Carbonate, CIF Asia  
Lithium Carbonate, CIF Europe  
Lithium Carbonate, EXW China (Battery grade)  
Lithium Carbonate, EXW China (Technical grade)

### LITHIUM HYDROXIDE

Lithium Hydroxide, FOB North America  
Lithium Hydroxide, CIF Asia  
Lithium Hydroxide, CIF Europe  
Lithium Hydroxide, EXW China

### LITHIUM FEEDSTOCK

Spodumene concentrate, FOB Australia

### STANDARD SPECIFICATION:

LITHIUM CARBONATE	
Formula	Li <sub>2</sub> CO <sub>3</sub>
Li <sub>2</sub> CO <sub>3</sub> content	Min 99.0%
Particle size	<40 µm
Common impurities	Na, K, Ca, Cl, SO <sub>4</sub>

### STANDARD SPECIFICATION:

LITHIUM HYDROXIDE	
Formula	LiOH
LiOH content	Min 55.0%
Particle size	<40 µm
Common impurities	Na, K, Ca, Cl, SO <sub>4</sub>

### STANDARD SPECIFICATION:

LITHIUM CONCENTRATE	
Formula	Li <sub>2</sub> O
Li <sub>2</sub> O content	6%
Particle size	< 75 µm
Common impurities	Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub>

# BMI LITHIUM INDEX

## LITHIUM PRICE INDEX

The Benchmark Mineral Intelligence Lithium Index (BMI Lithium Index) is a pricing index which tracks the monthly performance of lithium carbonate and hydroxide against a base of January 2009.

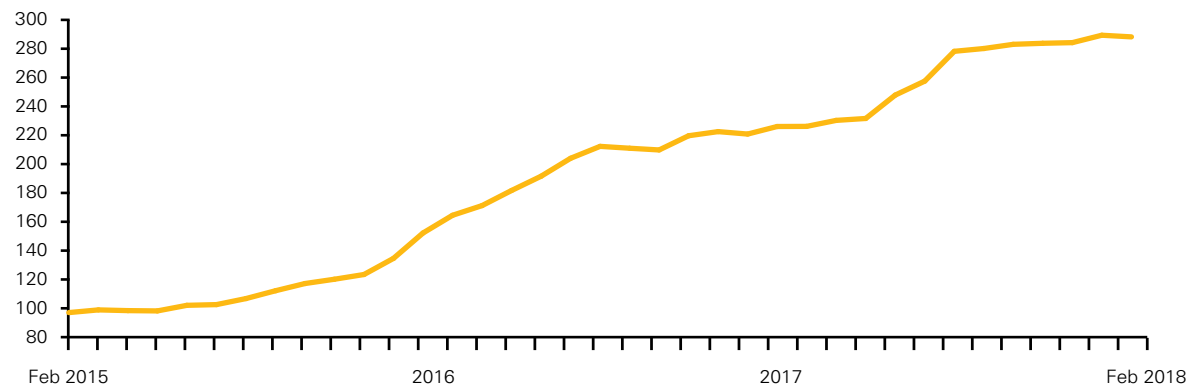
The index is calculated using a weighted average of prices we publish in order to reflect the distribution of trade in the market:

These prices have been selected to illustrate the price differentials for material across the most common trade routes.

Weightings are assigned according to the distribution of production and the volumes being traded across major supply routes.

## BMI LITHIUM INDEX

Published monthly in Benchmark's Lithium Price Assessment Subscription



# HOW IS LITHIUM TRADED?

## LITHIUM TRADING

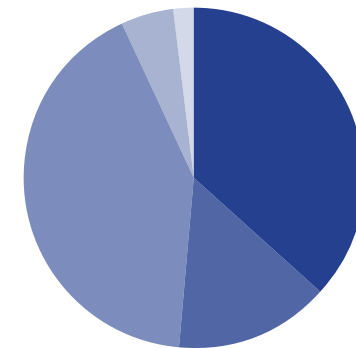
In 2017, lithium chemical transactions totalled around 215,000 tonnes. These contracts were, and continue to be, negotiated privately between buyer and seller.

Traditionally, volumes are traded in long-term ( $\geq 6$  month) supply agreements, however prices are often reset at regular intervals throughout these agreements. There is no spot market for lithium, no futures market and nor is it exchange traded.

Subsequently, all market data Benchmark obtains is done so confidentially and we set minimum transaction categories to avoid misleading outliers being included in our price ranges.

Volumes traded on long-term agreements ( $> 6$  months) are estimated to account for over 70% of the market globally.

**Lithium supply (LCE): Jan 2018**



■ Chile 36.8%      ■ US 5.0%  
■ Argentina 14.8%      ■ Other 1.8%  
■ China 41.5%

Source: Benchmark Mineral Intelligence

# WHERE DO WE PUBLISH OUR LITHIUM PRICES ASSESSMENTS?

## PUBLISHING

Benchmark's lithium price data is distributed primarily through the Benchmark Lithium Price Assessment subscription, however with prior approval some data and information included in this service may also be published in:

- Contracts
- Market consultancy and industry reports
- News articles
- Company financial statements

## SUBSCRIPTION:

The Benchmark Lithium Price Assessment is a dedicated subscription service which includes:

- Independent market analysis
- Monthly market reviews
- Online price database
- Global production statistics

To subscribe, please contact  
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## Lithium

Tight market persists as majors up downstream projections

- Lull in market activity over Chinese New Year sees prices stabilise; Benchmark Lithium Index unchanged
- Producers upgrade demand estimates for 2025 with higher pricing expected for H2 2018
- Chinese EV subsidy announcement pushes for longer-range targets; energy density improvements required to meet new requirements
- Umicore commit an additional €660m to expand cathode production in China and Europe; targeting 175,000 tpa production by 2021
- Pilbara Minerals secure Posco offtake agreement with the Korean firm investing A\$79.6 million for a 4.75% stake in the company
- Chinese companies commit to further conversion expansions as Qinghai Salt Lake begin work on 50,000 tpa lithium carbonate expansion; commissioning underway at Ganfeng's new 20,000 tpa hydroxide facility

## TERMINOLOGY

**Lithium feedstock:** This refers to lithium concentrate, the majority of which is converted into lithium chemicals for a wide range of end markets including lithium ion batteries.

**Lithium chemicals:** This refers to any downstream chemicals that are produced from spodumene feedstock or lithium brine. For the purposes of this report, it will refer to the general trend of lithium carbonate and hydroxide; any other chemicals will be specifically cited.

**Lithium carbonate:** the primary base chemical produced by the lithium industry used in a wide range of end markets including lithium ion battery cathodes, ceramics and glass, and pharmaceuticals.

**Lithium hydroxide:** the second largest chemical produced by the lithium industry, traditionally used in the production of greases but also competes with lithium carbonate in the lithium ion cathode sector, specifically NCA chemistry.

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# OUR ETHICS & COMPLIANCE POLICY

## ETHICS AND COMPLIANCE

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Benchmark operates according to publishing best practices and has a strict ethics policy which applies to all editorial employees.

In order to provide the highest quality information available to our subscribers, editorial employees are not permitted to trade any of the materials we cover and strict policies are in place to document and archive information received which is relevant to our published data.

Furthermore, staff are not permitted to invest in related stocks and have guidelines for interacting with industry sources and accepting gifts

## CORRECTIONS:

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If any published data is later found to be inaccurate or incorrect, the market will be immediately notified by an email alert. A correction will be published in the following edition of the monthly market report which will be distributed via email and published on Benchmark's web site.

The correction will also be updated in our online databases.