

THE
**LITHIUM
VOICE**



INTERNATIONAL LITHIUM ASSOCIATION (ILiA)

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EU lithium policy

DLE 101

In conversation with
Ellen Lenny-Pessagno

INCREASING LITHIUM PRICE TRANSPARENCY



THE CURRENT

Catch up with ILiA's work at a glance

Join the Product Water Footprint (PWF) Working Group!

ILiA is seeking interested parties to join the working group that will help to create the first standard industry guidance regarding the product water footprint of lithium products.

"We have chosen the format of an open working group, including non-members and academia, to create maximum buy-in to the project. We expect a very motivated group to move ahead quickly.", said Mark de Boer, PhD (Albemarle Corporation), Chair of the ILiA's Sustainable Lithium Subcommittee (SLS) which is overseeing the project.

Earlier this year ILiA published the first guidance to determine the product carbon footprint (PCF) of lithium products and the PWF is the next chapter of a wider examination of life cycle assessments (LCA) for lithium products.

Non-members may apply to join the working group. To register your interest email info@lithium.org.

ILiA attends the OECD Forum on Responsible Mineral Supply Chains

This is the third time that ILiA has attended this annual event in Paris, which holds a particular relevance for the Association's Responsible Production and Sourcing Subcommittee (RPSS). This year a key theme of the Forum was how to responsibly meet the world's requirement for a reliable supply of the minerals that are critical to the energy transition.

A highlight of the event was a closed-door discussion about industry standards between leading automakers and ILiA, the Nickel Institute (NI), Cobalt Institute (CI) and CSR Europe/ Drive Sustainability.

Responsible sourcing is applicable to all minerals, including lithium, produced from anywhere in the world.

The OECD's core document regarding responsible sourcing is called the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (3rd edition, 2016). This encourages companies to implement the five-step risk-based due diligence to their mineral supply chains, and thus identify and address any risks to human rights.

For further information, please contact ILiA.

RMOA update

The Health and Safety Subcommittee (HSS) continues to oversee the development of a comprehensive Risk Management Options Analysis (RMOA) which will benefit the entire global lithium industry. The RMOA will help regulators and industry participants to better understand the life cycle of lithium and its three most commonly used salts.

The RMOA is examining the current research on lithium, identifying gaps, and helping support an informed discussion by regulators. The lithium industry believes that classifications should be based on clear, compelling and comprehensive scientific evidence. Neither ILiA nor its members question the need for substances to be proportionally regulated to protect workers' safety. This project is generously underwritten by ILiA's Core Members.



Product Carbon Footprint (PCF) guidance for lithium products now available in English, Spanish and Chinese

ILiA's landmark guidance on calculating the PCF of lithium products is now available in English, Chinese and Spanish as part of the Association's mission to share relevant information about the lithium industry as widely as possible. All three editions are available from www.lithium.org.

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Chair's WELCOME



Welcome to the 6th edition of *The Lithium Voice* in which we discuss lithium prices, probably the most talked about topic in our industry! Discovering the true price of a specialty chemical in a global market is a very complex challenge, to say the least. We look at new developments in lithium price discovery and examine why the battery supply chain requires transparency and reliability for long-term growth.

Our second feature article is taken from a new report on direct lithium extraction (DLE) technologies which ILiA commissioned in collaboration with Rockwell Automation. The full report was written by Associate Professor Amir Razmjou at Edith Cowan University, Perth, Australia, and the full report is available as an open access white paper at www.lithium.org

Following on from the cover story in Lithium Voice #5, I'd like to note that our new lithium product carbon footprint (PCF) guidelines have recently been translated into Spanish and Chinese, to enable as many industry practitioners as possible to access this landmark document. The guidance is of critical importance for the lithium industry as it will create a benchmark by which the industry can measure its greenhouse gas credentials. All three language editions are available free on our website.

Our conversation this quarter is with Ellen Lenny-Pessagno who is Global VP, External Affairs and Sustainability at Albemarle Energy Storage. Ellen is a long-standing member of ILiA's Executive Committee and has been one of the Association's champions since day one. Here she shares some fascinating insights with us, including a forecast that the lithium industry could grow 2.5 times from 2024 to 2030. There truly has never been a time when lithium was more important to global development than it is today!

Anand Sheth
Founding Chairman

WHAT IS THE PRICE OF LITHIUM?

Increasing lithium price transparency

The price of lithium is one of the most important and debated subjects in our industry. Lithium is a specialty chemical and the industry is truly global, so estimating a benchmark price for a representative lithium product is a very complex challenge. Does anyone really know the price of lithium?

As Albemarle's Ellen Lenny-Pessagno explains in our quarterly interview (see p.12), "Prices are the bedrock of market decision-making, [but] the historical reliance on long-term contracting in lithium has posed challenges for the development of robust benchmark prices that accurately reflect market dynamics. This can make benchmarking prices challenging for automakers, traders and other stakeholders."

A maturing industry

It is often said that the lithium industry is a relatively young one. Although lithium has been industrially produced since 1924 (see Lithium Voice #4), the market only really took off in the 2000s as rechargeable batteries became commonplace.

Today rechargeable lithium batteries are essential for electric vehicles (EVs) and energy storage systems which enable us to decarbonise. Over 85% of lithium supply is used to make batteries compared with just 23% in 2010. At that time most lithium was used for specialised industrial applications like glass, ceramics and lubricating greases (see Lithium Voice #2). The market is growing rapidly and the forecast for future growth is also strong, with the analyst Wood Mackenzie expecting demand for

lithium to increase fivefold by 2040.

However, this rapid evolution of the market can create supply and demand imbalances since new lithium mines, refineries, battery factories and electric vehicle plants are not being built in the same areas, let alone at the same time. When demand-supply imbalances occur the price of lithium can fluctuate. One such imbalance happened in 2023, when demand for lithium outpaced supply resulting in a rapid rise in spot prices mid-year, before they subsided again.



Although such price variations are not unusual, even in mature markets, the lack of predictable prices can lead to difficulties raising the investment capital which is critical for new mining and refining projects. It is therefore extremely important for market participants to both understand current prices and to mitigate the risk of future price changes.

There are two ways market participants strive to better understand prices, price reporting agencies and auctions, and two ways they work to stabilise the

prices of their goods – and therefore their cashflow – off-take agreements on fixed (or semi-fixed) prices and using exchange-traded lithium futures contracts (agreements to buy or sell material for a particular price on a future date).

Long-term agreements and spot prices

Traditionally most lithium supply is sold on large tonnage, multi-year contracts known as off-take agreements. These contracts have a price which is usually fixed for the duration of the contract, but may be allowed to fluctuate (float) between a floor price and a ceiling price. The price is negotiated directly between sellers and buyers and it is not unusual for a chemical specification to be included in the contract terms.

Off-take agreements offer both buyer and seller a predictable financial transaction and are common in many industries, especially those with specialised products or a limited number of producers. Historically lithium had both of these conditions and participants used annual contracts as a way to lock-in prices and mitigate risk.

In the last decade the lithium industry has grown considerably and off-take contracts are still commonplace, but for another reason – the number of new mining projects.

New mining projects are expensive and take several years to start production, so a long-term off-take agreement which locks in future income gives investors confidence in the return on their investment. According to Anand Sheth, ILiA's Founding Chairman, who advised

several successful new lithium mining projects, “Investors would require greenfield mining projects to secure long-term off-take agreements for the total [lithium production] volumes and with additional conditions of floor and ceiling prices as a condition of their investment. Without debt, no new project could be developed.”

However, today fixed pricing is a thing of the past and lithium is increasingly sold at prices based on a market index. The contract price is linked to floating price mechanisms that may include floors and ceilings to allow for quarterly or even monthly adjustments, tracking changes in the spot price of lithium.

The spot price is the cash cost for short-term purchase and delivery, reflecting the marginal cost of buying or selling a lithium unit in the prompt market. In the lithium market at least six price reporting agencies (PRAs) publish estimated lithium prices regularly. The spot price for lithium carbonate in China is considered by some market observers as a benchmark for the industry given the country's strong position in the downstream lithium business.

However, there is constant debate, analysis and speculation

about prices since there is no such thing as a “standard” lithium carbonate or hydroxide product. Lithium is a specialty chemical and many consumers require specific grades.

Investors would require greenfield mining projects to secure long-term off-take agreements for the total lithium production volumes.

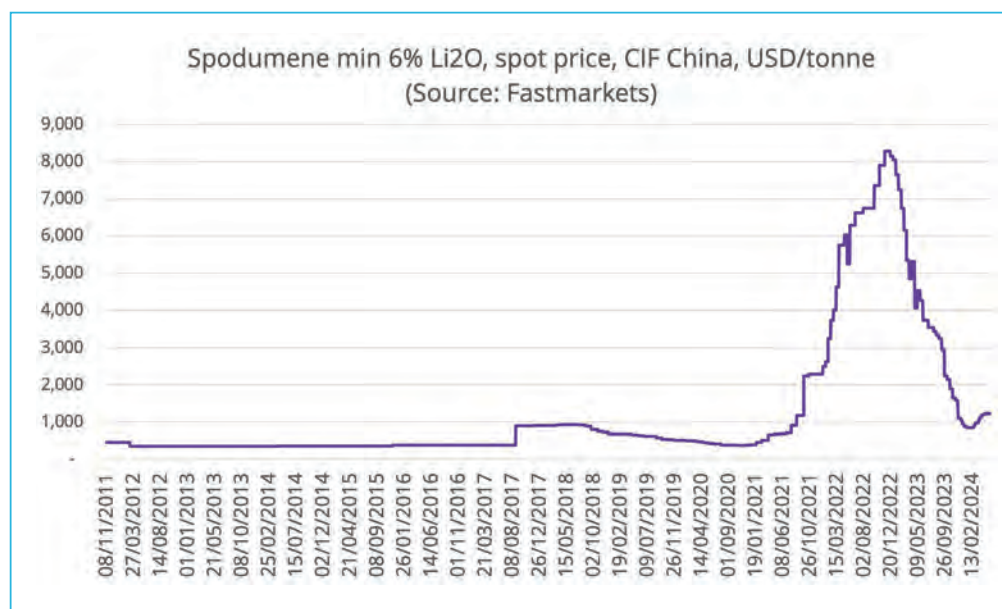
For example, technical grade lithium, which is used in the glass, lubricants and steel industries, is a relatively standard product, although is still far from being homogenous. However, battery manufacturers are particularly demanding and will typically stipulate numerous variables such as the maximum level of impurities allowed. Their strict certification requirements for raw materials can see a new producer can take up to 2 years to be approved to deliver battery-grade lithium.

In other words, it is extremely difficult to estimate the weighted average price of a generic lithium product at any moment, although that doesn't stop the PRAs from trying. Fastmarkets, a UK-based PRA (and member of ILiA), has a team of 12 people who assess different price data points daily to build a reference price.

Despite these herculean price discovery efforts, there is a perceived lack of price transparency in the market since the contracts are not public. This hinders the ability of investors to assess the risks and returns related to new projects. It should not be a surprise to learn that as the lithium market has expanded, new pricing mechanisms are emerging to cater to greater market liquidity. This can help producers too; while fixed-price off-take agreements work in periods of stability, they make it difficult for producers to take advantage of the higher value of their product if prices rise suddenly, or to avoid operating at a loss if their costs increase (and for consumers, vice versa).

Contracts for future lithium

Futures contracts are agreements to buy or sell assets at a predetermined price and date, and may be for delivery of physical material or purely a financial transaction ('cash settled'). The first futures contracts were developed for agricultural products like rice and corn in the eighteenth and nineteenth centuries, respectively. Since then financial exchanges have developed many futures and other sophisticated instruments that allow buyers and sellers to manage and mitigate financial risk, and recently they have been developed for lithium too.



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The ability to hedge against price volatility can allow a lithium producer to lock in sales income and stabilise cash flow. The ability to hedge also incentivises the allocation of investment capital for new raw material projects and banks are more likely to provide project finance when the pricing risk associated with the future production of the project is hedged.

Consumers like futures too. Electric vehicle manufacturers and consumer electronics companies need to source large volumes of battery metals including lithium, nickel and copper and any volatility in the prices of these materials adds to their financial risk. Consequently these end-users commonly use futures to lock in their costs, for example hedging copper with the CME Group's COMEX.

Ron Mitchell, Chair of the LME's Lithium and Cobalt Committee, told The Lithium Voice: "The biggest challenge for the lithium industry is raising investment capital as the debt market is not active in the sector. Banks don't have lithium experts who can forecast lithium prices so futures contracts provide a much needed risk mechanism."

Five years ago CME Group and the LME launched lithium futures contracts in response to the growth

in the lithium market and the needs of participants including financiers and end-users like the automotive industry. Since then several other exchanges have followed increasing the range of hedging mechanisms available to market actors, including for physical delivery.

Global exchanges offering lithium futures contracts

A centralized marketplace can provide better opportunity for price discovery and transparency. Lithium reference prices are central to the dynamic contracts being developed by CME Group (CME Globex), Guangzhou Futures Exchange (GFEX), the London Metal Exchange (LME) and The Singapore Exchange. These futures contracts are cash-settled using Fastmarkets

reference price with the exception of GFEX which is delivered physically. More contracts are in the pipeline including a lithium contract with physical settlement being developed by Abaax Exchange in Singapore.

Trading in lithium futures contracts is growing steadily, reflecting the fact that investors need price visibility and risk management tools in order to de-risk their investments and provide funding for new projects. To Szetoo Yuway, Sales & Futures Senior Director at major lithium producer Tianqi Lithium, the benefits this offers the industry are clear. "Exchange[s] provide effective price risk management tools for upstream and downstream in the lithium industry, enhancing



Exchange	Location	Product	Pricing Mechanism	Launched
CME Group	USA	Lithium carbonate, lithium hydroxide (cash-settled)*	Fastmarkets	2021
Guangzhou Futures Exchange (GFEX)	China	Lithium carbonate (physical delivery)	Market participation	2023
The London Metal Exchange (LME)	UK	Battery grade lithium hydroxide (cash-settled)	Fastmarkets	2021
The Singapore Exchange	Singapore	Lithium carbonate (cash-settled)	Fastmarkets	2023

Lithium futures available to the industry in May 2024 (*Note that CME Group also offers options).

the market's price discovery function, which contributes to the stabilisation of industry chain".

While the evolution of the lithium futures market shows considerable promise, it is important to note that unlike a sheet of copper or an ingot of zinc, specialty lithium chemicals need careful handling and storage. For example, lithium hydroxide is hygroscopic, naturally absorbing water vapour from the air.

According to Chengxin

Lithium, battery grade lithium hydroxide typically has a shelf life of six months from the date of production. Similarly, for standard delivery the GFEX only accepts lithium carbonate with a production date that is within 60 days (inclusive) from the delivery date.

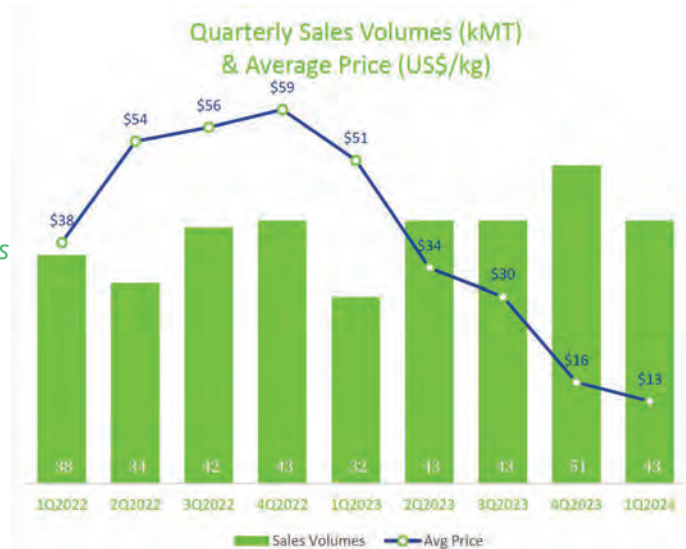
Digital price discovery

To augment the traditional price discovery by PRA journalists, in recent years digital auctions have emerged, offering occasional flashes of transparency, albeit for relatively small tonnages.

Pilbara Minerals occasionally sells parcels of its unallocated spodumene concentrates to the spot market using its Battery Material Exchange (BMX) platform. During the period of rising prices in 2023 the BMX offered a tantalisingly transparent proxy for the market as a whole, but in March 2024 the company explained that "[since the] forecast production volume for calendar year 2024 is now largely allocated, regular future spot sales via BMX during 2024 are unlikely".

Another raw material trading platform where producers can sell material is Metalshub, based

In the interests of lithium price transparency SQM, a leading lithium producer, publishes the quarterly volumes (kMT LCE) and the average price (USD/kg LCE) of lithium sales each quarter in its public reports (see www.sqm.com).



in Germany. This site has been used by Albemarle several times this year to sell some of its chemical-grade Australian spodumene concentrates and battery-grade carbonate.

"The primary reason for holding these bidding events is to bring price transparency to all lithium market participants... Our aim is to foster a more efficient, sustainable, and investible supply chain," Lenny-Pessagno told The Lithium Voice.

A third Australian lithium producer, Mineral Resources, also plans to sell on a digital platform.

While digital auctions undeniably offer transparency to those participating in the trade and have the advantage of being based on actual sales, the extent to which they could illuminate the market for a benchmark lithium product remains a question for the future.

Looking ahead

Futures and other forms of price discovery are important steps for the industry and reflect the growth and critical role of lithium in the shift to decarbonised transport.

As the market for lithium products matures financing options for new projects and the battery value

chain are expected to increase and exchange-traded lithium futures are likely to be part of this landscape. Przemek Koralewski, Global Head of Market Development at Fastmarkets told The Lithium Voice that "the trajectory of the lithium market could be similar to iron ore which evolved from a cash contract market to one with future contracts valued at more than three times the physical market [over several decades]."

A broader lithium financing market could have positive outcomes for both the battery industry and the energy transition as a whole. Certainly there is strong support for greater price transparency and hedging mechanisms from the main EV manufacturers who are already able to hedge the prices for most of their other battery raw materials.

It is not for The Lithium Voice to predict market developments, however historical trends show that new pricing mechanisms develop as industries grow in size and the number of participants. It would be unusual if the pricing of lithium - albeit a specialty chemical - were not to follow a similar path.

Note: ILIA's Antitrust and Competition Law Guidelines forbids it to discuss future lithium prices.

A very short introduction to

DIRECT LITHIUM EXTRACTION (DLE)

Exploring the technologies and potential for extracting lithium from brine without the use of evaporation ponds

The lithium industry is in a period of strong growth, driven by demand for rechargeable batteries for electric vehicles and supported by net-zero carbon policies. Albemarle, an industry leader, has forecast that the market could triple in size from 2023 to 2030 and as such it is important to consider all routes by which lithium might be produced.

Today the majority of lithium is industrially produced from two sources, hard-rock minerals such as spodumene or petalite, or extremely salty brines extracted from salars (salt lakes).

Traditionally, the way to produce lithium from brines has involved pumping the brine into large evaporation ponds and letting it evaporate until the desired concentration of lithium salts.

Although it is a relatively slow

process, taking up to 18 months, it is well-understood and highly cost competitive.

Alternative methods of selectively removing lithium ions from the brine avoid the use of evaporation ponds and are collectively described as direct lithium extraction (DLE). These processes could allow for a radical reimagining of how lithium is produced and several governments, including in Bolivia, Chile and Argentina strongly support the use of DLE technology at new lithium projects.

A few industrial-scale DLE plants are already in operation and many others have been demonstrated at laboratory and pilot scale. Since 2020, over USD 980 million has been invested in DLE, with both government and private entities showing keen interest. DLE doesn't just offer possibilities

for brines from salars though; several companies, including some ILiA members, are working on extracting lithium from geothermal brines and oil/gas-field brines too.

DLE has tantalising potential, but why is it not already widely used? The answer is complex and comes down to the fact that brines are very challenging liquids to work with and are often found in remote places. Every step of brine extraction, processing and reinjection carries technical challenges which must be overcome at scale.

Furthermore, every natural brine is different, with different levels of lithium content, total dissolved solids (TDS), location and more, which means that each brine requires a tailored approach and a DLE technology which works well in one salar may not work so well in another salar.

Salar de Uyuni in Bolivia is the largest salar and largest known lithium deposit in the world. The Bolivian government intends to extract lithium here using DLE.



The DLE process

Over the last 20 years, many DLE methods have been developed to separate lithium from other elements in brine. Several techniques use methods that were originally conceived for desalination and wastewater treatment purposes, rather than being specifically tailored for lithium extraction.

The DLE process begins with the collection of lithium-rich brine from underground reservoirs or salars, where it undergoes pre-treatment to remove impurities and create conditions for the subsequent extraction processes. DLE methods

employ various techniques to selectively capture lithium ions from the brine while leaving other ions behind.

These extraction methods offer efficient and selective separation of lithium from the brine, paving the way for high-purity lithium production. Following extraction, the captured lithium ions undergo post-treatment to recover them in a useable form, such as lithium chloride (LiCl).

Additionally, post-treatment ensures proper management of the depleted brine, meeting environmental regulations before

being reintroduced into the environment or reinjected into the underground reservoir or salar.

Key considerations which have an impact on the efficiency of DLE include the ratio of lithium to other salts dissolved in the brine (Li / total dissolved solids or TDS), of lithium to sodium (Li/Na), lithium to magnesium (Li/Mg), and lithium to sulphates (Li/SO₄) before and after DLE processing. Additionally, parameters such as the quantity of fresh water and energy requirement are critical to the success of a DLE project.

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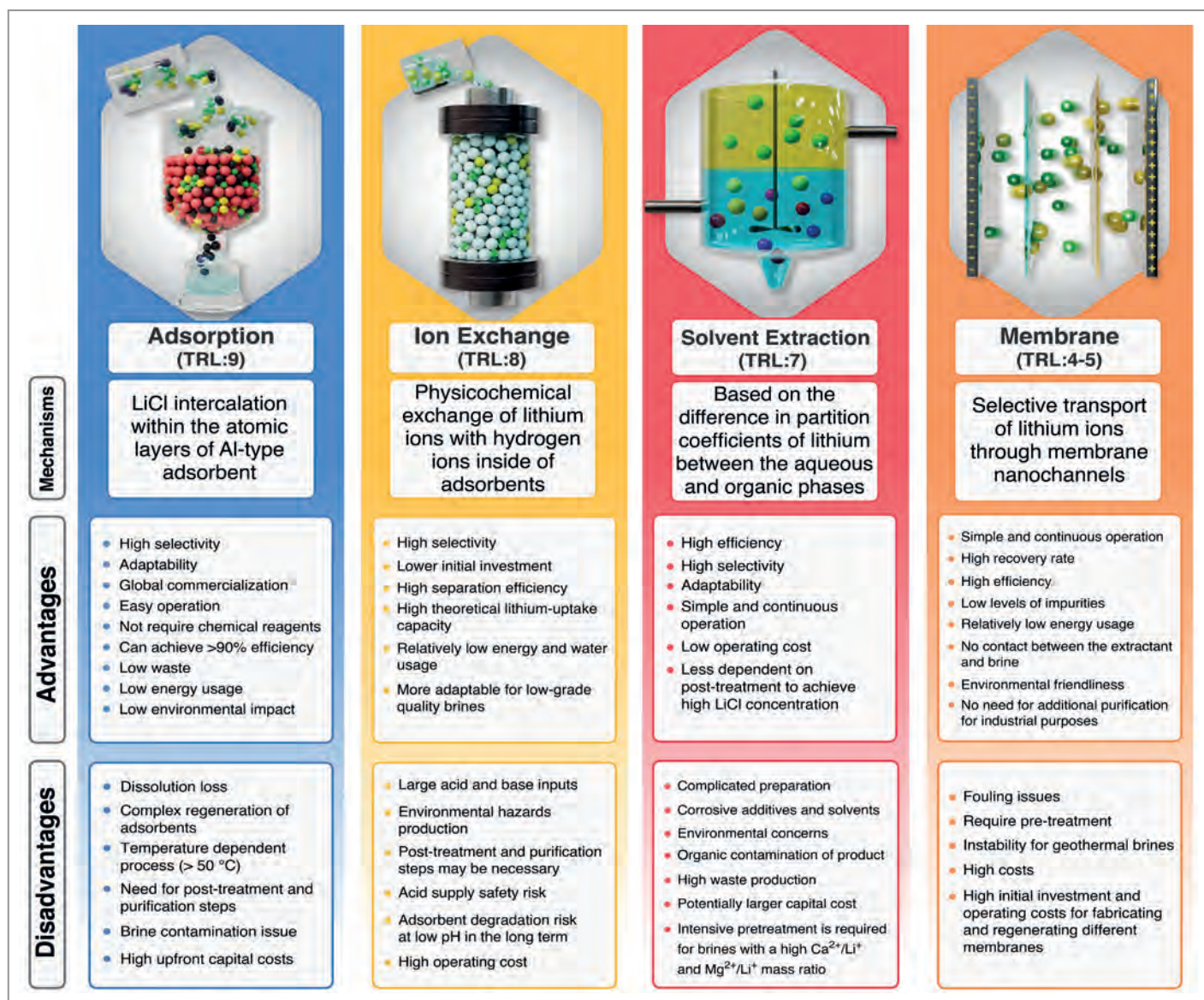


Figure 1 provides an overview of these selected DLE techniques, showcasing their mechanisms, advantages, and disadvantages. TRL refers to the technology readiness level, a method of assessing the readiness of a technology from 1 (low) to 9 (high) that was first devised by NASA. (Source: Dr A Razmjou).



DLE is already producing lithium at industrial scale at a handful of sites. This plant in China, owned by EVE Energy Co. Ltd, extracts up to 10,000 tpa LCE (battery grade) from brines using DLE technology provided by Sunresin New Materials Co. Ltd. The lithium concentration in the brine which is treated at this plant is 100-120 mg/L (Photo: Sunresin New Materials Co. Ltd).

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Key DLE technologies

DLE technologies can be categorised into four groups (see Figure 1):

- Adsorption
- Ion exchange
- Solvent extraction, and
- Membranes

In adsorption based DLE, lithium ions intercalate into the surface of solid particles, typically aluminium-based sorbents. In the industry, aluminium-based sorbents are sometimes referred to as generation one DLE, while manganese and titanium-based ion exchange sorbents are referred to as generation two DLE.

Meanwhile, ion exchange based DLE involves swapping lithium ions in a liquid phase with ions of the positive charge but different chemical properties e.g. H⁺ on a solid ion exchanger, mainly manganese and titanium-based sorbents.

Solvent extraction DLE for lithium recovery relies on exploiting the different solubilities of compounds in aqueous and organic phases. This method involves several steps: combining the organic phase that has a lithium selective extractant with brine to form lithium complexes, subjecting the complexes to a stripping step to

extract lithium, and recycling the organic phase.

Lithium extraction makes use of a range of organic solvents, including kerosene (the most common one), m-xylene, p-xylene, chlorobenzene, benzene, dodecane, chloroform, cyclohexane, ketone, methyl-tertbutyl ether, and acetic ether.

Membrane technology plays a crucial role in the advancement of DLE methods. Here a membrane acts to filter lithium ions out of the host liquid. Within membrane-based DLE, it is important to recognize two main types of membrane processes: pressure-assisted membrane processes; and reverse osmosis and potential-assisted membrane processes.

This list is far from exhaustive and several other types of DLE technology are reported to be in development.

The road ahead

From a technical perspective, the outlook for DLE appears promising, with advancements in technology leading to improved efficiency and effectiveness in lithium recovery.

From a sustainability standpoint, DLE offers several potential advantages concerning environmental footprint. They require less land area, have relatively low water usage (assuming they recycle water and reinject spent brine), and could even have

lower greenhouse gas emissions when renewable energy sources are utilized to power the extraction process.

The main challenge for DLE is the unique composition of each brine found across the world, while the risks and benefits of reinjection of spent brine needs further investigation too.

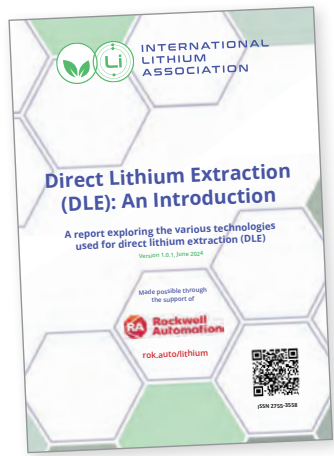
While no 'magic answer', this is a technology with considerable potential to contribute much-needed lithium units to the market in the years ahead.

Watch this space!





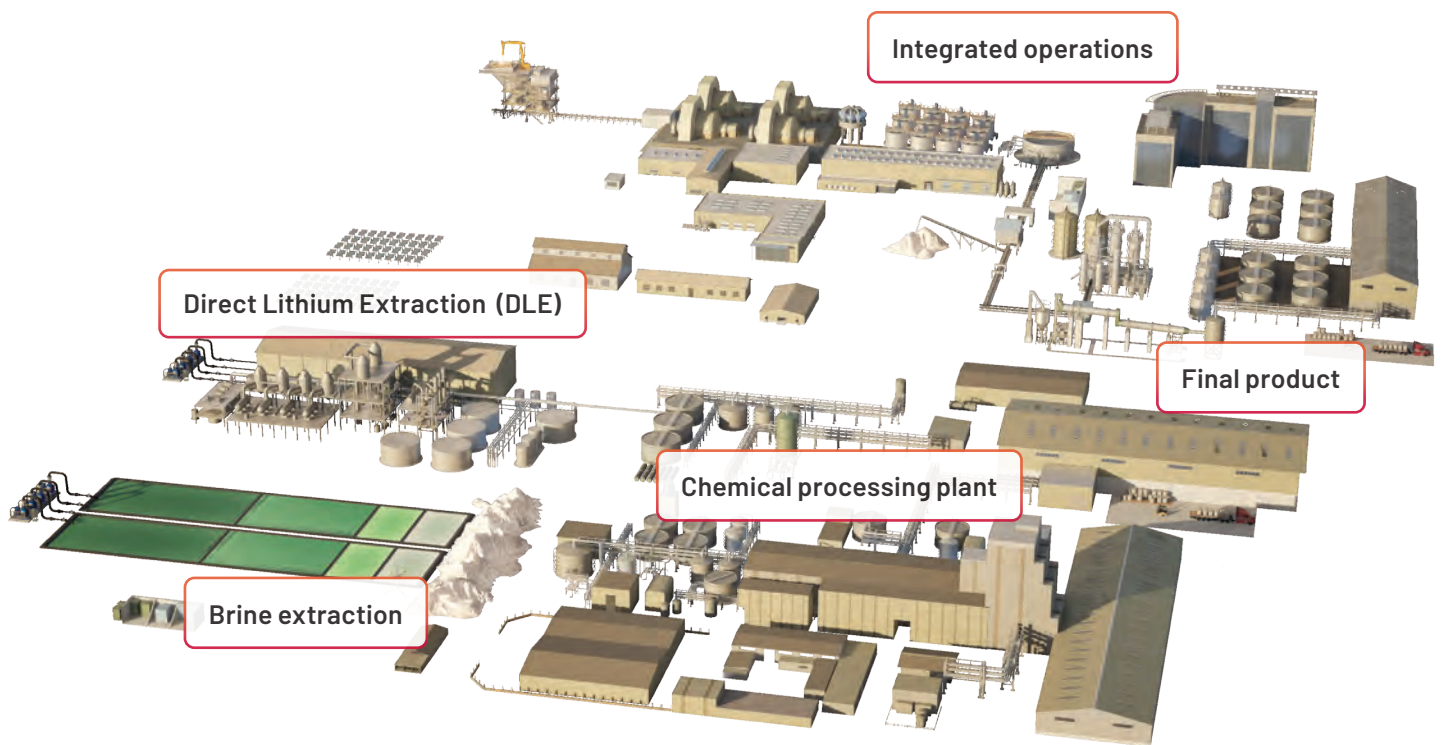
Rockwell Automation



This article is an extract taken from a new report on DLE technologies commissioned by ILiA in collaboration with member Rockwell Automation (rok.auto/lithium). The report was written by Associate Professor Amir Razmjou at Edith Cowan University, Perth, Australia. The full report is available at www.lithium.org

Connected Lithium Production: End-to-End

Integrating power, control, and information from extraction to processing to market!



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**Rockwell
Automation**

In conversation with

ELLEN LENNY-PESSAGNO

Global VP, External Affairs and Sustainability Albemarle Energy Storage, and member of ILiA's Executive Committee



As an industry leader, what is Albemarle doing to set high ESG standards?

As a purpose-driven and values-led organization, sustainability is core to who we are and how we operate at Albemarle. For example, at our Salar de Atacama and La Negra plants in Chile, we recently developed a model including ESG criteria such as carbon footprint data calculated using life cycle assessment (LCA) methodology and water and energy intensity usage. Looking forward, we expect to continue to advance this work and refine our methodology for calculating these ESG factors.

We are also proud of our efforts for continuous improvement and adoption of the Initiative for Responsible Mining Assurance (IRMA) standard. IRMA is by design

We expect that the EV industry needs more than 300,000 metric tons of new lithium capacity every year to satisfy growth.

a collaborative, multi-stakeholder organization with more than 400 requirements covering social and environmental issues.

Albemarle is the first lithium producer and only the third mine site globally to complete an independent audit and have its audit report published by IRMA.

In June 2023 we achieved an IRMA 50 level of performance for our site in the Salar de Atacama.

At our Kings Mountain, North Carolina site, we are implementing "IRMA-Ready" standards. These are special standards for mine sites in exploration phase; our ambition is to be the first ever IRMA 100 site worldwide.

You spent some time in Chile, where you recently hosted US Treasury Secretary Janet Yellen. Tell us about that.

It was a great honor in March to have Secretary of the Treasury Janet Yellen, Chile's Finance Minister Mario Marcel, and U.S. Ambassador Bernadette Meehan visit our state-of-the-art lithium chemical conversion complex in La Negra. Secretary Yellen visited Chile to discuss bilateral investment and securing supply chains for critical minerals in the clean energy transition.

During Secretary Yellen's visit to Albemarle's facility, we had the opportunity to highlight our global leadership in the lithium supply chain, our commitment to providing USD300 million for R&D activities in Chile, and our joint interest with the Chilean government for DLE development with a focus on bringing desalinated water to the Salar de Atacama.

Albemarle started lithium bidding events. Why—and how are they going?

Albemarle is working to contribute to the progress of price discovery and maturity in the evolving lithium market by conducting bidding events for chemical-grade spodumene and battery-grade carbonate.

Prices are the bedrock of market decision-making, and the primary reason for holding these bidding events is to bring price transparency to all lithium market participants.



The historical reliance on long-term contracting in lithium has posed challenges for the development of robust benchmark prices that accurately reflect market dynamics. This can make benchmarking prices challenging for automakers, traders and other stakeholders. We are pursuing a responsible approach to price discovery that can lead to a potential increase in the quality and visibility of pricing information among industry stakeholders. Our aim is to foster a more efficient, sustainable, and investible supply chain.

What is Albemarle's outlook on EVs?

We continue to believe in the EV transition and the growth in lithium demand as well as the opportunity it creates for Albemarle. Despite a downshift in demand growth in Europe and the United States, global EV sales are up 20% year-to-date, led by strong growth in China, which represents over 60% of the global EV market.

We continue to anticipate 2.5 times lithium demand growth from 2024 to 2030.

These factors all translate to significantly higher global lithium needs. To put all of this in perspective, we expect that the EV industry needs more than 300,000 metric tons of new lithium capacity every year to satisfy this growth. This means we need more than 100 new lithium projects across resources and conversion between now and 2030 to support this demand.

Besides rechargeable batteries, what are your favourite applications for lithium and why?

I love the healthcare applications of lithium and the lifesaving aspects of the batteries it powers, particularly its use as lithium metal anodes in pacemakers. What's fascinating to me is the potential of such lithium metal anodes to unlock applications that are not practical with today's lithium-ion batteries. For example, advanced lithium materials for next generation batteries may

power urban air transport. Think electric helicopters that transport people affordably for short trips in dense cities, with its light weight and ability to pack a lot of energy into a small form paves the way for new materials that will continue to transform mobility.

As an external affairs leader, what are the most pressing regulatory issues facing the industry?

One of the most critical issues we're facing as an industry is the transition from a free trade environment to the development of regional markets. Governments are adopting different approaches to attracting investment in the EV supply chain.

Support is needed to ensure a more regionally diverse build out of the supply chain, and it is important that governments select the right policy tools to support a sustainable and competitive supply chain that can compete on a global basis.

What role do you see for ILiA? What message do you have for ILiA members?

The lithium industry is still relatively new, and ILiA has an important role to play to promote this industry and to create policies to support our growth. They have been instrumental in serving as a platform to create a standard to conduct Life Cycle Assessments for lithium and to educate on the best sustainability practices in the industry.

I encourage all members to actively engage in ILiA to support this industry which is critical for reducing greenhouse gas emissions globally.



Comment on EU LITHIUM POLICY

The importance of accurate classification

The International Lithium Association (ILiA) is gravely concerned about proposals made by the Risk Assessment Committee (RAC) of the European Chemical Agency (ECHA) concerning a potential classification of lithium carbonate, hydroxide and chloride as Toxic for Reproduction Category 1a, not least because it is considerably different from the views of Australia, Argentina, Canada, Chile, the UK and the United States, all countries with a long history of safely producing and/or refining lithium products.

ILiA has been following ECHA's discussions on this subject and for more than two years we have been sharing our concerns about the scientific basis and data used to draw this conclusion with ECHA in a series of letters co-written with nine other associations representing companies active in the batteries, chemicals, electric vehicles, frits, lithium, lubricants, mining and non-ferrous metals sectors.

In our correspondence with ECHA and other relevant authorities in the European Union (EU) we have highlighted the official public opinions of Australia, Argentina, Canada, Chile, the UK and the United States which openly disagreed with ECHA regarding the proposed classification of lithium salts. For example, the expert scientific opinion of the Australian authorities is that "an appropriate hazard classification for the three named lithium salts is, 'at worst', Category 2" and not 1a.

These opinions demonstrate that there is no global scientific

agreement on the classification and that other countries might reach different conclusions on the classification, with possible repercussions on trade relations and access to lithium in Europe.

The dangers of misclassification

Classification is fundamental to safe chemical management and it is vital that classification is based on accurate, robust and comprehensive information. Classification is about identifying intrinsic hazards (the capacity to cause harm) so that an accurate assessment of the risk of using a particular chemical can be made. All sorts of chemicals that surround us in daily life are hazardous but most of them can be used safely, for example traces of chlorine gas dissolved in a swimming pool will sanitise the water, but in large quantities it is deadly.

A correct classification is key to ensure the evaluation of the risk and that possible risk mitigation measures are appropriately defined. In Europe, an incorrect classification which is too high would risk making EU Member States less attractive compared to other countries for lithium mining and refining projects, while other countries aim to enable investments in the lithium value chain: for example, in the United States the Inflation Reduction Act, which provides significant investment and production tax credits as well as a USD7,500 consumer credit to stimulate electric vehicle supply chain investment in the US. In light of the potential classification of lithium salts, opening a lithium



mine, a lithium refinery or a battery production plant in the EU would be more burdensome, with additional safety measures and uncertainties on permitting. Furthermore, any investment may be uncertain, due to the lack of predictability in possible risk management measures to be proposed following the classification. Some EU projects in the lithium battery value chain have already been relocated to other regions for various reasons, and the uncertainty created by the classification would be an additional reason against the re-shoring of industrial projects in the EU.

In addition, the capacity to refine lithium in the EU will also be crucial to recycle lithium in waste batteries to the ambitious degree mandated by the Batteries Regulation. Projects need sufficient time to actually deliver raw materials to the market, hence Europe needs to provide a clear signal to the market to invest in Europe now. One additional concern, which arises as a unique result of the EU's regulatory framework, is related to the possible listing of lithium as a Substance of Very High Concern (SVHC) and the consequent unsubstantiated stigmatization this would cause.

In conclusion

Chemical classification is of fundamental importance to the safe management and use of chemical products in industrial settings and also our day to day lives.

An over-classification has a significant and lasting impact, so it is vital that classification is based

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on accurate, robust and comprehensive information and that the process is not rushed and arrives at the most accurate answer.

As the letter from the Australian expert authorities explained, an appropriate classification for lithium carbonate, hydroxide and chloride would be 'at worst' Category 2, and such a classification

would not only maintain stability in the EU's regulatory settings, but also provide certainty to lithium-related businesses within Europe and "support the development and expansion of clean energy supply chains" well into the future.

Neither ILiA nor its members question the need for substances to be proportionally regulated in order to protect workers' safety, but we also believe that

classifications must be based on clear, compelling and comprehensive scientific evidence. Considering the strong scientific doubts expressed by international stakeholders, the industry, and even some EU Member States in RAC's initial opinion, we believe any final decision on this matter must be based on a strong scientific opinion, supported by the EU and globally.



View from NORTH AMERICA

From Adriana Carvalho, Katharine De Senne
for S&P Global Commodity Insights

Momentum is building in the US lithium mining sector as companies secure funding and scale up operations, driven by a more stable pricing scenario and import tariff measures, despite ongoing permitting challenges.

US miners applaud Biden tariffs, call for permitting reform

New trade action against China drew cheers from the US mining sector, but miners said permitting and onerous regulations still present a challenge.

President Joe Biden on May 14 announced tariff increases on USD18 billion of Chinese imports, including critical minerals, electric vehicles (EVs), batteries, and battery components. The increases follow a raft of incentives by the Biden administration to spur the domestic development of such industries.

Miners, EV makers, and the clean power industry called the tariffs a necessary corrective to China's dominance. However, many in the sector still criticized the administration for blocking large mining projects and extended permitting times.

Production prospects improve

More lithium miners have chosen to continue project ramp-ups and seek funding and partnerships, amid



a seemingly more stable global pricing environment.

In Nevada, Lithium Americas received a conditional commitment from the US Department of Energy for a USD2.26 billion loan that would cover most of the remaining capital needed to start construction of the Thacker Pass lithium project in Nevada by the end of the year. American Battery Technology Co. has commissioned a lithium

hydroxide production pilot plant at its Tonopah Lithium Flats claystone deposit project, also in Nevada.

Albemarle is expanding lithium carbonate capacity at its Silver Peak operation in Nevada to 10,000 mt/year by 2025, from 5,000 mt/year.

Albemarle and ABTC have federal funding for their operations in the region, with both companies recently disclosing they received about USD9 million and USD20 million, respectively, in tax credit allocations from the US-Inflation Reduction Act.

On the East Coast, Piedmont Lithium has stepped up its search for funding and strategic partners for its North Carolina lithium mining project, after the asset recently received a critical permit.



View from North America represents the opinions of S&P Global Commodity Insights and does not reflect the opinions of ILiA.

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Memories from ILiA's lithium networking reception in Perth, WA, Australia on April 15th, 2024



Members and guests joined ILiA for a lithium networking reception at Fraser's Restaurant in Kings Park, Perth.

The venue has stunning views across the city and provided the perfect backdrop for lithium industry leaders from Western Australia and around the world to get together, catch up with old friends and meet new potential business partners.

The evening was generously sponsored by SCT (Sichuan Calciner Technology Co., Ltd), the global leader in lithium refinery technology; Pilbara Minerals Ltd, the world's largest independent hard-rock lithium operation; and two of the world's leading lithium producers, Arcadium Lithium and Albemarle Corporation. The event was timed to coincide with Paydirt Media's Battery Minerals Conference 2024, which ILiA sponsored.



For details of ILiA's future lithium networking events visit <https://lithium.org/events/>

View from

SOUTH AMERICA

From Daniel Jiménez of iLiMarkets

A relatively quiet quarter, with production ramp ups, brown and greenfield, advancing and waiting for new production to start toward the second half of the year.

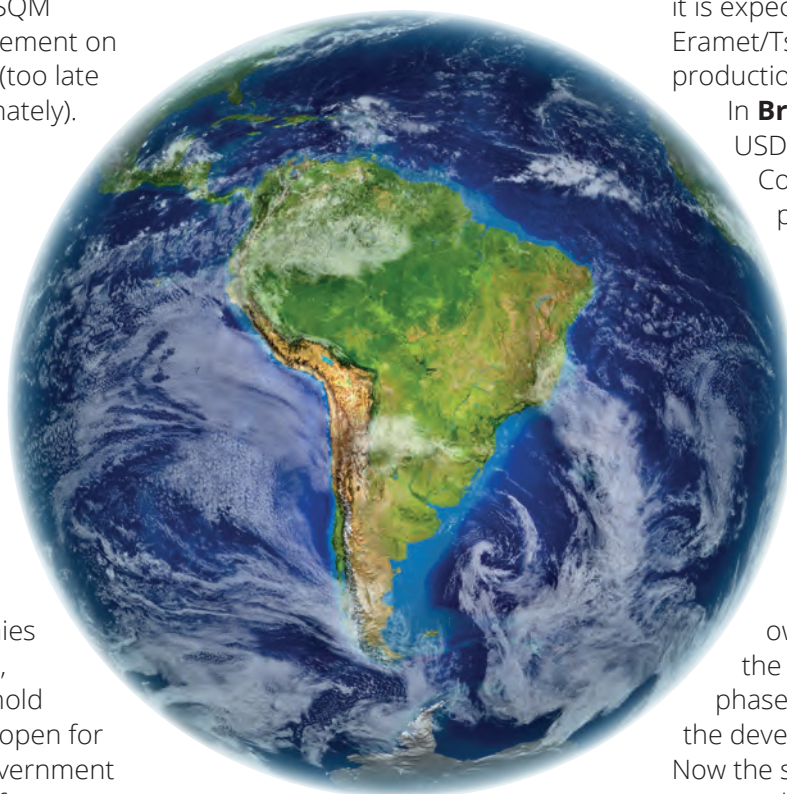
In **Chile**, Codelco and SQM reached a definitive agreement on lithium on May 31, 2024 (too late to analyze here, unfortunately).

As part of its National Lithium Strategy, the Chilean government has defined which salt flats will be open for lithium exploration and exploitation. It has defined three groups: i) salt flats where the state will retain majority control (Atacama and Maricunga) ii) salt flats that will be partnerships between private companies and the state companies, that will not necessarily hold majority and iii) salt flats open for private investors. The government has launched a Request for Interest, inviting national and foreign investors to explore lithium deposits.

BYD has postponed the production start date of its lithium cathode plant in Chile. BYD Americas CEO Stella Li said she was unsure how long the delay would last, citing “uncertainty” around the situation. The limited Li_2CO_3 price advantage probably does not justify a cathode plant.

Albemarle and Corfo reached an agreement to resolve the arbitration for the dispute on royalty payments. As part of the agreement, Albemarle will pay

USD 15 million to Corfo and has received an incremental quota for Li extraction of 240,000 tons, essentially doubling the remaining quota Albemarle has left today.



Moving to **Argentina**, several companies have reported news: United Mining Projects Corporation, (UAE Company) announced a USD550 million investment over four years in Argentina's Catamarca province. The agreement targets exploration and development of the Rio Grande Sur lithium brine project. Galan Lithium has signed the permits with the Catamarca Government to enable the commercialization of lithium chloride concentrate to be sold locally or exported.

Lithium Americas informed its Caucharí-Olaroz project that remains on target to produce 20,000 - 25,000 tonnes of lithium carbonate in 2024.

During the second half of 2024 it is expected that Zijin's 3Q and Eramet/Tsingshan's Ratones start production.

In **Brazil**, Mitsui invested USD30 million in Atlas Lithium Corporation. This project plans to produce 300,000 tons of spodumene concentrate (SC6) annually. Sigma Lithium announced its decision to double its production capacity to 520,000 ton/year of SC6. The planned commissioning date is the end of 2024.

In **Bolivia**, YBL (state-owned company) informed the progress for the second phase of its international call for the development of a pilot plant. Now the select companies will present their proposals for the pilot plant project.

On the other hand, problems were reported in the construction of the evaporation ponds. According to YBL, the carpets placed in the lithium evaporation ponds were very thin and did not comply with the contract. This means that due to strong solar radiation they have deteriorated rapidly.



View from South America represents the opinions of iLiMarkets and does not reflect the opinions of iLiA.

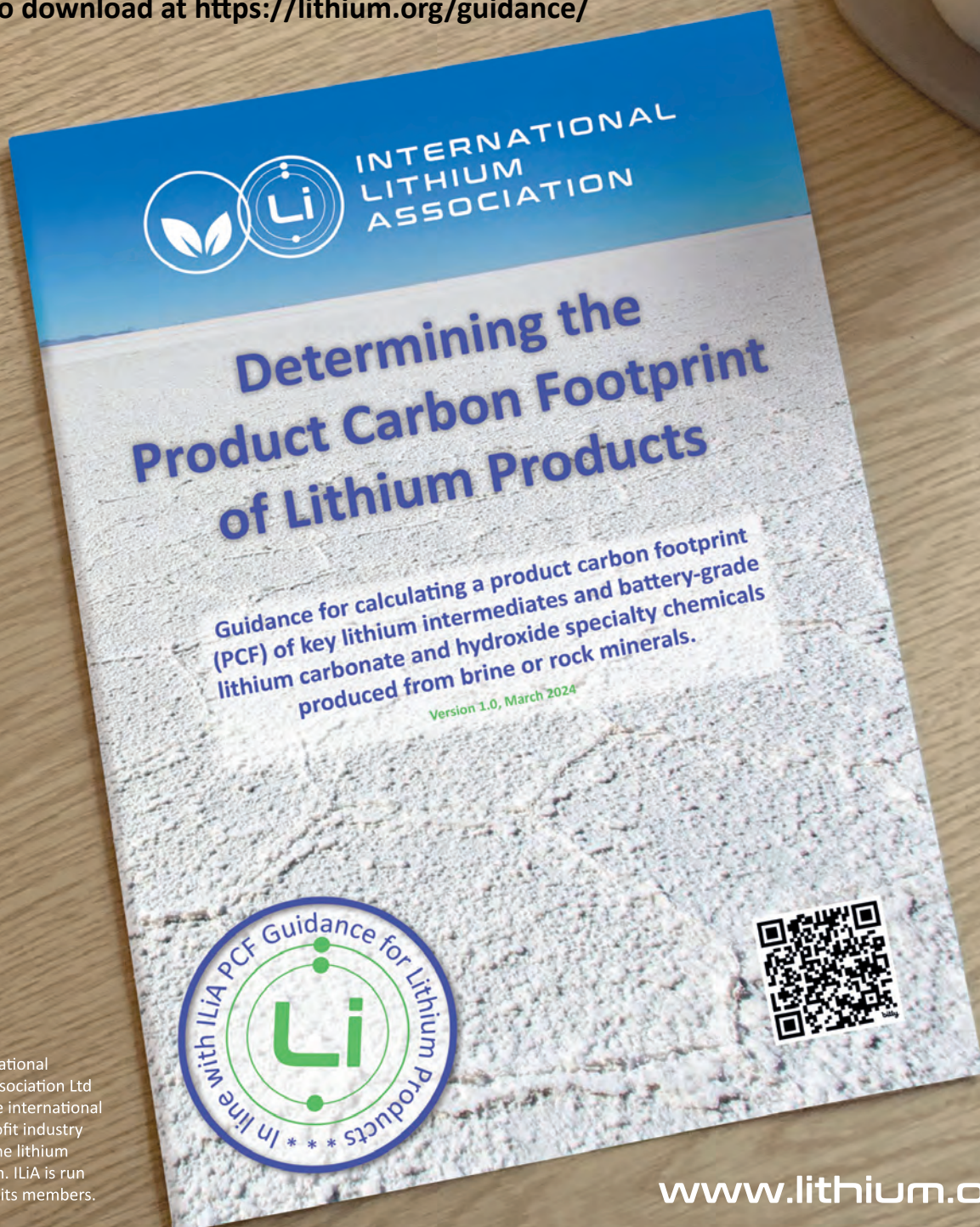


ILiA's New Guidance

“Determining the Product Carbon Footprint of Lithium Products”, has been created to allow anyone to create a product carbon footprint (PCF) assessment for key lithium intermediates and battery-grade lithium carbonate and hydroxide specialty chemicals in a standardized, replicable and comparable way. It is agnostic to the production route.

This is the first global effort to create standard lithium PCF guidance and represents the collaborative efforts of over 40 organisations from around the world. Available in English, Chinese and Spanish.

Free to download at <https://lithium.org/guidance/>



The International Lithium Association Ltd (ILiA) is the international not-for-profit industry body for the lithium value chain. ILiA is run by and for its members.

www.lithium.org

ILiA Connections



ILiA had the pleasure of hosting a dinner for HE David Choquehuanca Céspedes, the Vice President of the Plurinational State of Bolivia, his Secretary General Juan Carlos Alurralde, and HE Richard Porter, British Ambassador to Bolivia, when they visited London in March.



On a recent visit to Chengdu, China, ILiA donated a sample of petalite from Utö, Sweden, to Discovery Li, the new museum dedicated to Lithium created by Tianqi Lithium. Here Mr Frank Ha Chun Shing, President of Tianqi Lithium receives the sample. (Photo: Tianqi Lithium).



At Paydirt's Battery Minerals Conference in Perth ILiA's Roland Chavasse met with the Hon. David Michael, Western Australia's Minister for Mines and Petroleum, to discuss the carbon footprint of lithium.



ILiA's Astrid Karamira joined Minviro's Robert Pell, Anson Resources' Bruce Richardson, Anthony Tse and Carolina Ferreira Herrera on a panel about sustainable lithium at SMM's Li-ion Battery Americas 2024 event in Las Vegas, USA.



At the 41st International Battery Seminar & Exhibit ILiA's Astrid Karamira gave a presentation about the product carbon footprint guidance and met with Dr Apurba Sakti (Albermarle) & Stefan Debruyne (SQM).



The team welcoming guests to ILiA's first lithium networking event to be held in China, which was held to coincide with the China International Battery Fair in Chongqing, China.
Our thanks to Minviro and C&D for sponsoring.





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