IBK Capital Corp.

# Lithium Overview

## An Insight on Deposit Types & Extraction Methods

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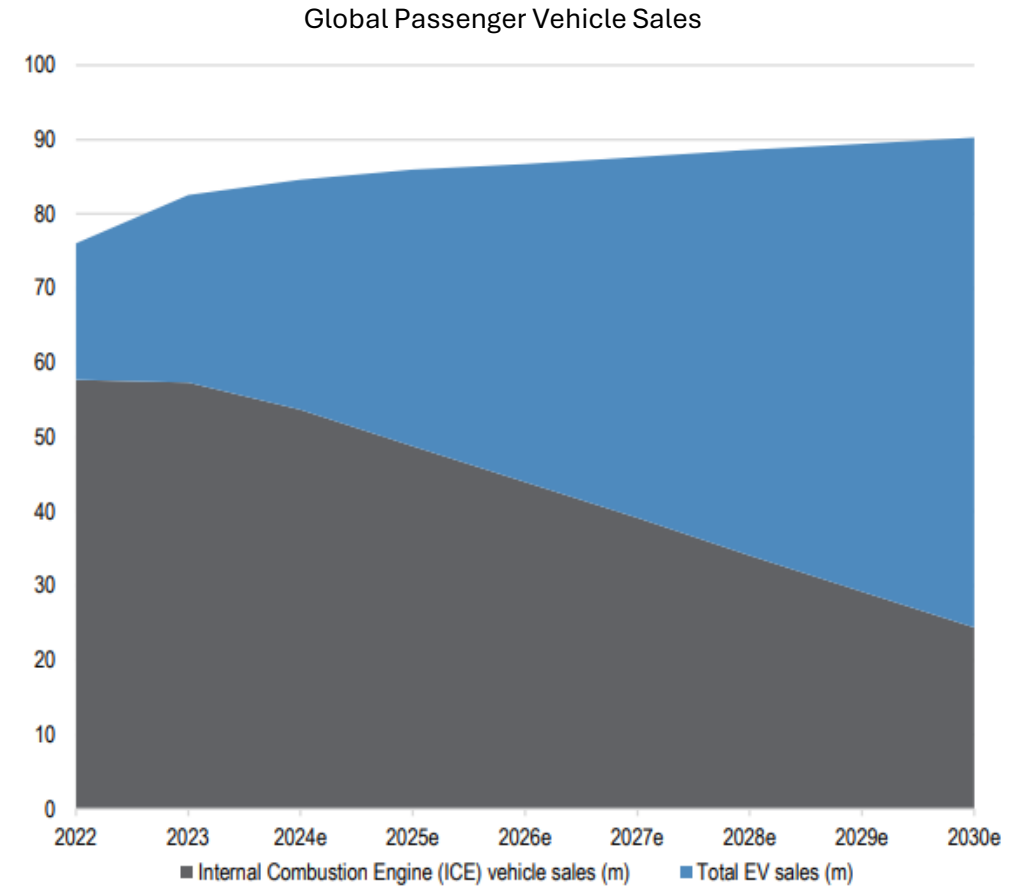
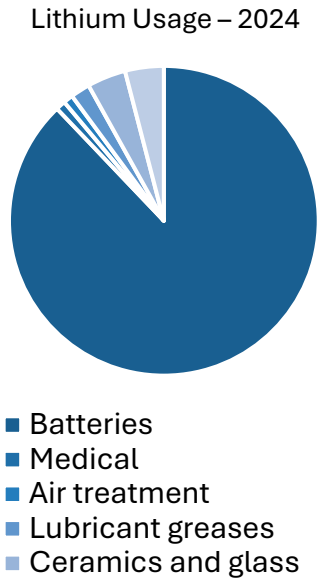
# Lithium – Key Facts

- A critical component in rechargeable batteries for electric vehicles (EVs) and renewable energy storage systems (ESS).
- In 2023, the global lithium market was valued at US$22.2 billion and is projected to grow at a CAGR of 22.1% (from 2024 to 2030), reaching US$89.9 billion by 2030.[1]
- US EV sale figures for 2024 are below projections but the global EV sector set a new monthly record with global sales reaching 1.7 million units. [2]
- EVs, ESS, and the surge in AI-driven data-centre growth are collectively driving a sharp rise in lithium demand, with global battery consumption expected to increase steadily through 2030. [3]
- Approximately half of the world's lithium mine concentrate is produced in Australia, with over 80% of the concentrate being processed in China. [4, 5]
- To be suitable for battery usage, lithium must be processed and upgraded to lithium hydroxide or lithium carbonate.
- Extraction and processing methods depend on the deposit type:
  - Pegmatite (Hard-rock)
  - Sedimentary (Clay)
  - Brine: Direct Lithium Extraction (“DLE”) or Evaporation Ponds (“EP”)

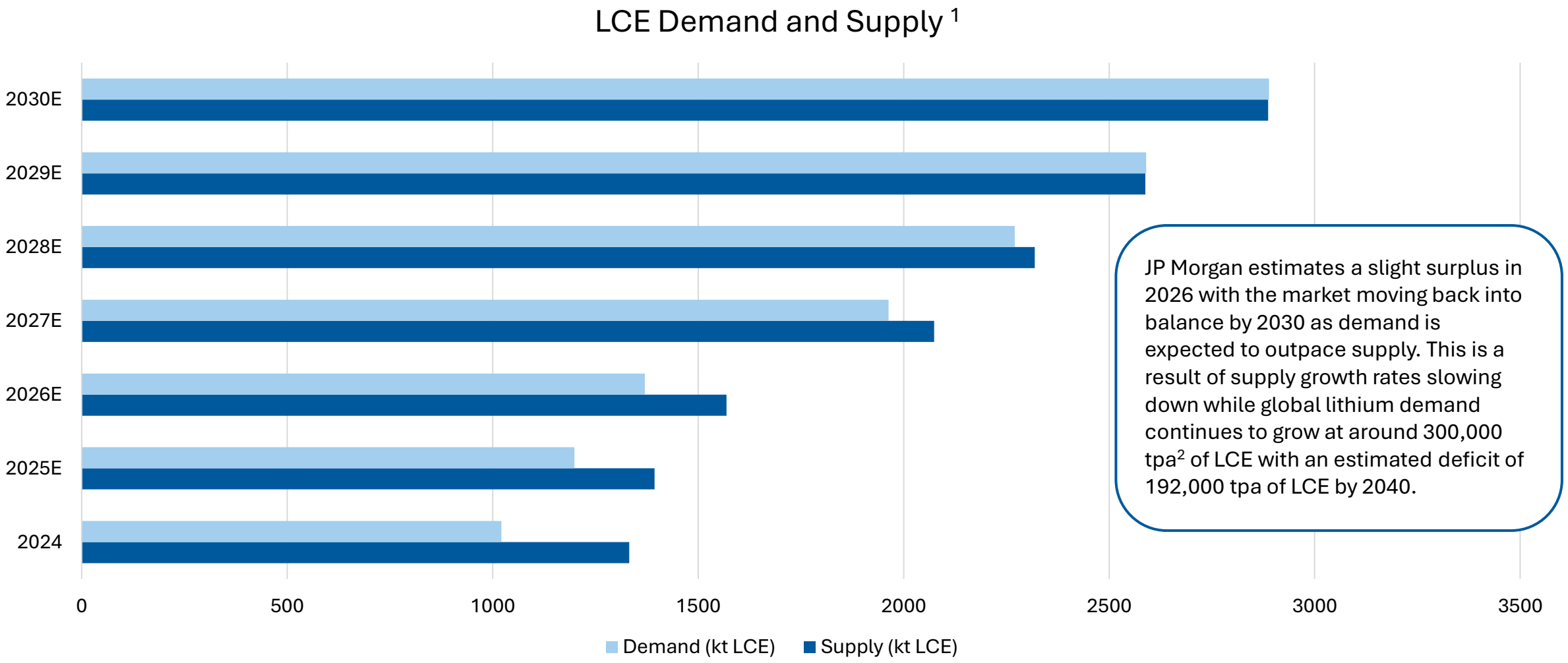



Source: Company data, J.P. Morgan estimates.




[1] Financial News Media, “Surging Lithium Market Growth Expected Through 2030.”
[2] Rho Motion, Press Release, 15th October 2024.
[3] McKinsey Battery Insights, April 2025
[4] United States Geological Survey, “Mineral Commodity Summaries, January 2023: Lithium”.
[5] Australian Bureau of Statistics, “Insights into Australian Exports of Lithium”, April 8th, 2022.

# Lithium – Demand & Supply




JP Morgan estimates a slight surplus in 2026 with the market moving back into balance by 2030 as demand is expected to outpace supply. This is a result of supply growth rates slowing down while global lithium demand continues to grow at around 300,000 tpa[2] of LCE with an estimated deficit of 192,000 tpa of LCE by 2040.

[1] JP Morgan estimates, October 2024
[2] Tonnes per annum.

# Pegmatite Deposits (Spodumene Ore)

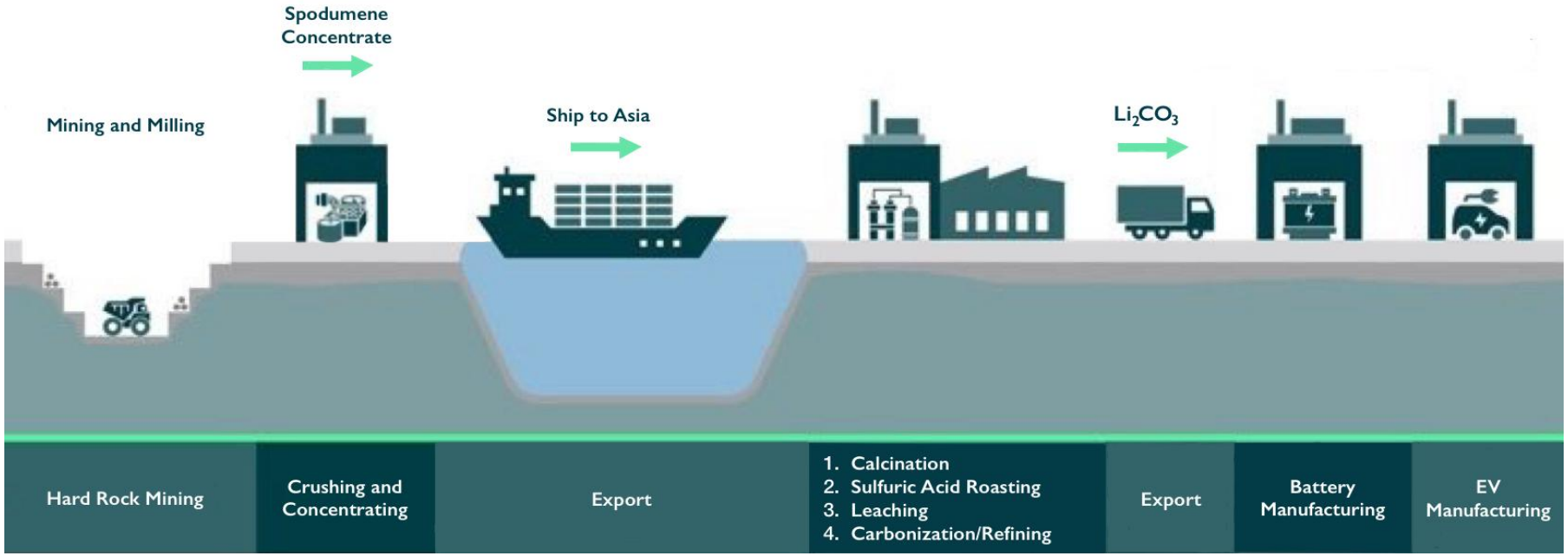
- 66% of global lithium mines are hard rock spodumene deposits. [1]
- The material is extracted through open-pit mining, after which the lithium ore is crushed and separated using mechanical processes and floatation to produce spodumene concentrate. In most cases, this spodumene concentrate is shipped to overseas processing plants where it undergoes energy and chemical intensive acid roasting and leaching. Once cooled and mixed with sulfuric acid, it is then re-roasted to produce lithium sulfate. Lastly, lime and soda ash is added to precipitate lithium carbonate or hydroxide from the final filtered solution.
- 67% of global lithium supply is processed in China. [2]

Advantages (mining and milling of pegmatite deposits):

- Reduced processing requirements due to the concentrate being shipped elsewhere
- Faster processing time than traditional brine extraction

Disadvantages:

- Processing hard rock is more energy intensive than other extraction methods
- Most concentrate ore is shipped to China for further processing
- Mine tailings from ore processing need proper management to prevent environmental contamination




Source: Lithium Harvest

Source: Pilbara Minerals

[1] Lithium Harvest, "The Lithium Mining Market," September 2024.
[2] Research Society of International Law, "China Takes Charge", 2023.

# Brine Deposits (EP)

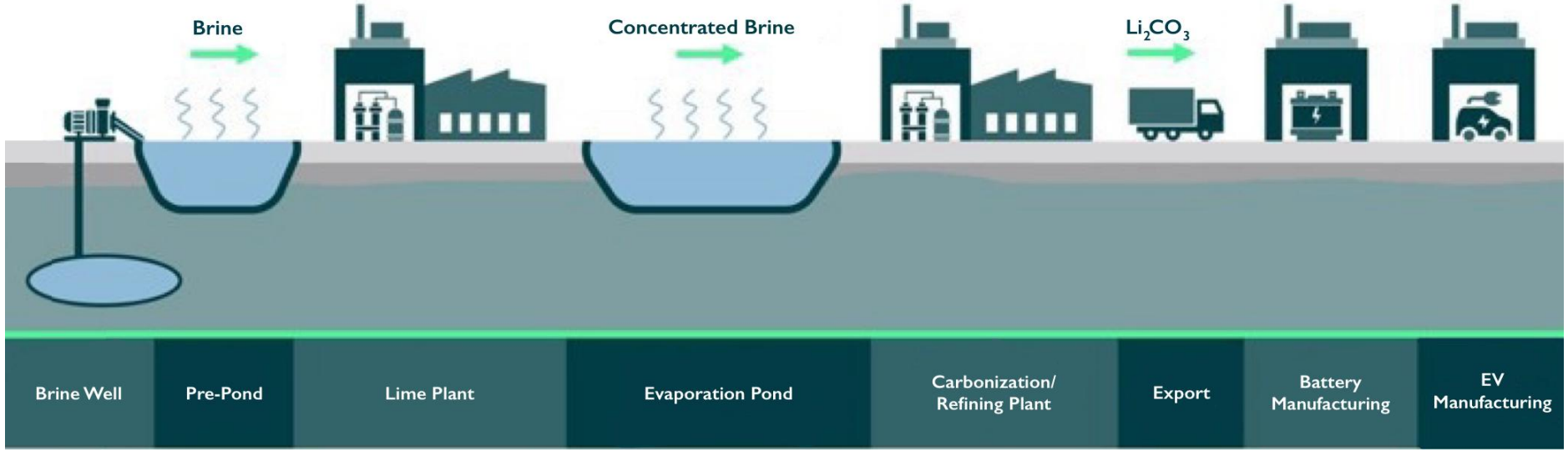
- 60% of global lithium stores are in brine deposits. [1]
- Brine, a concentrated solution of salt in water, is found in subsurface reservoirs.
- Accessing underground brine deposits requires drilling, after which the brine is pumped to the surface and directed into evaporation ponds. The brine remains in the recovery facility for several months or years until most water content is removed. Once an ideal lithium concentration is reached, brine is pumped to a lithium processing plant on or off site.

Advantages:

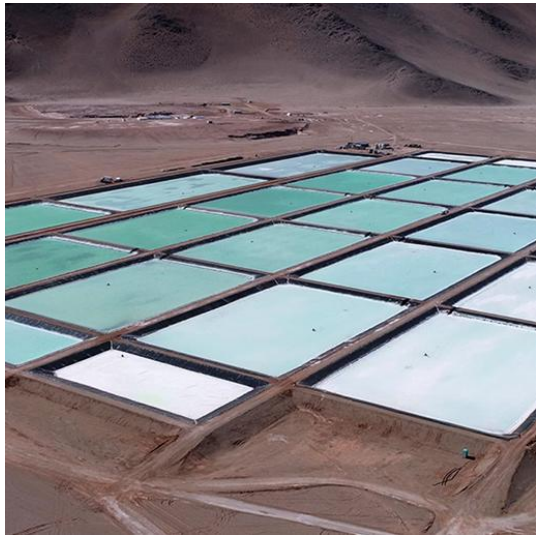
- Abundant lithium deposits
- Concentration of brine relies solely on solar power

Disadvantages:

- Very long process taking several months to years
- Lower recovery rate
- Large areas of land and volumes of water used for the evaporation ponds




Source: Lithium Harvest



Source: Arcadium Lithium

[1] MIT Climate Portal, "How is Lithium Mined?", February 2024.

# Brine Deposits (DLE)

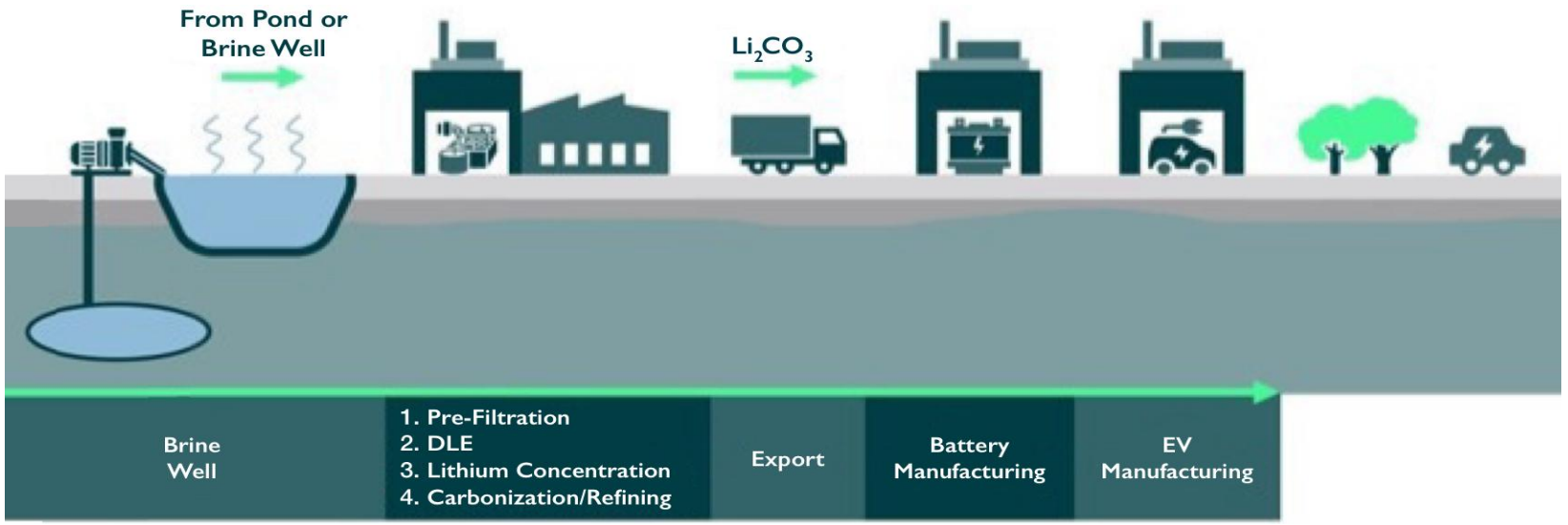
- Direct lithium Extraction (DLE) is an innovative in situ method for extracting lithium directly from lithium-rich brine solutions, producing Li-sulphate or Li-chloride which is further refined to produce lithium carbonate or lithium hydroxide.
- This technology selectively targets lithium ions from brines using specialized techniques like adsorption, ion exchange, and solvent extraction. [1]
  - Adsorption-Based DLE: Lithium molecule is physically adsorbed onto the sorbent and removed from the strip solution
  - Ion Exchange-Based DLE: Lithium ions are selectively exchanged with other ions using resin or exchange material to remove unwanted impurities.
  - Solvent Extraction-Based DLE: Organic solvents selectively bind to lithium ions in the brine solution to then be further processed.

Advantages:

- Higher lithium recovery rates than conventional brine extraction
- Lower environmental impact than traditional brine operations

Disadvantages:

- Limited availability of suitable adsorbents, resins, or membranes may restrict DLE use [2]
- Relatively new technique with high initial technology development costs




Source: Lithium Harvest

DLE's ion exchange technologies can also be applied to sedimentary (clay) deposits. In clay deposits, ion exchange is typically used after acid leaching to purify the lithium-rich solution by removing impurities such as magnesium, calcium, and boron.

[1] Detailed graphic in Appendix.

[2] Nature Reviews Earth & Environment, "Environmental Impact of Direct Lithium Extraction from Brines," 23rd February 2023.

# Sedimentary Deposits (Clay)

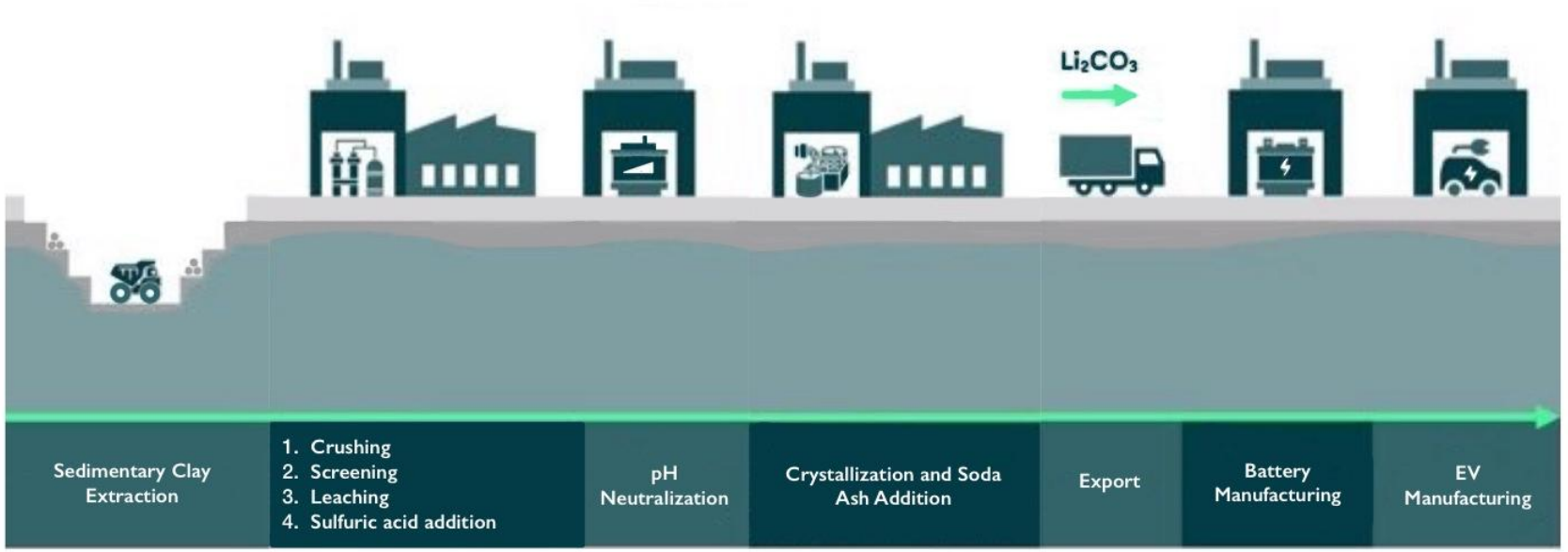
- In clay deposits, lithium is found in smectite clays, most commonly hectorite.
- Deposits which are close to surface are extracted via open pit.
- The process begins with ore crushing and screening, followed by slurry transfer to a leaching circuit where sulfuric acid dissolves lithium from the clay. The resulting solution undergoes pH neutralization and crystallization, removing impurities like magnesium. Soda ash is then added to produce high-quality battery-grade lithium carbonate.

Advantages:

- Lithium carbonate or lithium hydroxide produced on site with a lead time of 24 hours
- Much softer deposits than hard-rock pegmatite, similar extraction to coal mining

Disadvantages:

- Relatively new approach collapsing a critical section of the supply chain
- Higher upfront fixed costs due to mining, milling, and upgrading to produce battery grade lithium on site.




Over 90% of sedimentary (clay) lithium extraction/development projects are in the US with 75% found in Nevada. [1]
The McDermitt Caldera, located on Nevada-Oregon border, hosts Thacker Pass by Lithium Americas, one of the largest lithium deposits in the world at 12.1 Mt of LCE.

[1] Mining and Metals Research Corporation, Lithium Americas and Ioneer Carrying the Weight of all Lithium Clay deposits on their Shoulders."

# Deposits – Compared

| | Pegmatite | Brine – EP | Brine – DLE | Sedimentary [2] |
|---|---|---|---|---|
| LCE Production Time | Long – 3 to 6 months [1] | Very long – 2 to 6 years [1] | Short – Few days | Very short – 24 hours |
| Recovery Rate | ~60-80% (after processing) | ~50% | ~90% | ~83-93% |
| Typically Ships to Third-Party for LCE Processing | Yes | Yes | No | No |
| Energy Intensity | High | Medium-High | Medium | Medium-Low |
| Water Usage | High | High | Low – Water recycling | Low – Water recycling |

**Key Takeaway:** DLE extraction and sedimentary deposits provide quick on-site processing capabilities with low environmental impact.

[1] Lithium Extraction Methods, Lithium Harvest, September 2024.
[2] Based on Lithium Americas and Jindalee Lithium estimates.

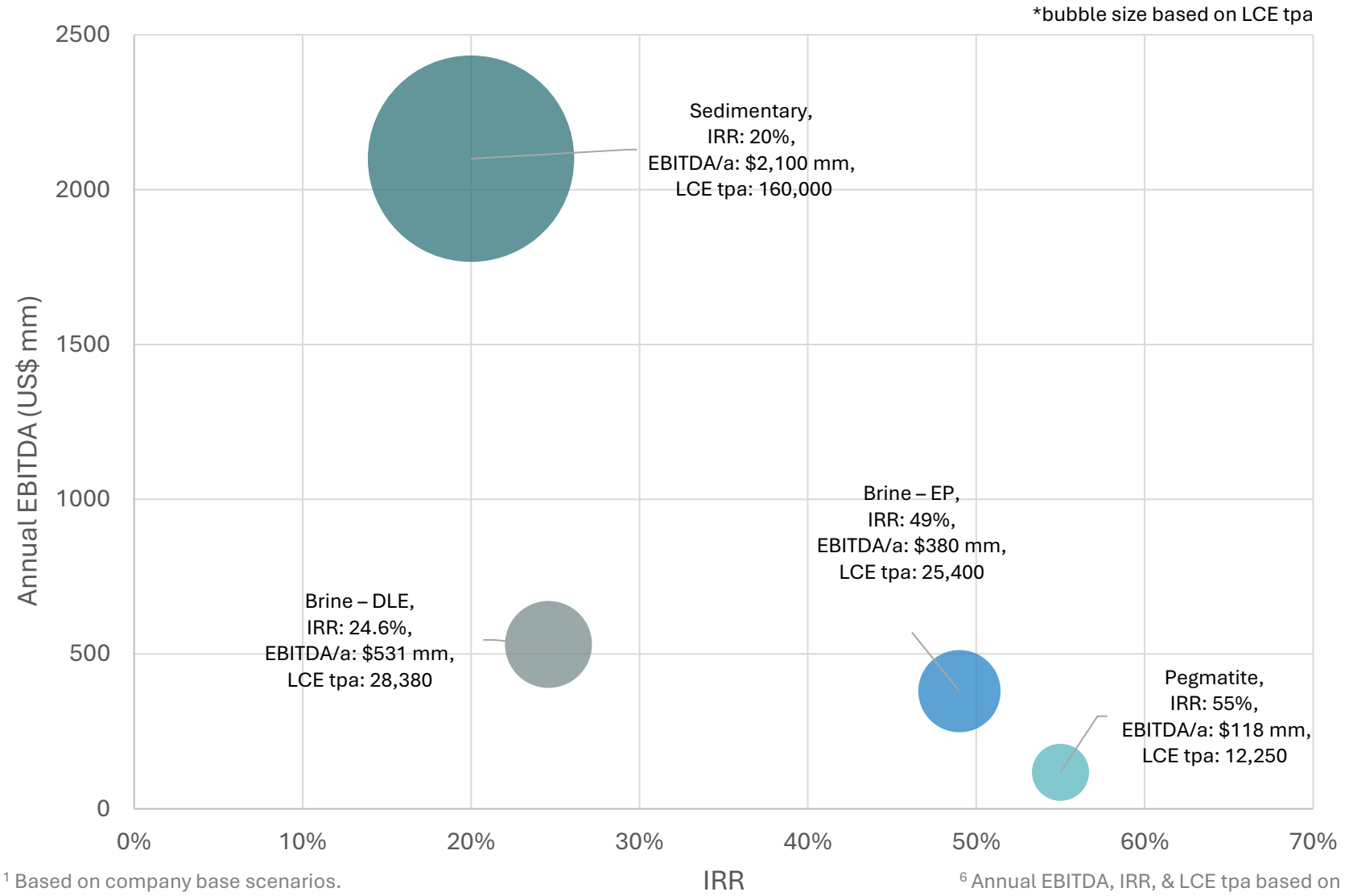
# Select Lithium Projects

| | Pegmatite | | Brine – EP | | Brine – DLE | | Sedimentary | |
|---|---|---|---|---|---|---|---|---|
| Project Name | Greenbushes | North American Lithium | Salar De Atacama | Cauchari-Olaroz | Salar Del Hombre | Clearwater Project | Thacker Pass | Rhyolite Ridge |
| Location | Australia | Canada | Chile | Argentina | Argentina | Canada | USA | USA |
| Ownership | Albemarle (49%), Tianqi Lithium (51%) | Sayona Mining (75%), Piedmont Lithium (25%) | SQM (100%) | Ganfeng Lithium (46.7%), Lithium Argentina (44.8%), JEMSE (8.5%) | Rio Tinto(100%) | E3 Lithium (100%) | Lithium Americas (100%) | Ioneer Ltd (100%) |
| Stage | Production | Production | Production | Production | Production | PFS | Construction | Awaiting FID |
| LCE | 8.5 Mt [1] | 1.8 Mt [2, 3] | 1.95 Mt [1] | 3.6 Mt [1] | 3.9 Mt [1] | 1.14 Mt [1] | 14.3 Mt [1] | 3.2 Mt [3] |
| Annual LCE Production (Mt) | 41,500 [4, 5] | 30,000 | 165,500 [6, 7] | 25,400 [10] | 75,000 | 28,000 [9] | 160,000 [8] | 20,600 |

**Key Takeaway:** While Brine (EP) achieved high annual production levels, sedimentary deposits offer more sustainable, quick on-site processing making them a promising choice for future demand.

[1] Based on in situ Mineral Reserve Estimates.
[2] Based a x2.473 conversion of $Li_2O$ to LCE.
[3] Based on Mineral Resource Estimates.
[4] 2023 production.
[5] Conversion to LCE is 0.02784 metric tons of lithium metal to 1 metric ton of spodumene concentrate at 6.0% Li2O.
[6] 2023 production.
[7] Lithium Carbonate Production of SQM from 2011 to 2023, Statista, May 2024.
[8] Based on all 5 Phase production estimates.
[9] LOH converted to LCE.
[10] 2024 production.

# EBITDA & IRR by Project Type [1]

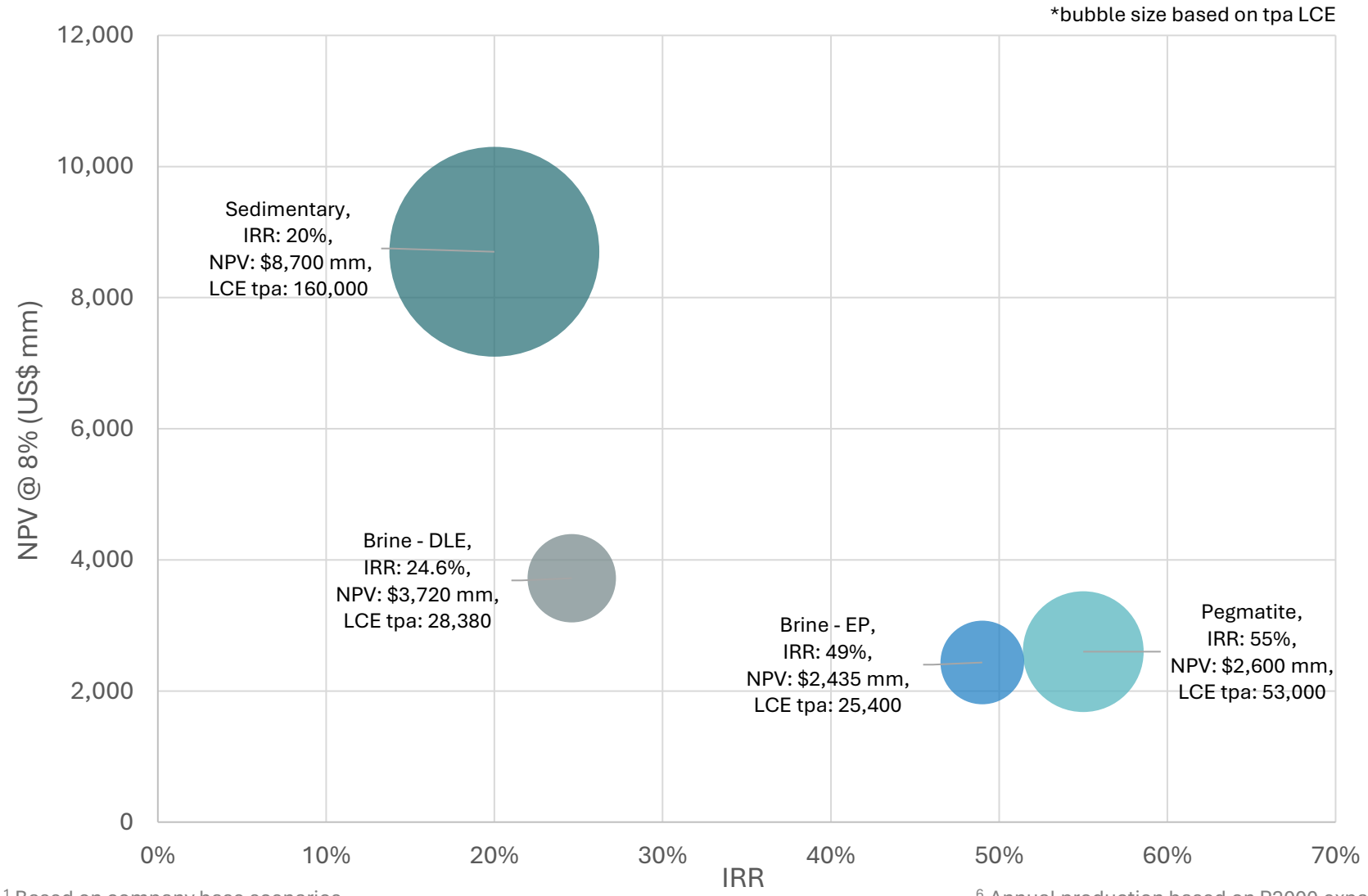



- Lithium Americas – Thacker Pass [2], USA
- E3 Lithium – Clearwater Project [3], Canada
- Lithium Argentina – Cauchari-Olaroz Salars [4, 5], Argentina
- Pilbara Minerals – Pilgangoora Project [6, 7], Australia

**Key Takeaway:** Sedimentary deposits stand out with the highest annual EBITDA reflecting strong profitability and substantial production capacity.

[1] Based on company base scenarios.
[2] Based on all phases.
[3] LOH converted to LCE.
[4] LCE tpa in 2024
[5] Annual EBITDA & IRR based on 2020 43 -101 Report.
[6] Annual EBITDA, IRR, & LCE tpa based on 2018 DFS.
[7] Conversion to LCE is 0.02784 metric tons of lithium metal to 1 metric ton of spodumene concentrate at 6.0% Li2O.

# NPV & IRR by Project Type [1]




- Lithium Americas – Thacker Pass [2], USA
- E3 Lithium – Clearwater Project [3], Canada
- Lithium Argentina – Cauchari-Olaroz Salars [4, 5], Argentina
- Pilbara Minerals – Pilgangoora Project [6, 7], Australia

**Key Takeaway:** Sedimentary deposits stand out with the highest NPV, highlighting their strong long-term value and economic viability.

[1] Based on company base scenarios.
[2] Based on all phases.
[3] LOH from PFS converted to LCE.
[4] NPV & IRR based on 2020 43 -101 Report.
[5] LCE tpa in 2024
[6] Annual production based on P2000 expansion.
[7] Conversion to LCE is 0.02784 metric tons of lithium metal to 1 metric ton of spodumene concentrate at 6.0% Li2O.

# Select Lithium Projects – Clay vs Brine (DLE)

| | Company | Project | Location | Type | Share Price | Market Cap | Annual LCE | Stage | Production Stage | Extraction |
|---|---|---|---|---|---|---|---|---|---|---|
| Clay | Lithium Americas | Thacker Pass | Nevada, USA | Clay | $5.23[1] | $1.09B | 160,000 | Construction | 2027 | Sulphuric acid leaching, with an ion exchange in the last step to remove Mg and Ca |
| | Century Lithium | Angel Island Mine | Nevada, USA | Clay | $0.26 | $31.27M | 34,000 | Permitting | 2028 | HCl acid leaching followed by an ion exchange |
| | Ioneer Ltd | Rhyolite Ridge | Nevada, USA | Clay | $4.48[2] | $302.6M | 24,500 | Awaiting FID | 2028 | Sulphuric acid leaching to break down lithium ore, followed by an ion exchange removes Mg and Ca from the leach solution |
| | Jindalee Lithium | McDermitt Lithium Project | Nevada, USA | Clay | $0.34 | $32.6M | 47,500 | PFS complete | 2032 | Acid leaching and ion exchange for lithium recovery |
| Brine | Rio Tinto (acquired Arcadium Lithium) | Fenix (Salar Del Hombre) | Catamarca, Argentina | Brine DLE | $69.44[3] | $120.4B | 25,000 | Production | - | Sorbent based lithium recovery, first commercial user of DLE (1996) |
| | Standard Lithium | South West Arkansas Project | Arkansas, USA | Brine DLE | $3.87 | $888M | 26,000 | Development | 2026 | Sorbent based lithium recovery, offsite processing with a third party (Koch Technology Solutions) |
| | E3 Lithium | Clearwater Project | Alberta, Canada | Brine DLE | $0.68 | $59.5M | 28,000 | PFS complete | 2028 | Sorbent based lithium recovery with an ion exchange |

Source: S&P Capital IQ, as of November 19, 2025

*All dollar values are USD*

[1] NYSE
[2] NASDAQ
[3] NASDAQ

# Select Lithium Producers & Explorers

**Pegmatite Deposits:**

ALBEMARLE

赣锋锂业 GanfengLithium

Pilbara Minerals

MINERAL RESOURCES

TALISON LITHIUM

LITHIUM IONIC

**Brine Deposits:**

**EP:**

RioTinto

ALBEMARLE

SQM Soluciones para el desarrollo humano

LithiumArgentina

**DLE:**

arcadium lithium

E3 LITHIUM

Standard LITHIUM

**Sedimentary Deposits:**

RioTinto

赣锋锂业 GanfengLithium

LithiumAmericas

ioneer

JINDALEE LITHIUM

SURGE BATTERY METALS

PELOTON MINERALS CORPORATION

# Lithium Industry Development in Nevada, USA

- The US imposed a 100% tariff on all EVs imported from China, alongside a 25% tariff on steel, aluminum, EV batteries, and key minerals. This has intensified the need for localized lithium supply to reduce reliance on imports. [1]

- Nevada's lithium sector is now drawing record levels of private and federal investment,
  - The Inflation Reduction Act (IRA) has spurred a surge in US-based battery projects, skyrocketing from four battery plants in 2019 to over 34 in 2024. [2]
  - In 2025, the U.S. government announced a 5% equity stake in Lithium Americas.
  - The University of Nevada-led Tech Hub awarded $15.5 million in October 2025 to fund 17 battery and critical materials projects. [3]

- Nevada is the only US state where the entire lithium-ion battery lifecycle exists. From mining to production, assembly, and recycling, Nevada has established a unique lithium battery ecosystem – the "Lithium Loop." [4, 5]

- Battery production is now the largest manufacturing sector in Nevada, accounting for 18% of the state's jobs in manufacturing. [4]

- The second annual Governor's Lithium Summit was held in September 2025, uniting policy makers, industry leaders, and researchers to enhance Nevada's "Lithium Loop." [5]

- Nevada's favorable business climate, with no corporate or inventory tax, combined with robust incentive packages, has made the state an attractive and cost-efficient location for manufacturers. [4]

**Battery Manufacturers involved in Nevada:**

LYTEN

dragonfly ENERGY

Panasonic

LITHION

**EV Manufacturers involved in Nevada:**

Ford

TOYOTA

TESLA

gm general motors

STELLANTIS

[1] Global Finance, "New US Tariffs Begin on Chinese Goods," October 2024.
[2] SLR, "The Battery Revolution: Balancing Progress with Supply Chain risks in 2024, October 2024.
[3] Nevada Today, "Nevada Tech Hub awards $155m in funding," October 2025
[4] Manufacturing Dive, "Nevada is an EV Battery Gold Mine," October 2024.
[5] Nevada Governor's Office of Economic Development, "Lithium Loop," September 2025.

# Lithium Market Activity

- Q3 2025 - The U.S. government strengthens its strategic involvement in domestic lithium production, agreeing to take a 5% equity stake in Lithium Americas Corp. and a 5% stake in its joint venture with General Motors.

- Q1 2025 - Rio Tinto acquires Arcadium Lithium in an all-cash transaction for US$6.7 billion.

- Q4 2024 - Lithium Americas Corp. closes a US$2.26 billion loan from the US Department of Energy to finance construction of processing facilities at Thacker Pass, Nevada.
- Q4 2024 - General Motors ups its commitment establishing a US$625 million joint venture with Lithium Americas Corp. for the purpose of funding, developing, constructing, and operating Thacker Pass.

- Q4 2024 - Sayona Mining is set to merge with US-based Piedmont Lithium in an all-stock deal valued at US$623 million.
- This merger will consolidate Sayona's Canadian operations and bolster its exposure to the North American electric vehicle sector, positioning the combined entity as a significant player in the lithium market.

# Lithium Market Activity

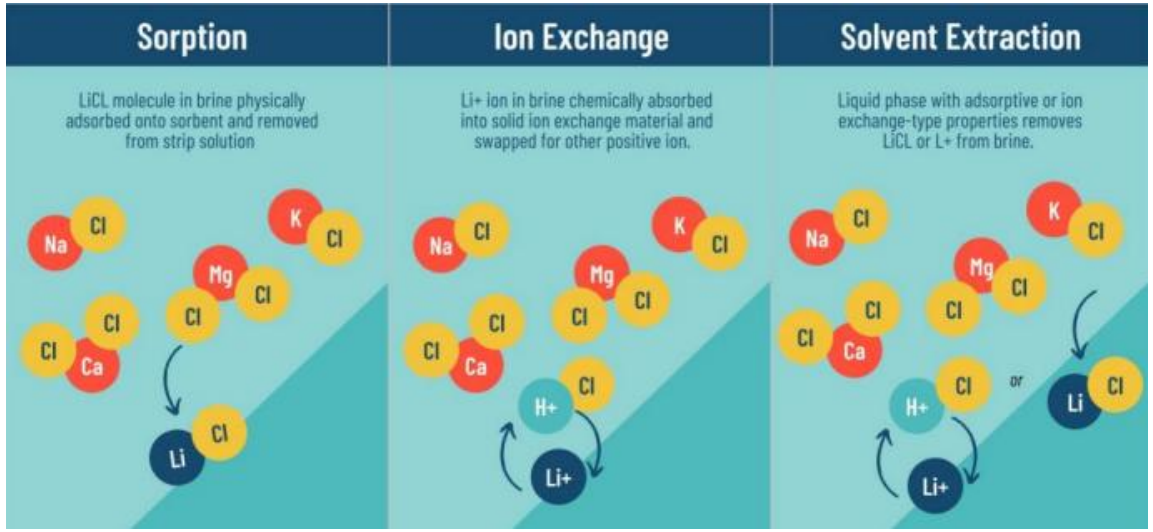
- Q3 2024 - Pilbara Minerals Limited agree to acquire 100% shares of Latin Resources Limited for US$369 million, giving Pilbara control of Latin Resource's Salinas lithium project.

- Q2 2024 - Volkswagen Group and Rivian launch a joint venture agreement that sees Volkswagen invest US$ 5.8 billion in Rivian.
- Rivian receives US$6.6 billion loan from the US Department of Energy.

- Q1 2023 - Ioneer's Rhyolite Ridge project receives a US$700 million conditional loan from the US Department of Energy and signs binding agreements with Ford and Toyota-Panasonic.

# Appendix

## Direct Lithium Extraction




Source: Vulcan Energy, November 2021

| Reagents used in Clay | Reason |
|---|---|
| Sulfuric Acid | Dissolves lithium from clay minerals during leaching. |
| Limestone | Neutralizes acidic leachate to adjust pH for downstream processing. |
| Soda Ash | Reacts with lithium solutions to form lithium carbonate, the final product. |

**Comparison of Processing Pathways for Different Types of Lithium Resources**

| Resource Category | Pumping | Evaporation | Mining | Crushing and/or Upgrading | Roasting and/or Calcination | Chemical Leach from Mineral | Chemical Refining to Product | Waste Disposal Risks | Hydrogeology Risks |
|---|---|---|---|---|---|---|---|---|---|
| Evaporative Brine | ■ | ■ | | | | | ■ | | ▨ |
| DLE Brine | ■ | ▨ | | | | | ■ | ▨ | ▨ |
| Sedimentary | | | ■ | ▨ | ▨ | ■ | ■ | ▨ | |
| Pegmatites | | | ■ | ■ | ▨ | ■ | ■ | ▨ | |

■ Always or Almost Always ▨ Sometimes □ Never or Rarely

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