

Direct Lithium Extraction 2.0

Moving from Innovation to Scalable Supply



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DLE isn't new!

DLE 1.0 goes back to the early 90s

1997

Fenix, Argentina



2015–2020

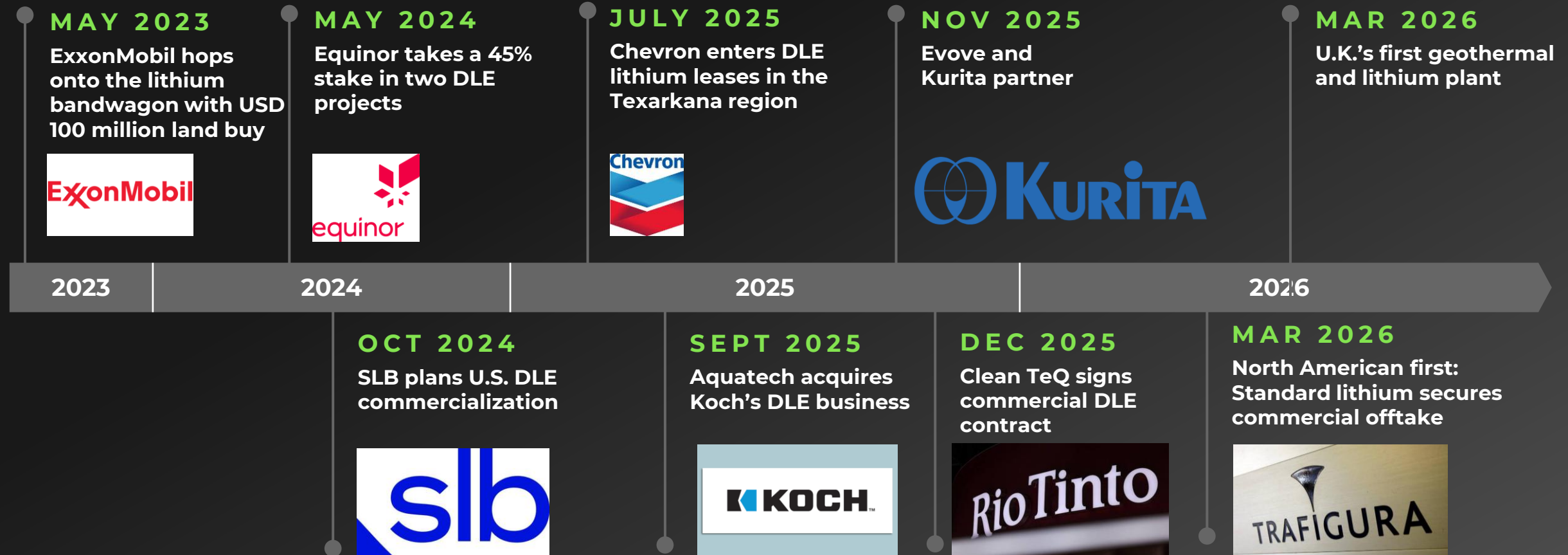
Qinghai, China



Scaled up in the last decade

Commercial momentum is shifting DLE

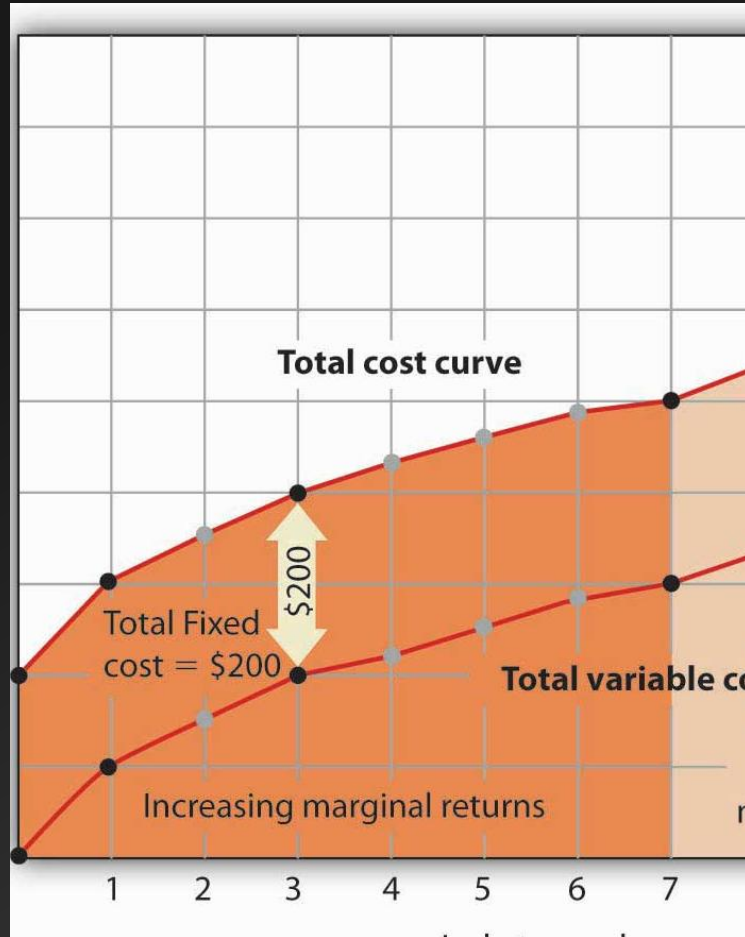
Projects and partnerships are accelerating



The best technology wins!



Lower opex means better economics



Next-generation DLE replaces incumbents



Agenda

01

Drivers for DLE 2.0

02

DLE scale-up through the lens of project economics and tech stack

03

Outlook: What you should do!

Drivers for DLE 2.0

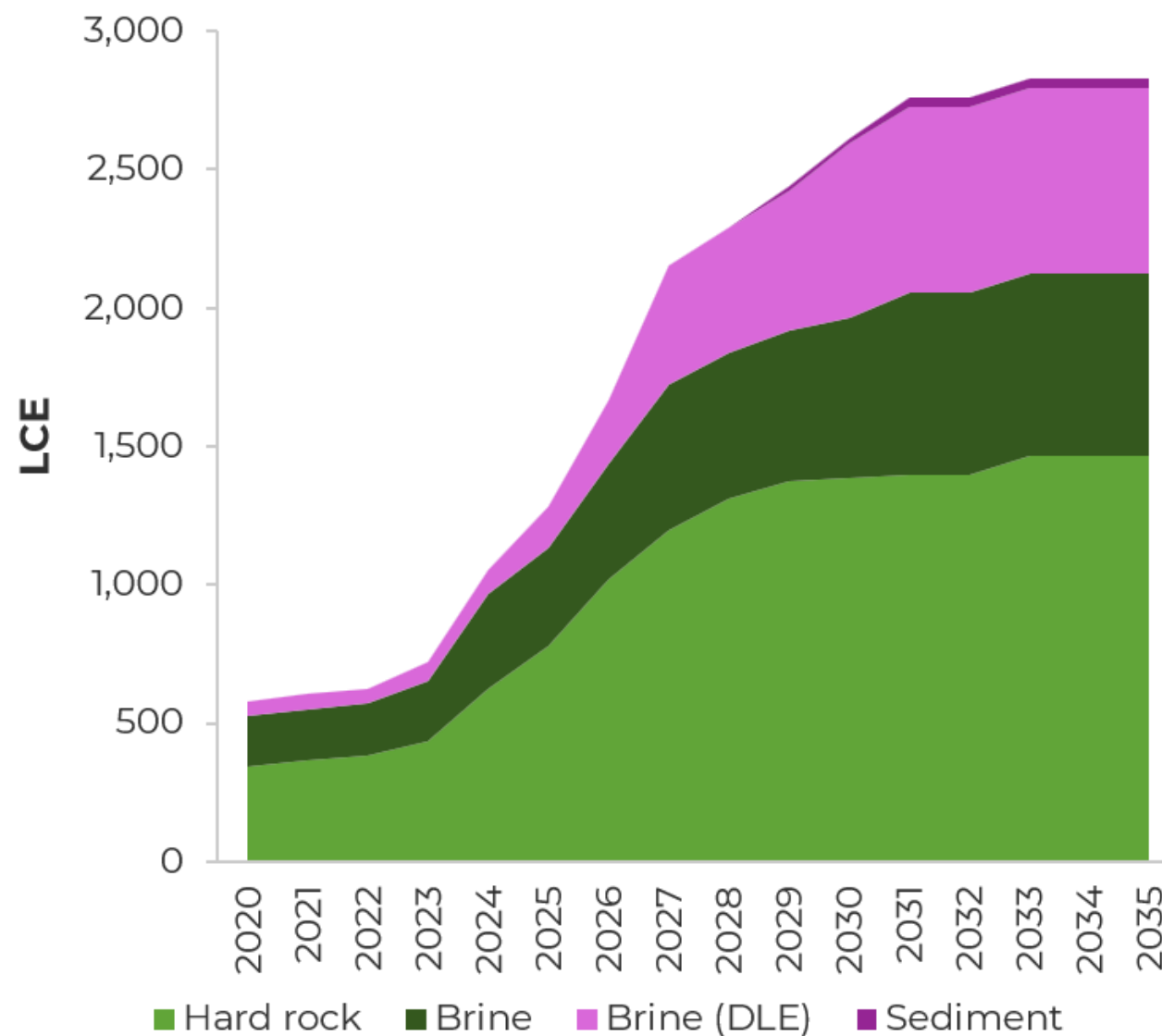
Supply demand to onshoring policy

Supply demand dynamics

Growing lithium demand is reopening the opportunity for brine-based resources

- Lithium demand continues to outpace long-term supply growth.
- Brines are becoming competitive again.
- DLE expands supply — it doesn't replace hard rock.

Global Lithium Production by Resource Type



Global policy drivers: Onshoring



European Critical Raw Materials Act's aims

Chile forms state-controlled entity with SQM to control domestic lithium production

Chinese lithium company halts tech exports as trade tensions build

By Ernest Scheyder and Lewis Jackson

February 18, 2025 7:01 PM EST · Updated February 18, 2025



China's battery technology export restrictions – cathode, lithium, gallium

25 JULY 2025

Zimbabwe to introduce lithium export quotas, sets conditions for resumption of shipments

By Reuters

April 8, 2026 4:54 AM EDT · Updated April 8, 2026



Volatile prices!



Direct lithium extraction has the potential to fundamentally change how lithium is produced.

– Jakob Stausholm, former CEO
Rio Tinto, mining executive

Lithium carbonate price (\$US'000/mt)



Source: S&P Global Platts



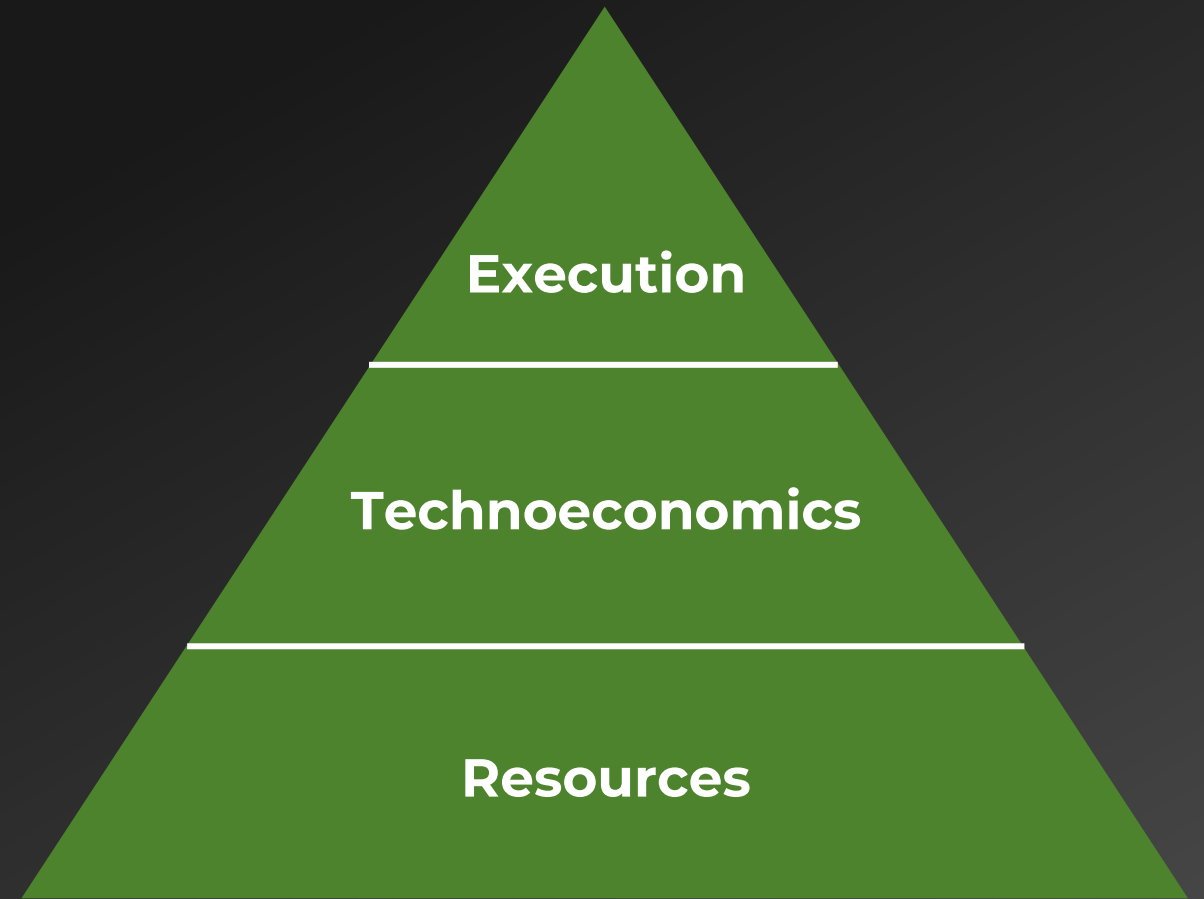
Which projects remain economically resilient across the lithium price cycle?

DLE scale-up

Resource, economics, execution

Pyramid of DLE success: Three factors

The Lithium “success” triangle



Resource types create different challenges



Continental brines

Salars are some of the highest-grade brines in the world — 0.04% to 0.15% Li.

Stage of development

Commercial



Geothermal brines

Low-grade sources contain as little as 0.01% to 0.04% Li.

Stage of development

Development



Oil field brines

O&G wastewaters are some of the lowest-grade brines, containing <0.01% Li.

Stage of development

Early pilot



Clay deposits

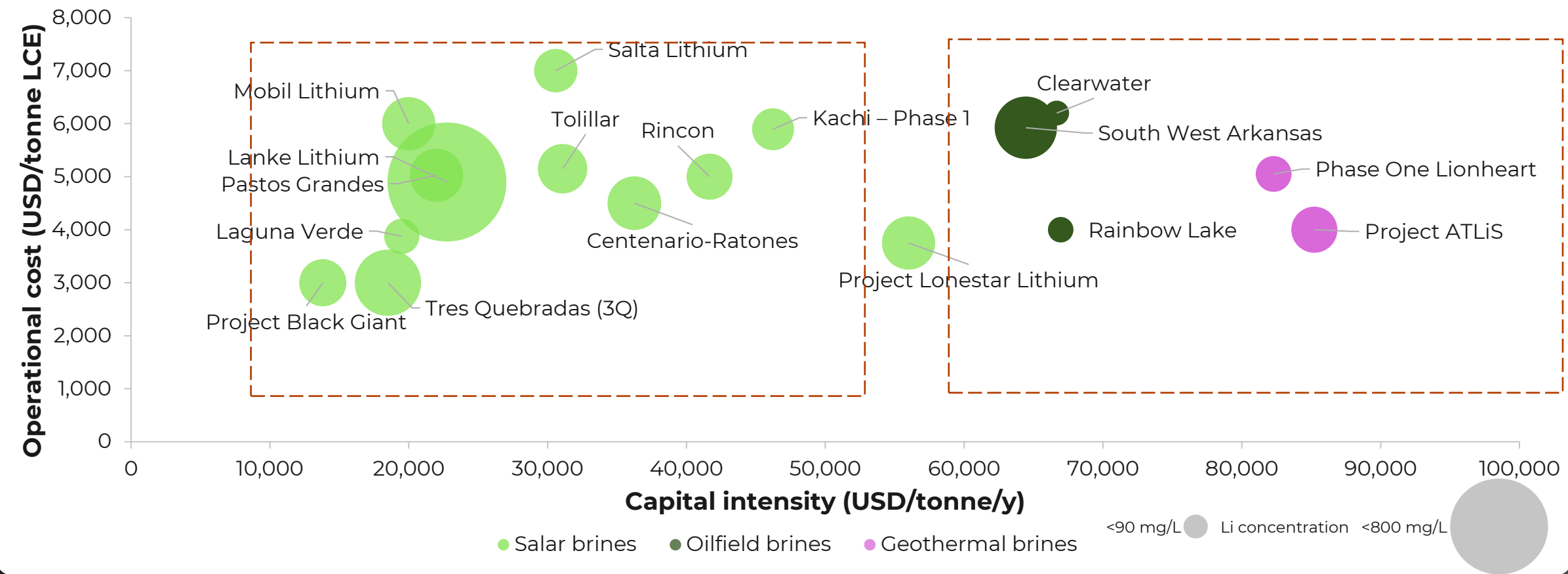
Lithium-bearing clays contain 0.1% to 0.4% Li, significantly higher than most brines.

Stage of development

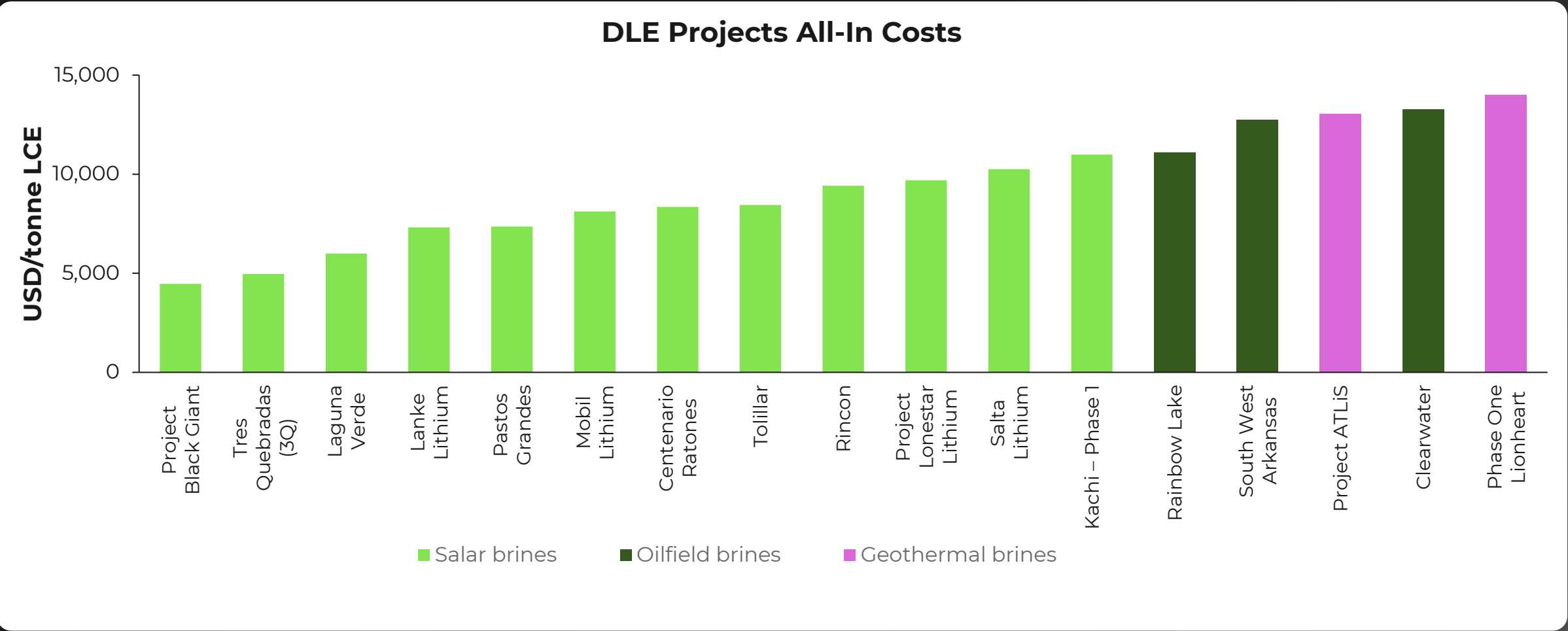
Lab and early pilots in North America

Resource competitiveness

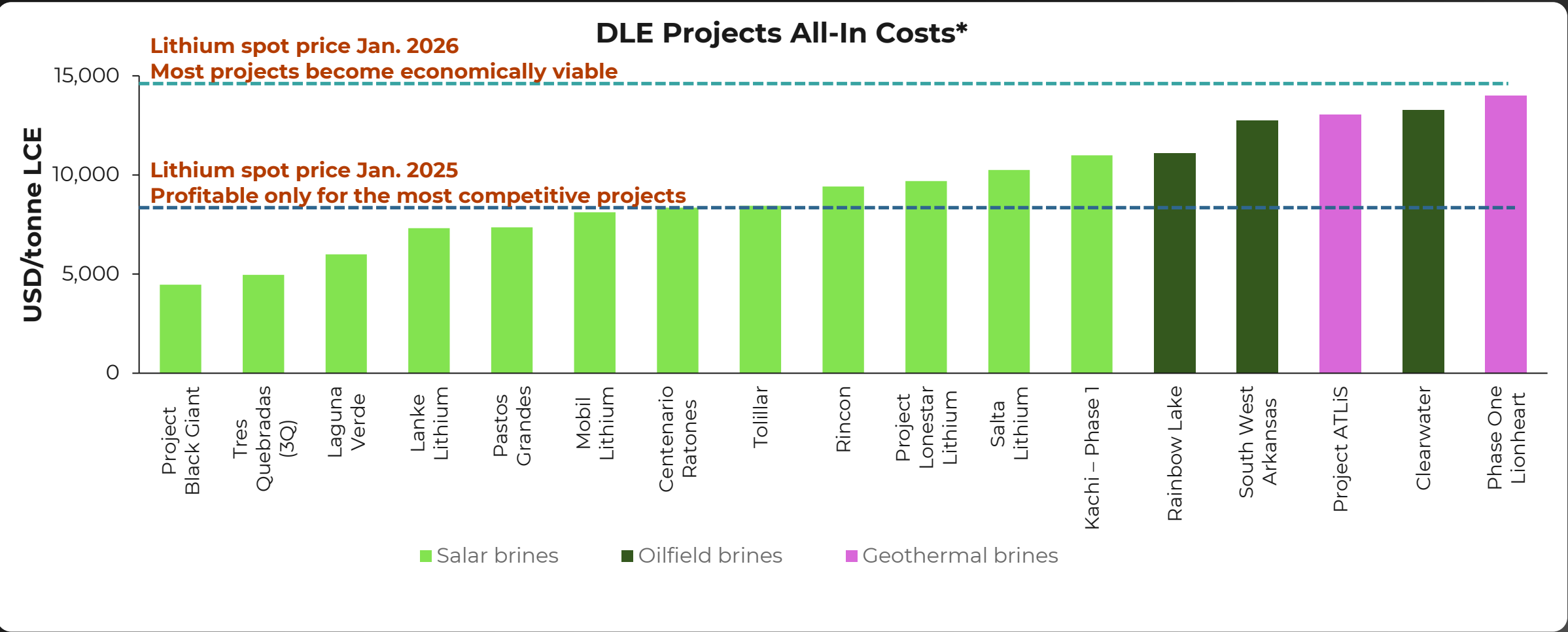
DLE Project Comparison by Resource Type



Resource competitiveness: All-in costs



Resource competitiveness: Payback

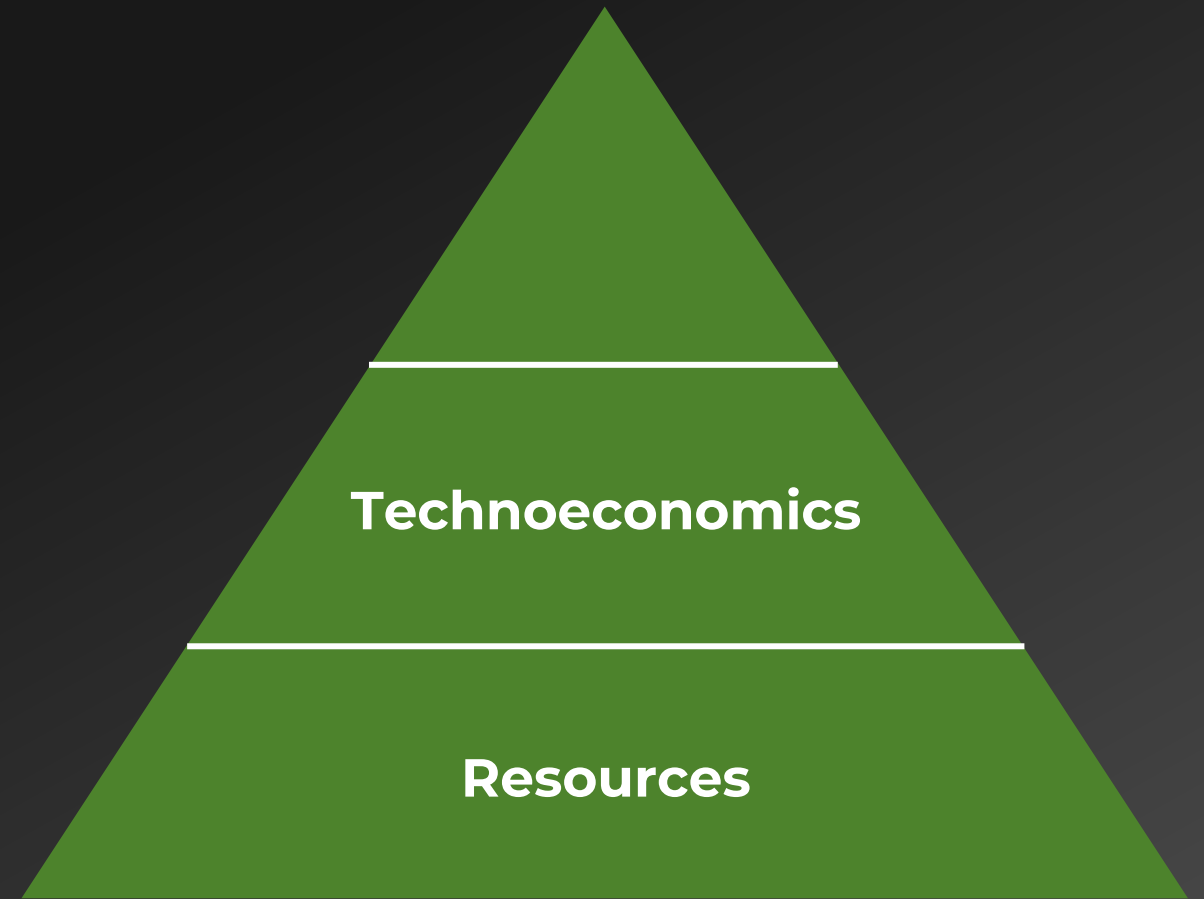




Project economics are determined as much by resource and capital efficiency as by the extraction technology itself.

Pyramid of DLE success

The Lithium “success” triangle



Technology choice affects execution risk more than project economics

FEEDSTOCK REFINING

Pump brine to surface

Impurity removal

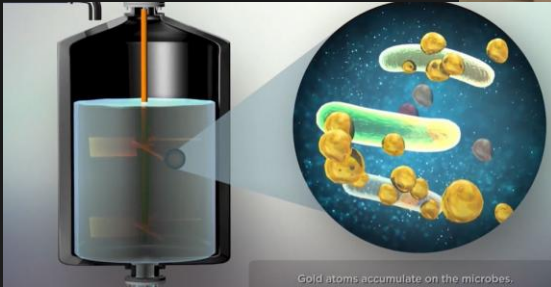
DLE

Filtration and washing of LiCl

CHEMICAL PRODUCTION

Carbonation to produce Li_2CO_3

Crystallization to produce LiOH



Adsorbents

Ion-exchange resins

Solvent extraction

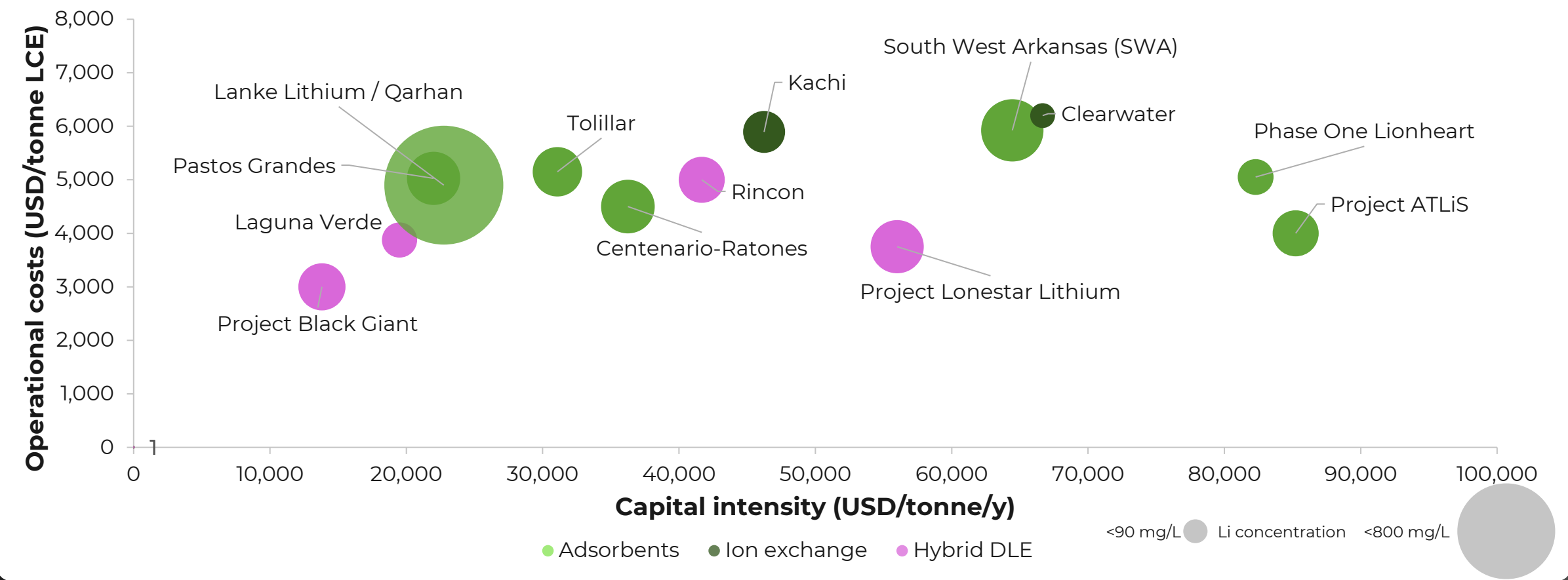
Membranes

Biomining



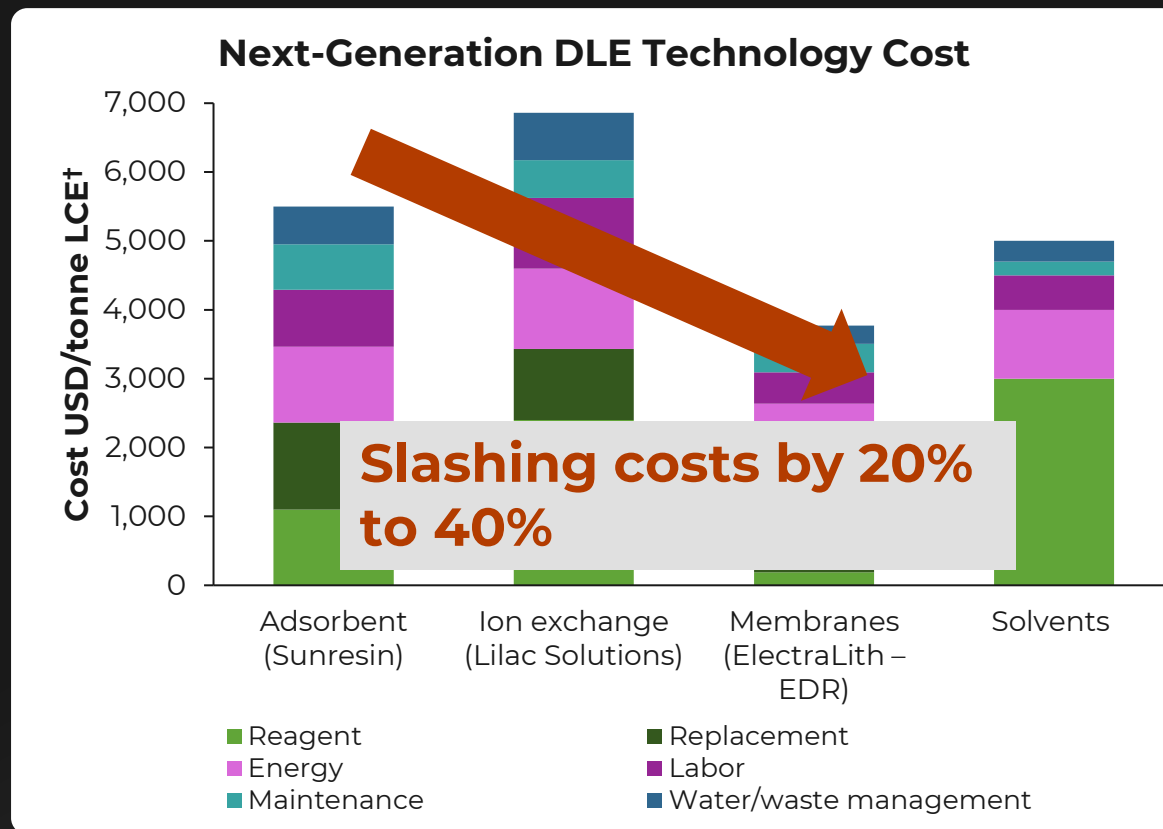
Proven adsorbent and hybrid systems lead project deployment

DLE Project Comparison by Technology



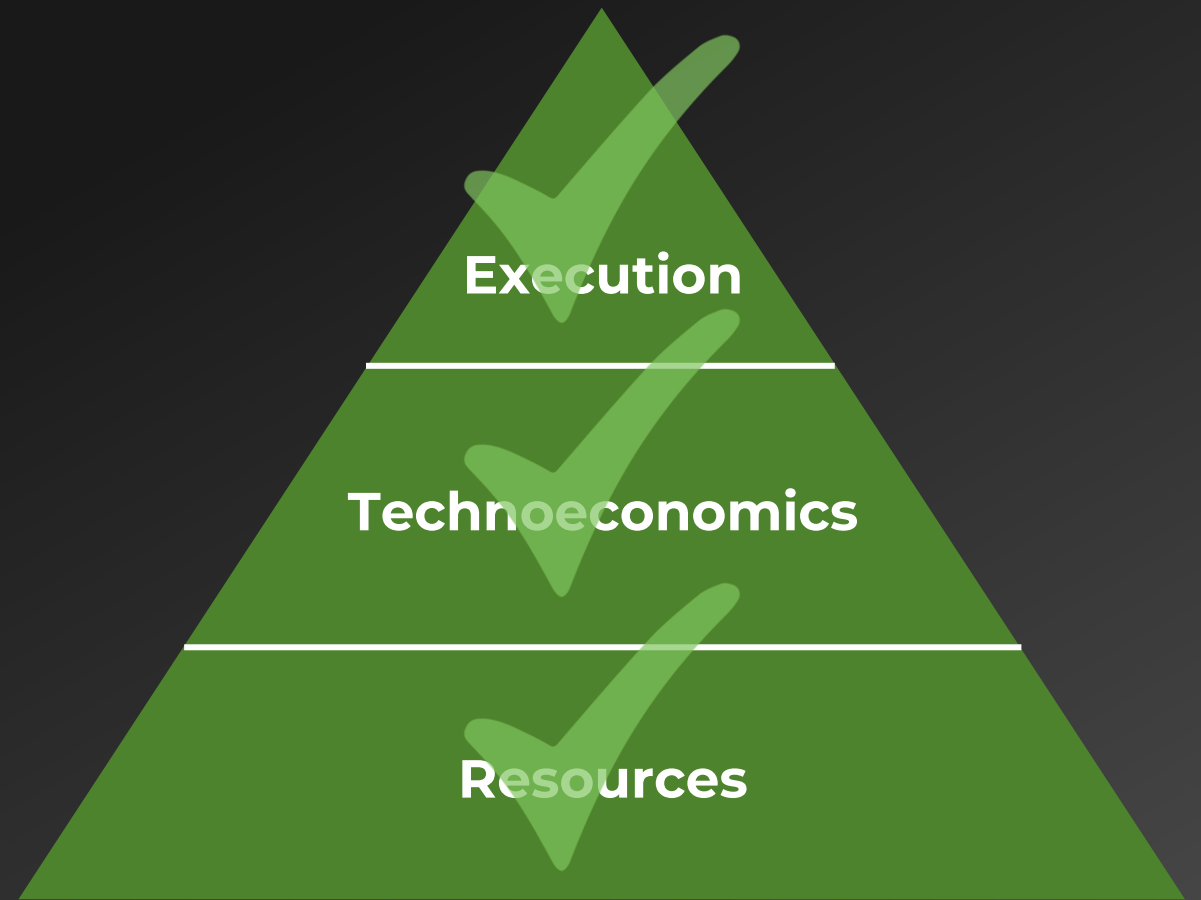
Execution: Emerging cost reduction levers

The next wave of DLE lowers the biggest cost drivers



Pyramid of DLE success

The Lithium “success” triangle



Outlook

No silver bullet DLE

Outlook

Chemicals & materials



Make commercial tech improvements

Invest in tech adjacency and integration

Consolidate and share project revenue

Energy



Focus on proven flowsheets

Scale geothermal projects

Expand unconventional resources

EPC – Integrators



Invest in systems-level capabilities

Integrate downstream innovations

Expand globally and diversify



Thank you



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