

Direct Lithium Extraction and the Case for Laguna Verde

CleanTech Lithium PLC. AIM: CTL. Frankfurt: T2N.

Our review of the Laguna Verde PFS



SP Angel Corporate Finance LLP

Non-Independent Research · MiFID II Exempt

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A low grade, a piloted flowsheet, and a US\$959M NPV

Our reading of the PFS: the geology, the process and the economics

GEOLOGY

At 186 mg/L the grade is bottom quartile among DLE peers, and 15,000 tpa is modest scale. The offsets are real: brine comes up warm at 20 to 30 °C, the chemistry is clean, and the grade barely moves, from 188 to 184 mg/L over 25 years.

PROCESS

Adsorption DLE turns 85.5% of contained lithium into product; solar ponds manage 40 to 65%. Output is grade × flow × recovery, and flow is where the test data sits. All six solar unit operations run commercially today, and the full flowsheet has run on 1,196 m³ of actual brine.

ECONOMICS

US\$748M of capex works out at US\$49,900 per tonne of capacity, below the 481 mg/L Smackover DFS. Opex is US\$5,768 per tonne, 38% of it energy. Set the US\$959M post-tax NPV8 against a market cap near US\$24M and you see why we wrote this note.

THE RUNWAY

CEOL ratified late 26 → partner named Q4 26 → EIA and DFS 2027 → FID → first lithium 2031

Exhibit 1 The five critical metrics

186 mg/L

reserve grade: low among peers, but modelled to hold near flat for 25 years

85.5%

overall recovery, built on pilot data; the RNS labels this the optimistic case
pilot DLE 88.0%, design 90.0%

~US\$49,900/t

capital intensity, against US\$64,400 for the 481 mg/L Smackover DFS (Sep 2025)

568 L/s

the flow rate the whole model rests on; 36 wells, backed by pump tests LV05 and LV06 at up to 16 L/s per well

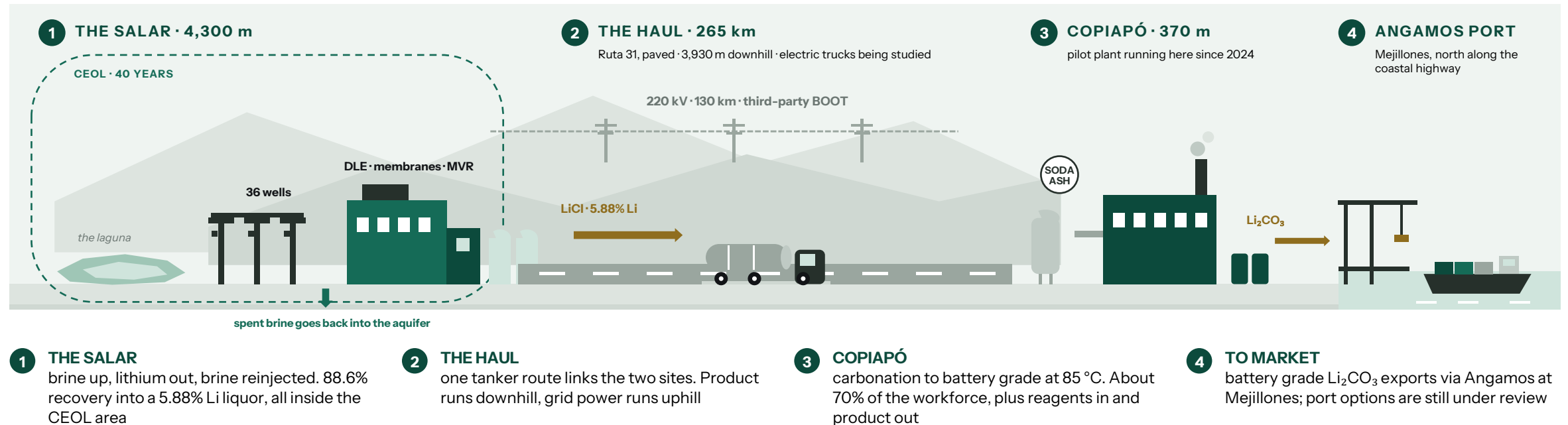
US\$959M

post-tax NPV8 on a US\$22,500/t price assumption, within 0.2% of spot on 14 Aug

The valuation stands or falls on whether the wellfield can hold 568 L/s.

A two-site operational strategy

Concentration happens at the salar; the finishing chemistry runs in Copiapó, 265 km away and 3,930 m lower. The split is deliberate.



THE ASSET

40-yr CEOL

decree signed 10 Mar 2026, full ratification expected late 2026

1.90 Mt LCE

global resource at 174 mg/L, including 0.84 Mt M and I at 178 mg/L

378 kt LCE

Probable Reserve at 186 mg/L, over a 25-year simulation

100 mg/L

economic cut off, and Lanshen recovers from feeds as low as 80 mg/L

100% owned

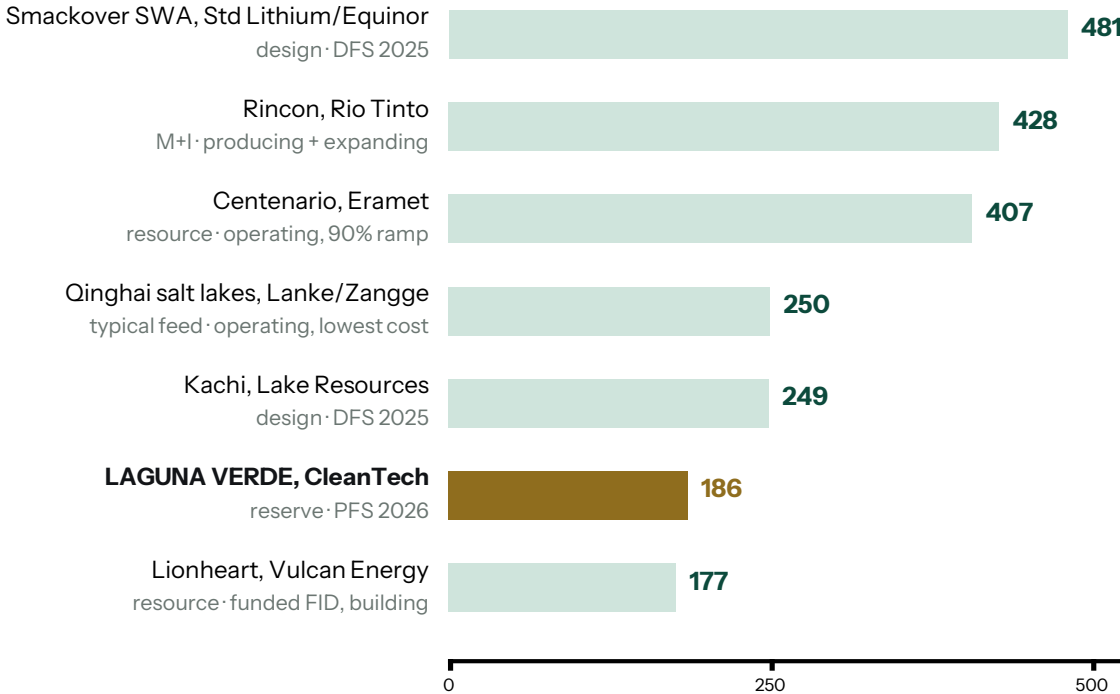
wholly owned; no third-party royalty disclosed

Only concentrated LiCl crosses the mountains: the water stays in the basin, and the delicate chemistry stays at 370 m.

How 186 mg/L still gets to 15,000 tpa

The grade sits near the bottom of the peer table, but output is grade times flow times recovery, and flow is the part with test data.

Exhibit 2 Lithium grade, comparable brine projects · mg/L



Ponds needed feed above 1,000 mg/L, with Atacama running 1,400 to 1,800. That barrier set brine valuations for four decades. **Adsorption DLE removed it**, and Vulcan closed €2.2bn in the same grade band in May 2026. Here the cut off is 100 mg/L.

OUTPUT = GRADE × FLOW × RECOVERY

568 L/s

× 186 mg/L

= 3,331 t Li/yr

× 85.5%

× 5.323

brine from Year 2. The 36 well design is backed by pump tests at up to 16 L/s per well

= 105.6 g of lithium per second

contained lithium at the plant gate each year

global recovery, backed by pilot data

conversion into lithium carbonate equivalent

≈ 15,160 t LCE → the 15,000 tpa nameplate is simply this arithmetic
Basis: the wellfield feeds the plant all year (8,760 h) per the RNS reserve simulation; opex assumes about 8,000 operating hours.

Two pump tests, wells at up to 16 L/s, and a reserve signed by the same competent person as Rio Tinto’s Rincon.

GRADE HOLDS 188→184 mg/L / 25 yrs

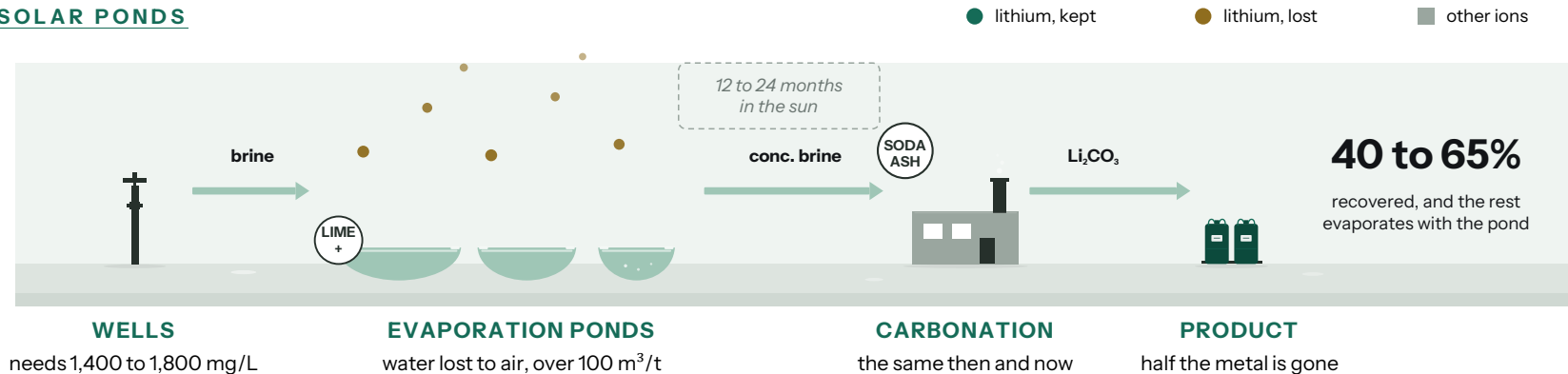
NO POND-STYLE DECLINE

15,000 tpa is tested flow, a stable grade and a design recovery that still has to hold at scale.

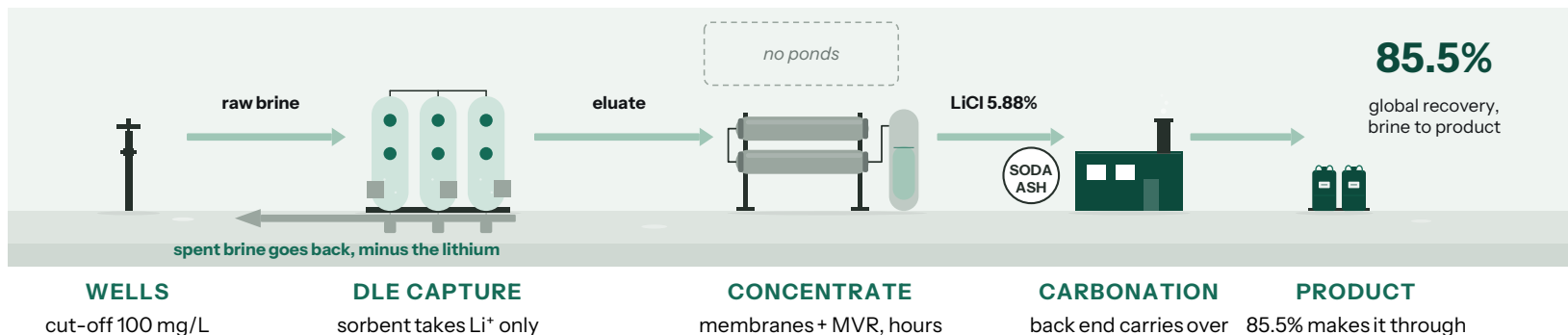
Evaporation Ponds lost half the lithium; adsorption keeps 85.5%

The ponds route spends 12 to 24 months in the sun; adsorption takes hours, loses 14.5%, and sends the water back to the basin.

SOLAR PONDS



DIRECT LITHIUM EXTRACTION



LOW GRADE IS ALREADY BANKABLE

174 to 181 mg/L

Vulcan Lionheart targets this same grade band. FID in Dec 2025, €2.2bn secured by May 2026, and now in construction → lenders have already funded this grade band.

~250 mg/L · Mg/Li 400:1

The Qinghai salt lakes carry far worse impurities yet make battery grade at RMB 35,000 to 45,000 per tonne, with Zangge reporting margins above 45%.

since 1998

Fenix at Hombre Muerto has run alumina sorbent DLE for nearly three decades.

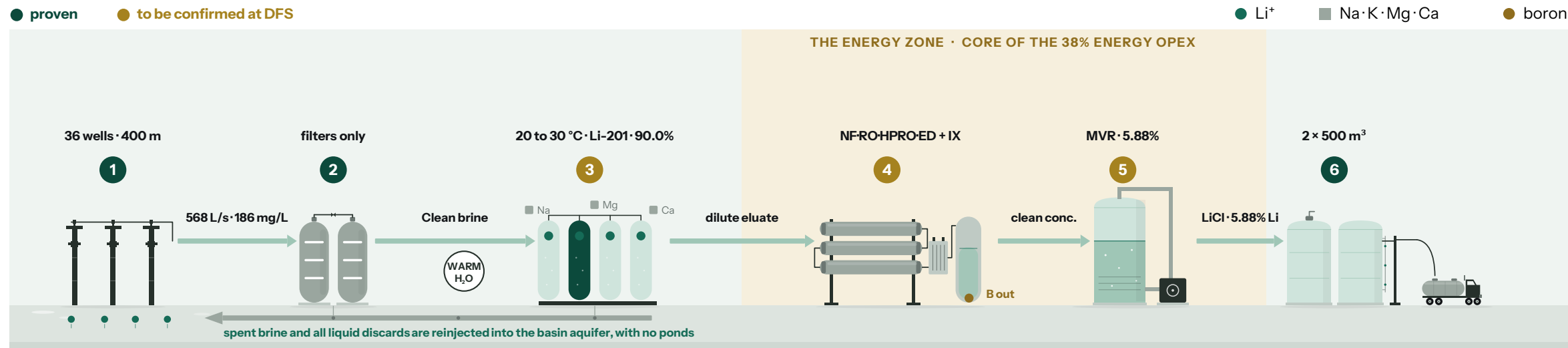
90% of nameplate

Eramet Centenario, a greenfield DLE build at 4,000 m, went from first output to positive EBITDA in 18 months.

Adsorption moves the economics from grade to flow, and at 186 mg/L against a 100 mg/L cut-off there is room to spare.

Inside the process plant at the salar: 568 L/s in, 5.88% LiCl out

Wellhead brine becomes a concentrated lithium liquor in hours. Lanshen designed the process, Ad Infinitum reviewed it, Worley integrated it.



- 1 EXTRACT**
pump tests support well rates of up to 16 L/s; **the 568 L/s case needs 36 wells to hold that rate long term**
- 2 PRETREAT**
simple multimedia filtration, with no heat, acid or lime before the sorbent
- 3 CAPTURE**
10 carousels of 30 columns capture 90.0% of the lithium; **pilot loading was 3.5 g/kg against a 4.6 g/kg spec; Lanshen re-testing on 20 m³ now**
- 4 PURIFY**
membranes and IX give 98.4% recovery and reject about 97% of the boron; **a possible by-product credit**
- 5 CONCENTRATE**
MVR evaporation concentrates the dilute eluate to a 5.88% Li solution, the heaviest power draw; **altitude derating to be confirmed at DFS**
- 6 STORE + LOAD**
two 500 m³ buffer tanks load the tankers that run down Route 31 daily

KEY HIGHLIGHTS

~1,190 m³

brine per tonne of LCE, pumped and returned rather than consumed

175,200 MWh/y

site power, about 20 MW, over a 130 km 220 kV third-party BOOT line

88.6%

salar plant recovery: DLE 90.0% × membranes 98.4%

US\$42.8M

first fill of adsorbent and resins, then about US\$9M a year to sustain

5.6 L/s

freshwater taken, against about 570 L/s of basin recharge

All six unit operations run commercially elsewhere; the job here is making them work at 4,300 m.

Copiapó turns the liquor into battery grade

The delicate finishing chemistry runs at 370 m, close to the workforce, the reagents and the port road.

● proven ● to be confirmed at DFS

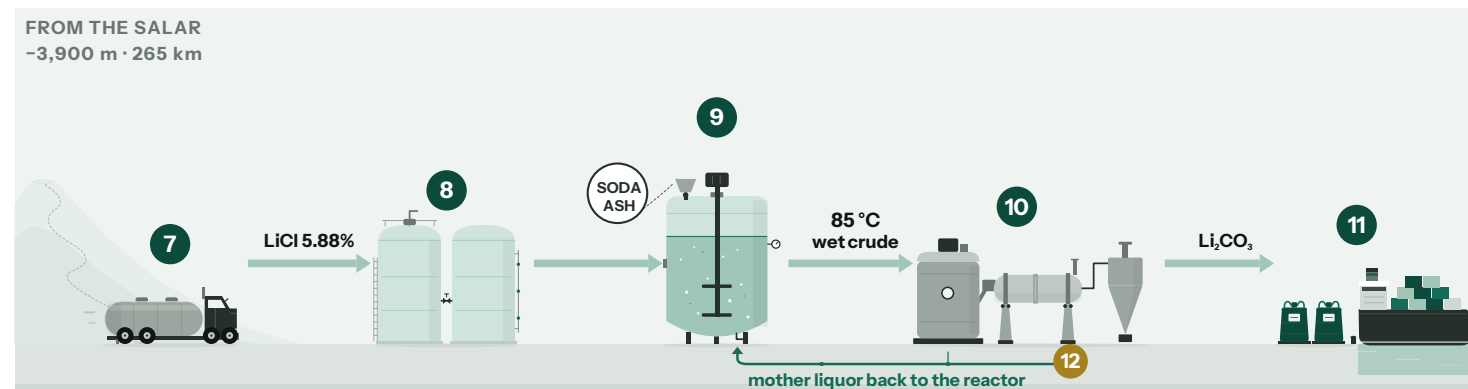
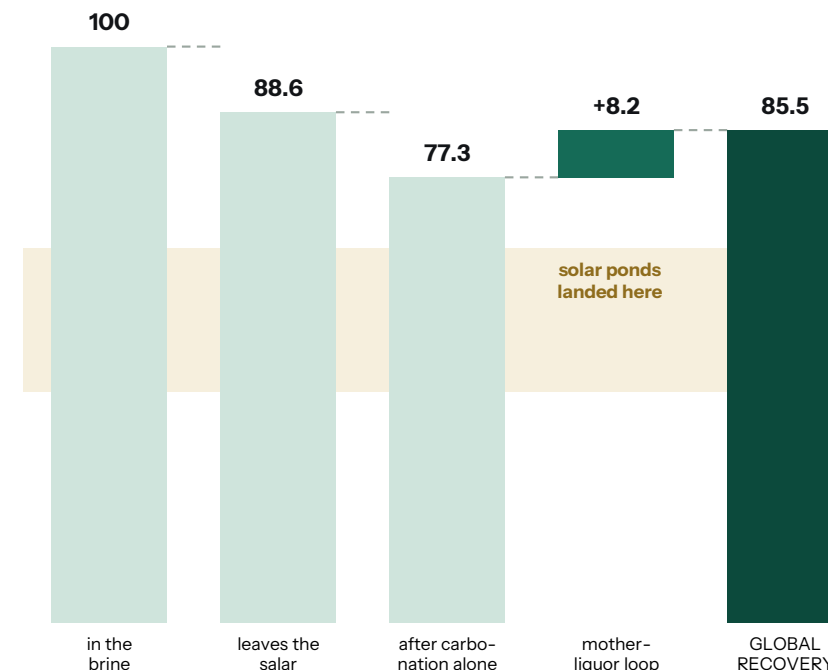


Exhibit 3 Where the lithium goes · % of feed



WHY THE TWO-PLANT SPLIT

PEOPLE

jobs and shift rosters at 370 m instead of 4,300 m

LOGISTICS

reagents in, product out, and nothing hauled back uphill

RISK

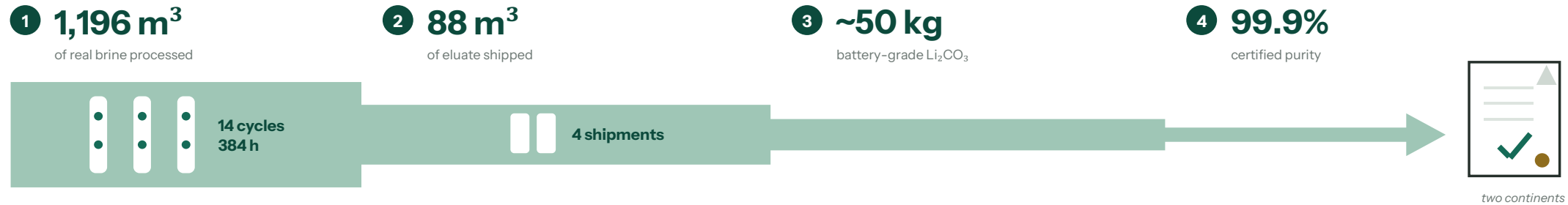
the delicate chemistry runs on sea-level oxygen

The salar bars come from the 2024 pilot and the supplier design basis; carbonation comes from the Conductive Energy trials. **Ponds land at 40 to 65 on this scale.**

85.5% of the wellhead lithium ships as product, about double a pond, and pilot data sits behind every loss.

Already proven on real brine

1,196 m³ of raw Laguna Verde brine has run through the full flowsheet, and the product was assayed on two continents.



SEMI-INDUSTRIAL PILOT · COPIAPÓ 2024

1,196 m³ of real brine, 14 cycles, 384 hours continuous, 1.085 t LCE out, plus 7.8 m³ over 10 cycles in the Santiago lab

ELUATE SHIPPED · 2024

four shipments of concentrated eluate sent to Conductive Energy in Chicago and Dallas

BATTERY-GRADE MADE

about 50 kg of Li₂CO₃ made at 87.2% stage recovery in an independent US facility

ASSAYED TWICE

Dorfner Anzaplan (Germany) returned 99.9%, and five 2026 batches came in at 99.68 to 99.91% (Benchmark, Houston)

Exhibit 4 Impurity rejection at pilot · verified Jan 2025 · axis 95 to 100%



Measured on real brine and verified by Dorfner Anzaplan. This is why the purification circuit stays simple.

TO BE PROVEN at DFS · work underway

→ slide 12

- 1 reinjection field trials: Zelandez engaged for the options study (Jul 26)
- 2 adsorbent life beyond 14 pilot cycles; re-tests now running
- 3 a second long-duration pump test to pair with LV06
- 4 85.5% recovery holding at demonstration scale



the 1 t/month pilot plant, Copiapó



battery-grade sample

The chemistry is proven on real brine; what the DFS still needs is a field season on the aquifer.

Every step already runs somewhere

The due diligence question is simple: is there a commercial plant running this step today? For every stage, the answer is yes.

THE STEP	WHO RUNS IT TODAY	SCALE / SINCE	WHY IT TRANSFERS
Alumina-sorbent DLE	Fenix, Hombre Muerto (Arcadium, now Rio Tinto)	continuous since 1998	the same sorbent chemistry Laguna Verde specifies, proven on an Andean brine for 28 years
DLE on ~250 mg/L brine	Lanke / Zangge at Qarhan salt lake, Qinghai	20+ years · Mg/Li ~400:1	Qinghai runs at ~250 mg/L with Mg/Li ~400:1 at first quartile cost, so a diluted, high impurity feed is not a barrier by itself
The adsorbent, Lanshen Li-201	the sorbent family reported in Koch's LSS at Standard Lithium SWA, plus a 1 kt Minmetals demo in 2021	8,000 m ³ supplier capacity	it is the exact consumable in the Laguna Verde flowsheet, with supply and design data in hand
Greenfield DLE at 4,000 m	Eramet Centenario, Argentina	Dec-24 start → 90% of nameplate Jun-26	Laguna Verde sits in the same altitude band, so Centenario's ramp is a live commissioning template
Wellfield & reserve modelling	Montgomery & Associates	Rincon, a 2.07 Mt reserve for Rio Tinto (Dec-24)	the Laguna Verde reserve is signed by the same competent person as Rincon's (M&A's Michael Rosko)
Membranes + IX behind DLE	Sunresin flowsheets, Chinese salt lakes	multiple commercial plants	Laguna Verde's purification train is the same pairing, already trialled on its own eluate
High-altitude LiCl trucking	POSCO Sal de Oro → Güemes refinery	operating Oct-24 · first profit reported Q2-26	Laguna Verde plans the same Andean haul, which POSCO has shown can run at a profit
Grid power via third-party BOOT	Chilean transmission market, Kachi-YPF Luz FEED	established contracting model	the BOOT line in the Laguna Verde plan uses a model Chilean counterparties already price

What is new is the combination: **this adsorbent, at this altitude, on this grade**, and the estimate already carries a 20% contingency for exactly that.

None of the hardware is experimental; the 20% contingency covers putting it all together at 4,300 m.

Grade explains less of the cost than you might think

Like for like only: greenfield DLE and hybrid brine projects, from PFS through early operation. Each grade is labelled with its basis.

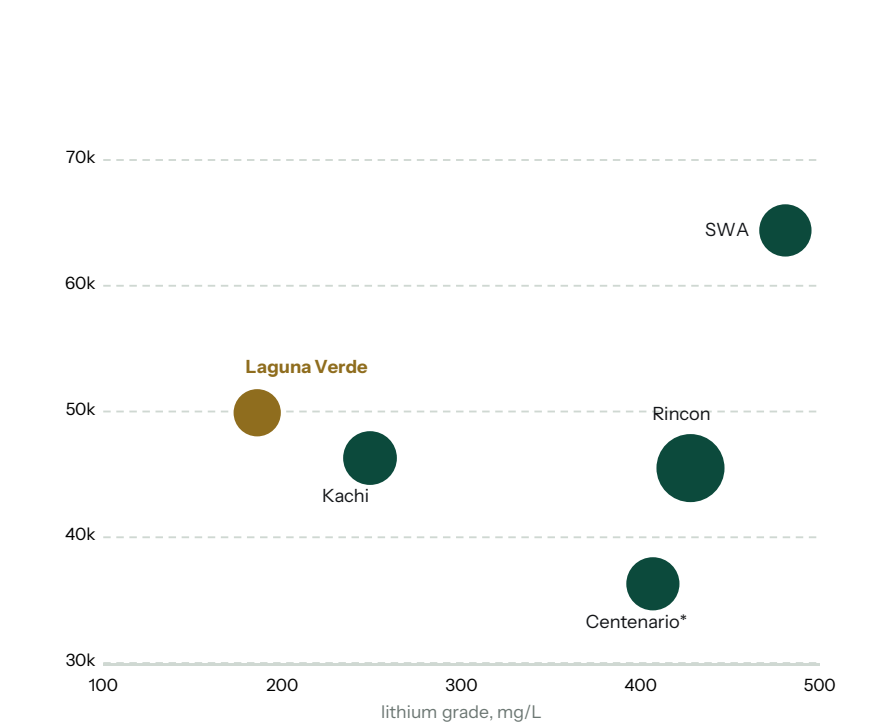
Exhibit 5 Comparable greenfield DLE brine projects

PROJECT	GRADE mg/L	TECHNOLOGY	ELEV m	ktpa LCE	CAPEX US\$/t	OPEX US\$/t	STATUS AUG-26
Laguna Verde	186 ^r	Lanshen adsorption	4,300	15	~49,900	5,768	PFS
SWA Smackover	481 ^d	Koch LSS	low	22.5	~64,400	5,924 ^a	DFS, pre-FID
Kachi	249 ^d	Lilac ion exchange	3,900	~25	~46,300	5,895	DFS, financing
Centenario	407 ^{rs}	Eramet alumina	4,000	24	~36,300 ^s	5.4 to 5.8k ^c	operating, 90% ramp
Rincon	428 ^{mi}	RT adsorption	3,700	53 to 60	~44 to 47,000	1st quartile	building and expanding
Tres Quebradas	n.d.	adsorption (Zijin)	4,100	20+40	n.d.	low	operating, ramping
Sal de Oro	n.d.	DLE + ponds (POSCO)	4,000	~48	n.d.	n.d.	profit Q2-26
Lionheart	174 to 181 ^r	VULSORB adsorption	low	~21	n.c. ^p	n.d.	building, €2.2bn closed

^r reserve · ^d plant design · ^{mi} measured and indicated resource · ^{rs} resource · ^s secondary source, not from the company · ^a all-in · ^c cash cost target · ^p the €2.2bn is a financing package that includes power assets, so it cannot be divided by capacity

LEADS ON lowest disclosed total opex · 2.4 wells per ktpa · 85.5% piloted recovery · simple brine
LAGS ON grade (186 mg/L) · scale (15 ktpa) · financing progress · elevation (4,300 m)

Exhibit 6 Grade vs capital intensity



SWA works 2.6× the grade yet carries 1.3× the capital intensity. Bubble size shows capacity.
*Centenario from secondary sources.

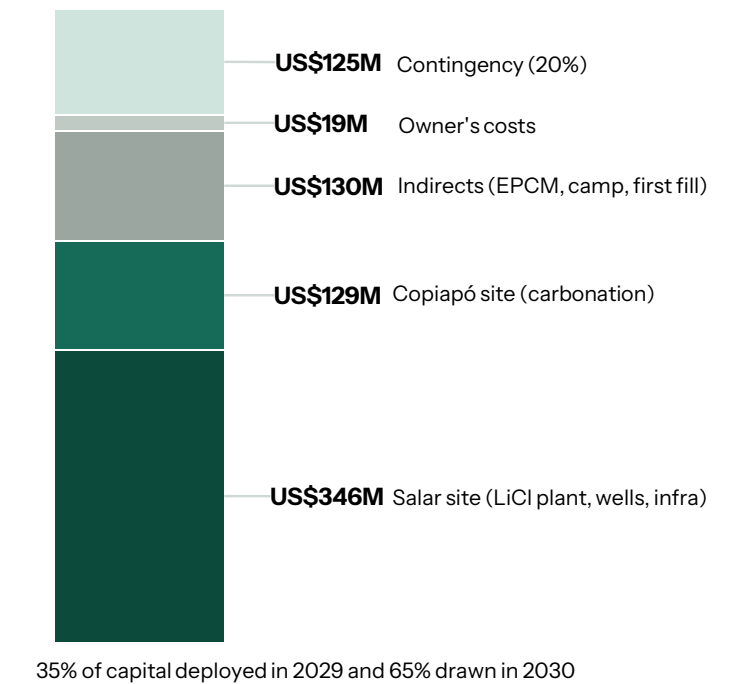
The market still values CTL at **US\$6.9/t of resource against a US\$27.3 peer median** (slide 13). Closing half that gap would more than double the market cap.

Smackover has 2.6× the grade yet 1.3× the capital intensity; impurities, energy and scale set cost too.

Where the money goes

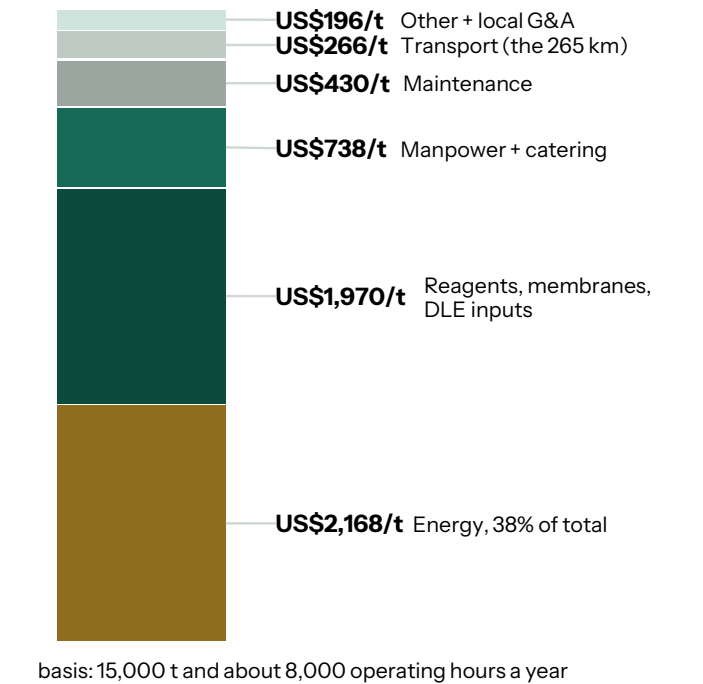
An AACE Class 4 estimate in Q4 2025 dollars, accuracy -30/+45%. The cost structure shows where the DFS can move the needle.

Exhibit 7 Capex, US\$748M installed



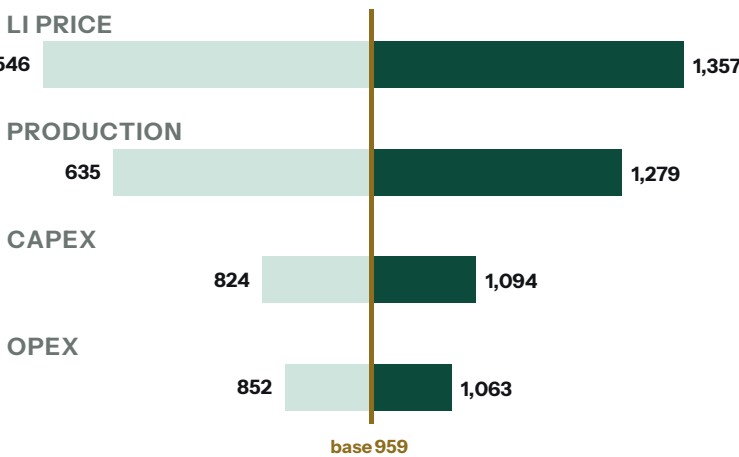
≈ US\$49,900/t of capital intensity, against a peer band of 36 to 64k. **The 220 kV line is excluded, as it is third-party BOOT.**

Exhibit 8 Opex, US\$5,768/t total



Energy means pumping, membranes and MVR at altitude; **that is where low grade shows up.** AISC is about US\$7.8k with royalties.

Exhibit 9 Post-tax NPV₈ at ±20% · US\$M



PRICE CHECK · AUGUST 2026

GFEX (China)	about CNY 151,500/t on 14 Aug 26, more than double the mid-2025 low
Global BG ref.	US\$22.47/kg, or about US\$22,470/t on 14 Aug 26 (CarbonCredits)
PFS deck	US\$22,500/t long term (Canaccord Nov-25), within 0.2% of spot
Royalties	about 6.1% of revenue all-in, an ad valorem rate banded by price (CEOL)

Energy is 38% of opex and the BOOT line covers only the electric half; what moves NPV most is price and volume.

The five numbers the DFS has to land

The DFS scorecard: five metrics, and the work programme already running against each

568 L/s

SUSTAINED WELLFIELD FLOW

Pump tests support well rates of up to 16 L/s; the 568 L/s case needs 36 wells to hold that rate long term



FOR THE DFS TO PROVE long-duration multi-well draw tests extending LV05/06

85.5%

GLOBAL RECOVERY

Missing the target by 10% cuts the NPV by about US\$160M



88.6% is design (pilot DLE was 88%); 96.5% is the carbonation plant design, supported by the Conductive Energy trials. The RNS calls 85.5% the optimistic case.

FOR THE DFS TO PROVE the chain holding at demonstration scale

4.6 g Li/kg

ADSORBENT WORKING CAPACITY

The pilot hit 3.5 g/kg against a 4.6 g/kg spec, which sizes the 300 columns and the US\$42.8M first fill



FOR THE DFS TO PROVE close the gap or re-size the first fill; re-test underway

0

REINJECTION FIELD TRIALS TO DATE

Zelandez engaged Jul 26 to define the programme; the trials must rule out short circuiting



FOR THE DFS TO PROVE injectivity trials that rule out short circuiting

13 MWh/t

ENERGY PER TONNE OF LCE

175,200 MWh/yr at the salar rests on the 220 kV third-party line; Copiapó (19,200 MWh/yr) draws the local grid, and LPG heat sits outside both



FOR THE DFS TO PROVE a binding BOOT term sheet, plus progress on renewables

late 2026

CEOL RATIFICATION · IN PROCESS

Decree signed 10 Mar 2026; the remaining step is administrative, in the Contraloría queue



NEXT MILESTONE ratification, which triggers the CCHEN licence and the EIA filing

Land these five numbers in the DFS and the low grade stops mattering; the work on each is already running.

Two near term catalysts close the gap

At US\$6.9 per resource tonne the market has priced in every downside and ignored the catalysts.

RISK	WHY IT MATTERS	WHAT STANDS AGAINST IT	OUR READ
Funding & partner	nothing is financed yet, and the PFS assumes 100% equity by convention	a live Cutfield Freeman process with parties under NDA in the data room; partner targeted by end-26	High
Permitting chain	CEOL → CCHEN licence → EIA (~12 m prep + ≥18 m review) → RCA	decree signed, baseline data banked since 2022, and an EIA co-design pact with indigenous communities	High
Aquifer & reinjection	one long-term pump test and no injectivity trials yet	a conservative model from Rincon's own competent person; Zelandez reinjection study now running	Medium
Plant & altitude execution	4,300 m build, thin air, and the 3.5 vs 4.6 sorbent loading gap	the two-plant split keeps about 70% of labour at 370 m instead of 4,300 m	Medium
Lithium price	sustained <US\$12k/t shelves the financing case	spot matches the US\$22,500 base within ~0.2%, and the price-banded royalty softens the downside	Medium

THE RUNWAY TO FIRST LITHIUM

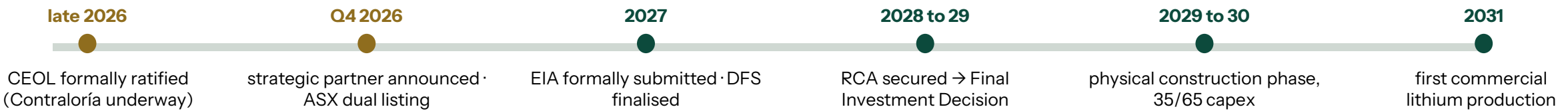
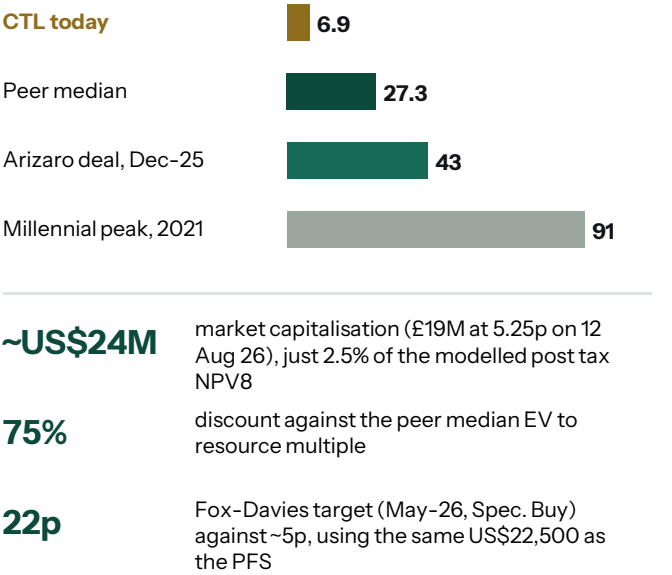


Exhibit 10 EV per resource tonne · US\$/t LCE



Two catalysts, CEOL ratification and a named partner, sit between a US\$24M market cap and a US\$959M NPV.

Source: Fox-Davies Capital initiation 13 May 2026 for the EV/t peer set and target; EV/resource on combined 2.82 Mt LCE (Laguna Verde + Viento Andino), Fox-Davies methodology, restated at the 12 Aug capitalisation (362M shares, 5.25p, £19.1M). Transactions as cited therein. Milestones from PFS RNS and company guidance. SP Angel Non-Independent Research · MiFID II Exempt.