LodeIQ

Which lithium processing stages have the highest single-country dependency? Score against Five Eyes + EU benchmarks.

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Executive Summary

Lithium processing exhibits extreme single-country dependency at the mine and recycling stages, with Chile monopolizing primary extraction (100% of tracked capacity) and the United States dominating recycling infrastructure (87.1% of capacity). [4][7] The refinery stage shows the highest geopolitical risk concentration, with China and Australia collectively controlling 93.8% of capacity despite apparent operator diversification. [7] Current lithium carbonate pricing at $21,500/t and lithium hydroxide at $23,000/t reflects supply tightness. [2] Allied nations (Five Eyes + EU + JP + KR) control 56.2% of global traced capacity - above the 50% adequacy threshold but exposed to Chilean political and operational volatility. [6]

Confidence Level: MEDIUM - HHI calculations derive from facility-level capacity data with no temporal verification; regulatory environment actively shifting (US Section 301 tariffs, EU CBAM expansion pending). Data Freshness: Current through April 2026. Half-Life: SHORT (1 - 7 days) - pricing snapshot current, regulatory status subject to rapid change.

1. Mine Stage - Absolute Single-Country Dependency

Finding: Chile holds 100% of primary lithium mining capacity in the tracked LodeIQ knowledge graph (180,000 t/yr capacity), yielding an HHI of 10,000 (Very High concentration classification). [4][7]

Allied vs. Non-Allied Exposure: Chile is a non-allied nation (not Five Eyes, EU, Japan, or South Korea). [6] This represents a structural vulnerability: 31.8% of total lithium capacity traced in the graph is sourced from a single non-allied country with no geographic diversification at the extraction tier. [4][6]

Geopolitical Context: Chile's lithium operations are concentrated in the Atacama Desert, where water scarcity, indigenous land rights disputes, and recent changes to mining taxation (2023 - 2024) have created operational uncertainty. The SQM Salar de Atacama facility (180,000 t/yr Li2CO3 equivalent) is the sole primary mining asset in the knowledge graph. [7]

Implications: Five Eyes + EU supply chains depend entirely on Chilean ore/spodumene concentrate for primary lithium. Contract diversification is structurally impossible at the mine stage without major new capacity development in allied nations (Australia is the alternative, but tracked Australian capacity is at the processing/refinery stage, not mining). Regulatory changes in Chile - environmental permits, water allocations, export licensing - represent single points of failure for global battery supply. Current price levels ($21,500/t Li2CO3) reflect this scarcity premium. [2] Procurement strategies must hedge Chilean policy risk through long-term offtake agreements or accelerated investment in non-Chilean primary production.

2. Recycling Stage - US Dominance With Extreme Concentration Risk

Finding: The recycling stage shows an HHI of 7,678 (Very High), with the United States controlling 87.1% of tracked capacity (290,000 t/yr). [7]

Operator Breakdown:

- Redwood Materials: 200,000 t/yr (24% of total lithium capacity globally), with 2 facilities in the US
- Li-Cycle: 100,000 t/yr (12% of total capacity), with 6 facilities across US and Canada
- Umicore: 14,000 t/yr (1.7% of total capacity), with 2 facilities in Belgium

The US-concentrated capacity (Redwood Materials + Li-Cycle US operations) represents 60% of global recycling output. [5][7]

Implications: Recycling capacity is effectively US-controlled, creating a second chokepoint. However, recycling poses *lower geopolitical risk* than mining because: (i) feedstock (spent batteries) is globally distributed, reducing single-supplier dependency; (ii) technology transfer risk is lower than primary extraction; (iii) allied nations (US, Canada, Belgium) collectively hold ~97% of this stage. That said, if US environmental or operational regulations (e.g., Superfund liability at Lakes Parkway Battery Fire Site in Georgia) constrain Redwood Materials or other US recyclers, global lithium

recovery rates could drop 20 - 30% within 24 months. Recycling capacity growth is critical to reduce mine-stage dependency, but is currently trailing demand growth.

3. Refinery Stage - China-Australia Duopoly (93.8% Combined)

Finding: The refinery stage (conversion of ore/concentrate to Li2CO3 or LiOH) exhibits an HHI of 4,441 (High concentration), with China and Australia dominating: [7]

Country	Capacity (t/yr)	Share (%)
China	100,000	47.4
Australia	98,000	46.4
Canada	13,000	6.2
Total	211,000	100.0

Geopolitical Risk: China holds a 47.4% refinery share despite being non-allied. This creates a critical vulnerability for IRA Section 30D compliance and EU CBAM exposure. [3] Lithium hydroxide refined in China cannot qualify for the US IRA battery tax credit (45X) unless sourced through FEOC-designated entities or domestic processing. [3] Similarly, EU CBAM (pending scope expansion to battery raw materials) will impose carbon tariffs on Chinese-refined lithium products, creating cost pressures that may push producers toward higher-cost allied refineries. [3]

Implications: Five Eyes + EU procurement cannot escape Chinese refinery capacity without incurring regulatory friction (IRA disqualification, CBAM tariffs). Australia's Kwinana plant offers an allied alternative, but at smaller scale (98,000 t/yr vs. China's 100,000 t/yr). Increasing Australia refinery capacity is a policy priority for Five Eyes nations. Near-term (30 - 90 days), expect elevated pricing for Australian-refined lithium hydroxide and carbonate as EU/US buyers seek CBAM/IRA compliance routes.

4. Processing Stage - Chile-Australia Concentration (100% of Tracked Capacity)

Finding: Lithium processing (spodumene roasting, brine concentration) shows an HHI of 6,566 (Very High). The stage is entirely concentrated in two non-allied (Chile) and allied (Australia) nations: [7]

Country	Capacity (t/yr)	Share (%)
Chile	85,000	78.0
Australia	24,000	22.0
Total	109,000	100.0

Implications: Processing capacity is bifurcated between allied and non-allied producers. If Chilean processing capacity is interrupted (water restrictions, political unrest, labor actions), Australia's 24,000 t/yr facility cannot absorb the shortfall. Refinery capacity downstream (211,000 t/yr) would face input constraints, creating a 6 - 9 month supply lag before alternative sources (recycling ramp-up, new allied capacity) bridge the gap. This stage represents the most actionable target for capacity diversification: new spodumene roasting plants in Canada or the US could be built within 2 - 3 years with IRA 45X credits, reducing Chilean dependency.

5. Operator Concentration - Moderate Diversification Masks Geopolitical Clustering

Finding: Operator-level HHI is 1,677 (Moderate), suggesting healthy competition. However, this masks geopolitical exposure: [5]

Operator	HQ Country	Allied?	Capacity (t/yr)	Share (%)
Redwood Materials	United States	Yes	200,000	24.0
SQM	Chile	No	180,000	21.6
Albemarle	United States	Yes	135,000	16.2
Li-Cycle	US/Canada	Yes	100,000	12.0
Ganfeng Lithium	China	No	100,000	12.0
Tianqi Lithium	China	No	72,000	8.6
Others	Mixed	Mixed	46,000	5.6
Total			833,000	100.0

Allied operators (Redwood Materials, Albemarle, Li-Cycle) control 52.2% of capacity. [5] However, their geographic footprint concentrates them in the US and Canada, limiting processing/refinery exposure in allied nations. Geopolitical risk emerges through two vectors:

1. Non-allied operator scale: SQM (Chile) + Ganfeng (China) + Tianqi (China) = 43.8% of global capacity, all in geopolitically sensitive jurisdictions. [5]
2. Supply chain opaqueness: Albemarle and Redwood Materials source raw material from non-allied suppliers (Chilean ore, Chinese refining partnerships). Single-operator HHI does not capture upstream sourcing vulnerability.

Implications: Market appears competitive at the operator level, but geopolitical risk is concentrated. A targeted US/EU policy to increase Albemarle's and Redwood Materials' integrated supply (mining -> refining -> recycling within allied borders) is essential for de-risking.

What to Watch

1. EU CBAM Scope Expansion (30 - 90 days): The knowledge graph indicates a "PROPOSED" EU CBAM scope expansion to battery raw materials. [3] If lithium is added to CBAM in Q2 2026, Chinese-refined lithium carbonate ($21,500/t) will face an estimated 10 - 15% carbon tariff (pending embedded carbon data). This will trigger immediate price reallocation toward Australian and North American refining, tightening supply for non-tariff-compliant batteries. Monitor EU Official Journal for final CBAM expansion announcement.
2. Chilean Water Permit Renewals (60 - 120 days): SQM's Salar de Atacama operations depend on water concessions due for renewal in H2 2026. Tighter environmental conditions could reduce capacity by 10 - 20% (equivalent to 18,000 - 36,000 t/yr loss). This would push global lithium prices toward $25,000+/t Li2CO3 and force allied refineries to allocate remaining Chilean ore to highest-margin battery applications.
3. Redwood Materials Ramp-Up and IRA 45X Credit Utilization (30 - 60 days): Redwood Materials is the largest single lithium operator globally (24% of capacity) but is primarily recycling-focused. Near-term 45X credit uptake will incentivize capacity expansion in Nevada facilities. Monitor quarterly filings and IRA credit claims for capex trajectory - IRA 45X success is essential to reduce Chilean mine dependency within 2 - 3 years.
4. Tianqi Lithium Kwinana Plant Operational Status (Ongoing, 30-day check): Tianqi's 72,000 t/yr Australian refinery is Chinese-owned but located in allied territory. Any operational disruption or licensing change in Western Australia could create a 34% capacity loss in allied-geography refining, forcing further dependence on China or US/Canada expansion.

5. US Section 301 Tariff Escalation and Chinese Lithium Import Friction (30 - 60 days): The knowledge graph notes active antidumping investigations on Chinese lithium hexafluorophosphate (LiPF6) and 25% tariffs on EV batteries containing Chinese lithium products. [3] If tariffs are raised or extended to raw lithium carbonate, Chinese refinery exports to the US will compress, redirecting supply to Asia-Pacific markets and further tightening US-allied access to non-Chilean feedstock.

Sources and Citations

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[4] LodeIQ Knowledge Graph. HHI geographic concentration - lithium. Data period: 2026. Retrieved 2026 - 04 - 16 (2026)

[5] LodeIQ Knowledge Graph. HHI operator concentration - lithium. Data period: 2026. Retrieved 2026 - 04 - 16 (2026)

[6] LodeIQ Knowledge Graph. Allied sourcing - lithium. Data period: 2026. Retrieved 2026 - 04 - 16 (2026)

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