

Governing the Lithium Triangle: Fiscal Regimes, Industrial Policy and Regional Coordination in Chile, Bolivia and Argentina

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Agenda

- Introduction
- Global demand, concentration and current state of lithium production
- Fiscal and Institutional Regimes: Design, Trade-offs and Binding Constraints
- Environmental and social risk as macro-fiscal constraints
- Diversification pathway and green industrial policy strategy
- Closing remarks



Lithium triangle: Chile, Argentina and Bolivia



The Lithium Triangle, spanning Chile, Argentina and Bolivia, holds over half of global lithium resources, but recent price volatility and intensifying geopolitical competition over battery supply chains have exposed the fragility of revenue projections built on optimistic demand assumptions.

Chile

Hybrid model combining state-owned enterprise majority control with private operators

Argentina

Decentralised, low fiscal-take regime anchored in subnational ownership

Bolivia

State-led extraction with limited production to date.

Source: S&P Global Commodity Insight, S&P Global Capital IQ



Why this matters now

Energy transition

EV sales grew from thousands to millions of units since 2010 → lithium shifted from niche input to the strategic mineral

Market value

50%+ of global resources → prices swinging from \$8,100 to \$72,000 + per tonne in just four years

Long-term growth

Fiscal design + diversification + timing → **durable growth** that outlasts the extraction window

Avoid extractivism

Commodity dependence: Raw lithium exports only → refining, batteries and EVs captured elsewhere



Four questions guiding this report

- 1) How do current fiscal regimes shape long-term value creation and risk exposure in each country?
- 2) How do environmental and social constraints function as binding macro-fiscal parameters that cap sustainable revenue trajectories?
- 3) What would coordinated fiscal governance across the Triangle deliver, and at what political cost?
- 4) Which adjacent sectors offer realistic diversification pathways if lithium revenues are strategically deployed?

This paper use comparative political economy, macro-fiscal scenario analysis, and the Economic Complexity Index framework to answer these four interconnected questions

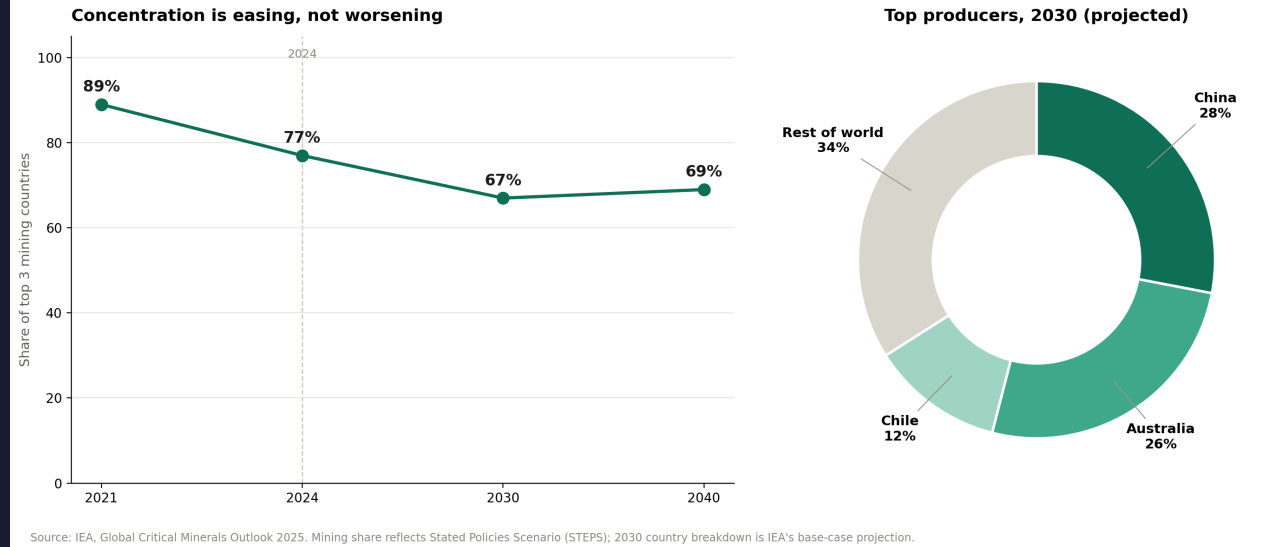


Global demand, concentration and current state of lithium production

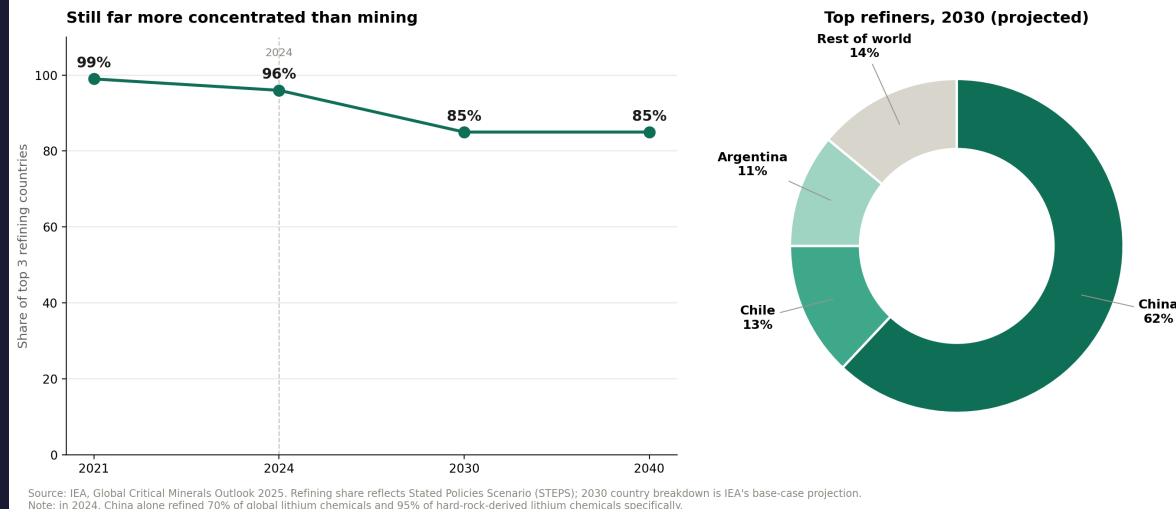
Mining is diversifying

- Top-3 share falling: 89% → 77% → 67% by 2030 (Zimbabwe, Namibia, Mali, Argentina, Bolivia, Brazil, US, Canada)
- China (28%), Australia (26%), Chile (12%) lead, but no single country dominates
- **Lithium is the exception: most critical minerals are getting more concentrated, not less**

Lithium mining: geographic concentration, 2021-2040



Lithium refining: geographic concentration, 2021-2040



Refining tells a different story

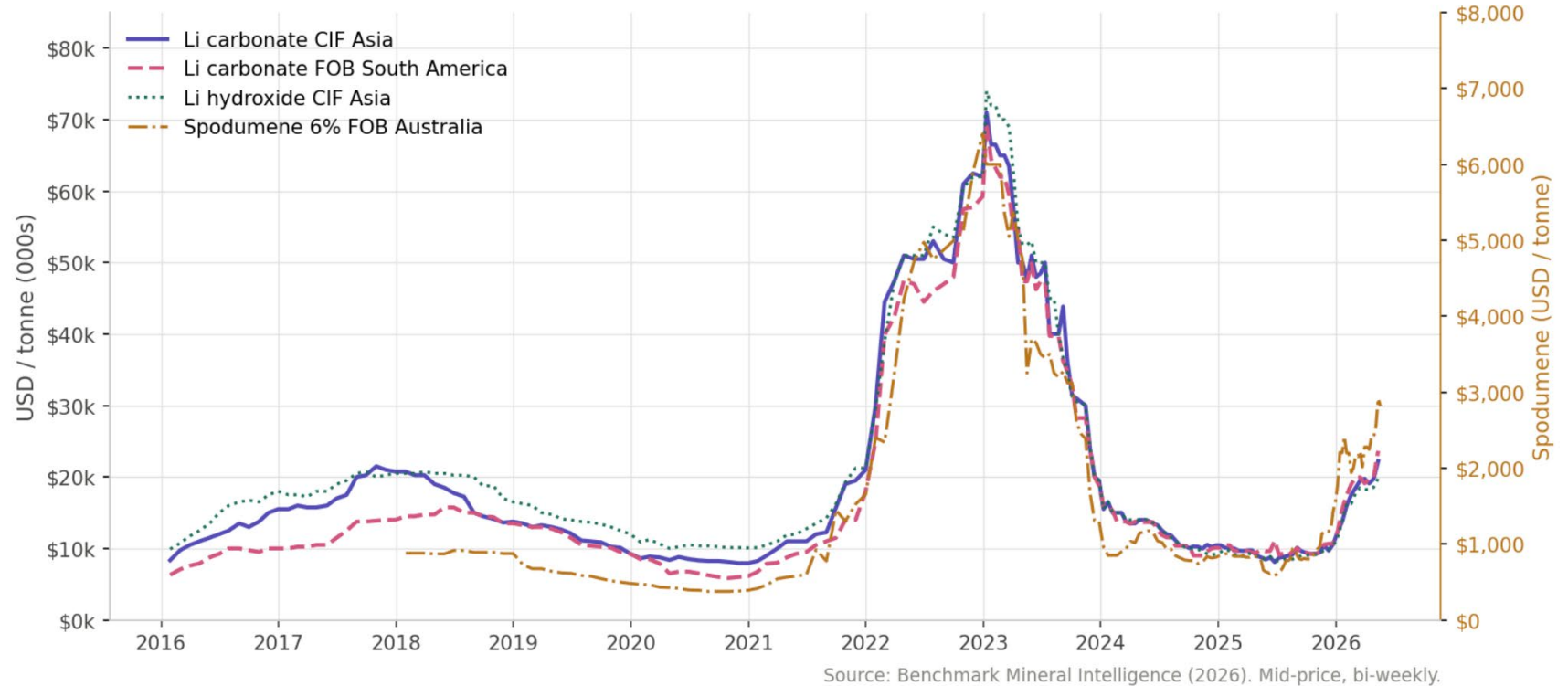
- Top-3 share stays **high**: 96% → 85%, barely moving after 2030
- **China alone refines 70%** of lithium chemicals today, **95%** for hard-rock lithium specifically
- **The real bottleneck isn't digging it up, it's processing it**



Global demand, concentration and current state of lithium production

The decisive change in lithium global demand has been driven primarily by the global expansion of electric vehicles

Figure 1. Lithium price dynamics, 2016–2026



Source: Benchmark Mineral Intelligence (2026). USD/tonne, mid-price, bi-weekly. Left axis: lithium carbonate (min 99.2%) and lithium hydroxide (min 56.5%), CIF Asia; lithium carbonate (min 99.0%) FOB South America. Right axis: spodumene 6% FOB Australia.



Global demand, concentration and current state of lithium production

Three scenarios:

Sustained

EV growth continues at today's pace → prices hold steady

Growth

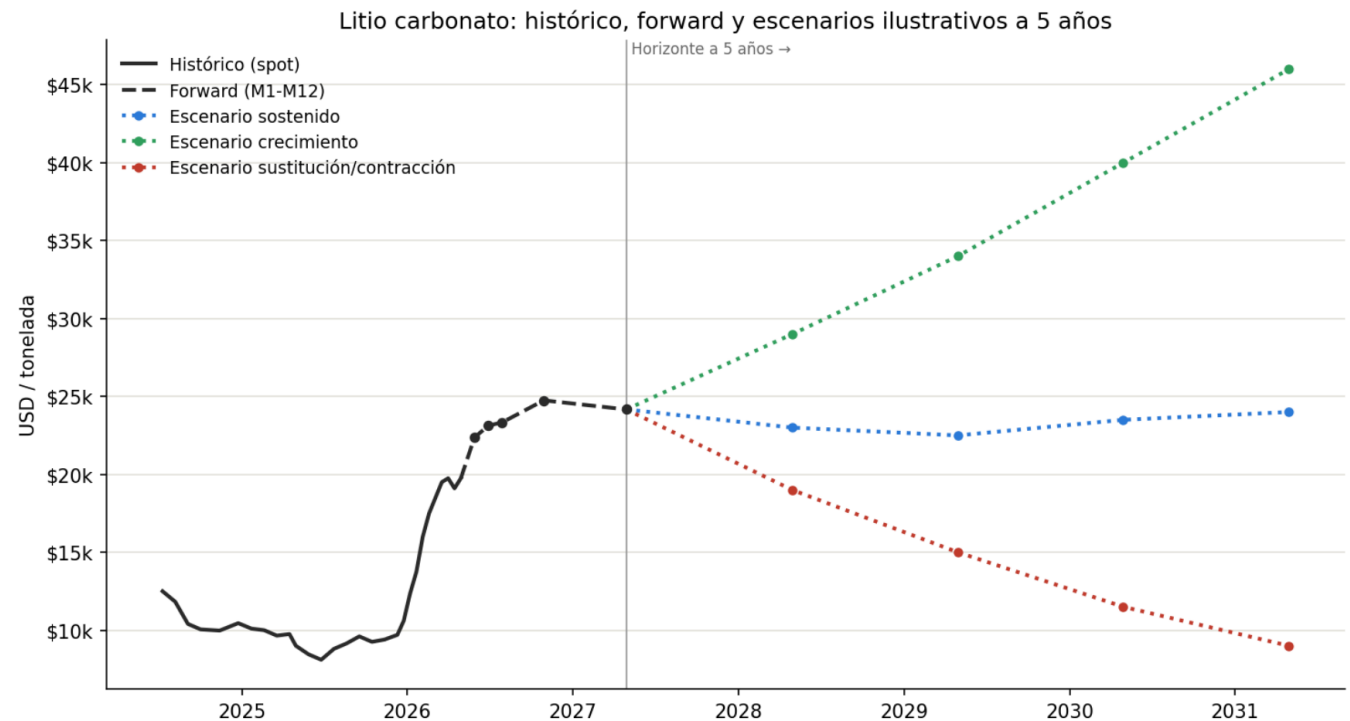
Decarbonization speeds up, demand outpaces supply → prices recover

Substitution

Sodium-ion batteries get cheap enough to compete → prices stay low for good



Figure 2. Lithium carbonate: historical price, forward curve, and illustrative five-year scenarios



Escenarios ilustrativos basados en relatos de demanda de BNEF, IEA (NZE) y US DOE — no son un pronóstico de precio.

Note: the three scenario lines from 2027 onward are illustrative trajectories consistent with the qualitative demand narratives in Table 1, not a price forecast. Source: Benchmark Minerals Intelligence (historical and forward curve); scenario paths authors' own illustration.

Global demand, concentration and current state of lithium production

All three scenarios agree lithium demand will grow a lot — they just disagree on **how fast the world moves toward clean energy**.

STEPS — "business as usual"

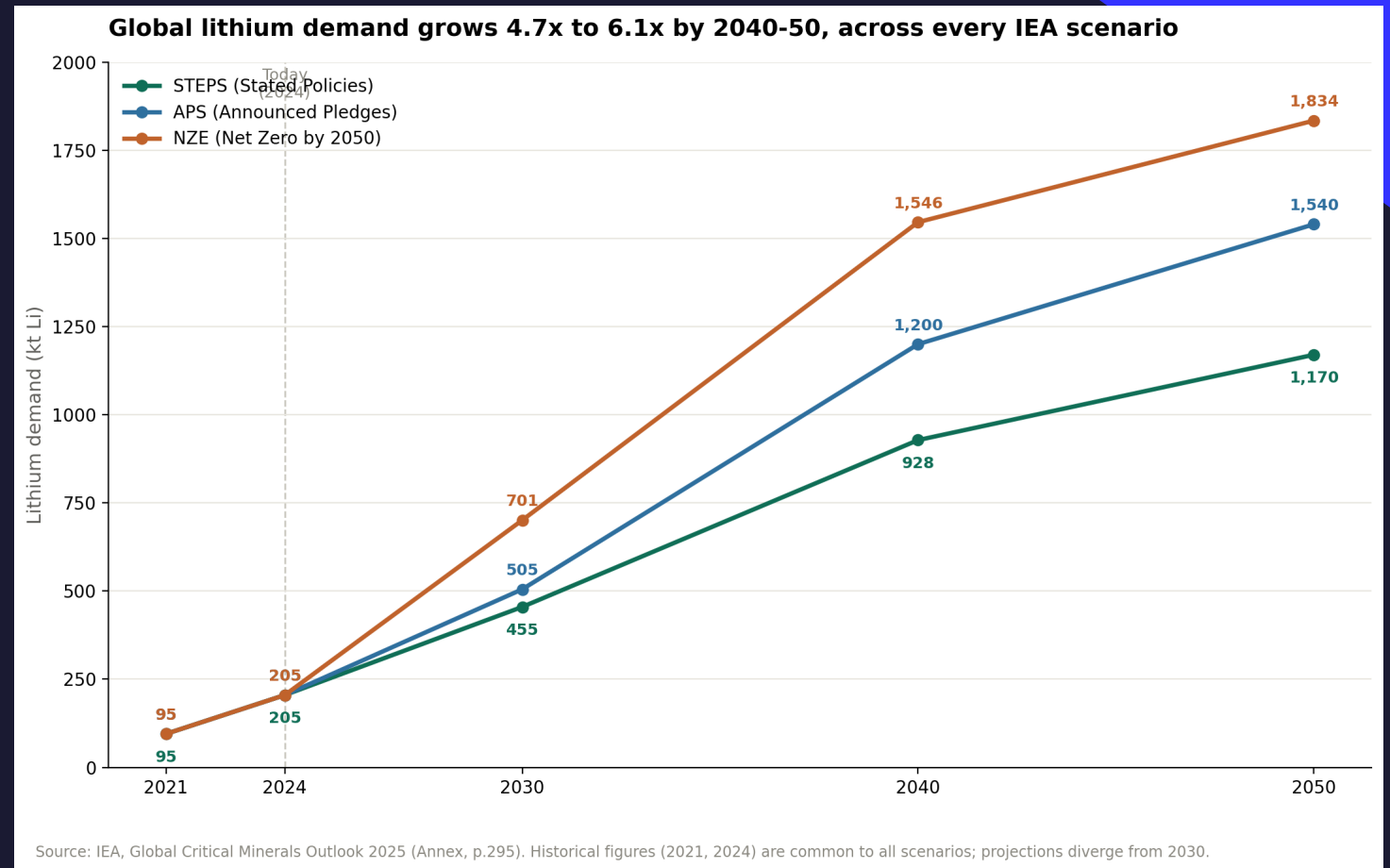
Governments keep the climate policies they've *already put in place today*, nothing more. Demand still grows nearly 5x just from EVs and batteries already in motion.

APS — "promises kept"

Assumes every country actually *delivers* on the climate pledges/targets it has *announced* but hasn't fully legislated yet. Faster EV adoption and more battery storage push demand higher

NZE — "on track for net zero by 2050"

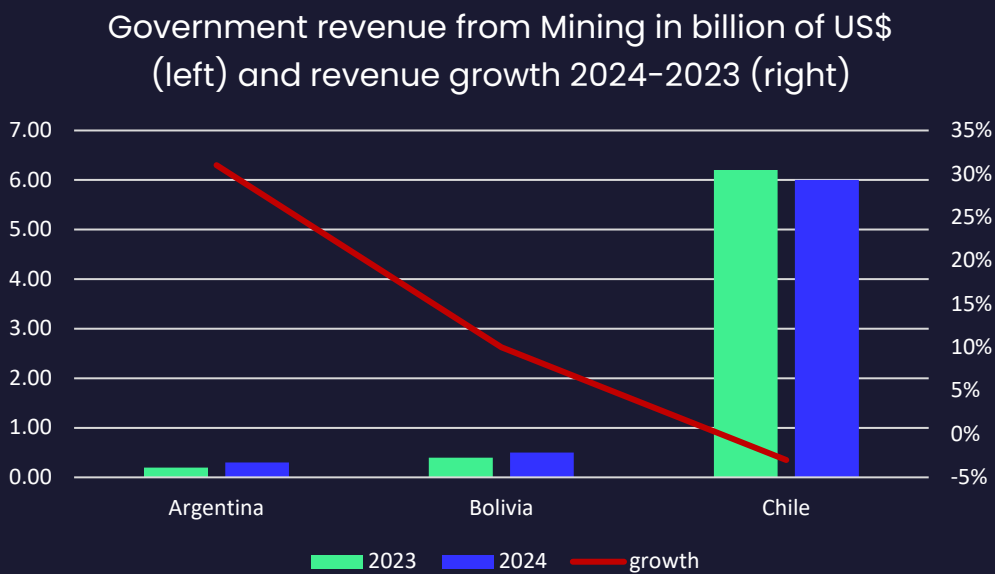
The most ambitious path: what would need to happen for the world to hit net-zero emissions by 2050. This requires the fastest possible EV and clean-energy rollout, so lithium demand grows the most



Fiscal and Institutional Regimes: Design, Trade-offs and Binding Constraints

Fiscal regime

Fiscal instrument for extracting industries: Corporate Income Tax (CIT), royalties, signature bonus, state participation, Variable Income Tax (VIT), Resource rent taxes, etc



Tax Revenue and non-Tax Revenue from Mining as percentage of GDP in Chile, Bolivia and Argentina in 2023 - 2024

	Total Revenue		Tax Revenue		Non-Tax Revenue	
	2023	2024	2023	2024	2023	2024
Argentina	0.03	0.04	0.02	0.02	0.01	0.02
Bolivia	0.97	1.03	0.44	0.47	0.54	0.56
Chile	1.84	1.81	0.9	1.18	0.94	0.63



How divergent regime designs could generate different revenue trajectories and incentive structures, even when countries face similar commodity price cycles such as lithium

Fiscal and Institutional Regimes: Design, Trade-offs and Binding Constraints

Fiscal instrument comparison in Chile, Bolivia and

	Chile	Bolivia	Argentina
Royalty rates	Standard withholding tax rates, corporate tax statistics for royalties is 30%	Mining royalties at a rate of between 1% and 7% depending on the kind of mineral and calculated on the total sales price. 60% discount on the rates of mining royalties if minerals are sold within the Bolivian market	3% rate royalties' cap Royalties determined by the regulations of the jurisdiction where the mine is located
Corporate income Tax (CIT) structures	CIT statutory at 27% and targeted small business rates is 25% that called First Category Tax (FCT) - New FCT reduction for SME to 12.5% for 2025, 2026, and 2027 and 15% for 2028. - Effective tax rates corporate tax statistics in 2025 is 23.44%	CIT at 25% for all companies - Additional 25% CIT that affects only extractive activities of non-renewable natural resources (mining and oil/gas) - Additional tax for all mining companies on the taxable net profits, at 12.5% if the mining company carries out exploitation activities or 7.5% if the mining company carries out manufacturing activities with raw minerals that add value. - Effective tax rates corporate tax statistics in 2025 is 26.6%	CIT rate differ on taxable income level such as 25% for (0-133M ARS) 30% (133M – 1.3B ARS), and 35% for income above 1.3B ARS. - Effective tax rates corporate tax statistics in 2025 is 32.35%
State participation mechanism	State-led public-private model	Solely managed by state-owned companies	Permits private ownership, exploration, development and production

Takeaway:

- CIT & Royalties is a core component of extractive industry fiscal regimes
- Beyond policy rate, tax administrative capacity also plays significant role for the revenue collection performance for the country.
- Design choice for developing countries also often influenced by sovereignty over resource where existing industries are fully nationalised or the extracting industry dominated by State Owned Enterprise (SOE) operation both in national and subnational level.



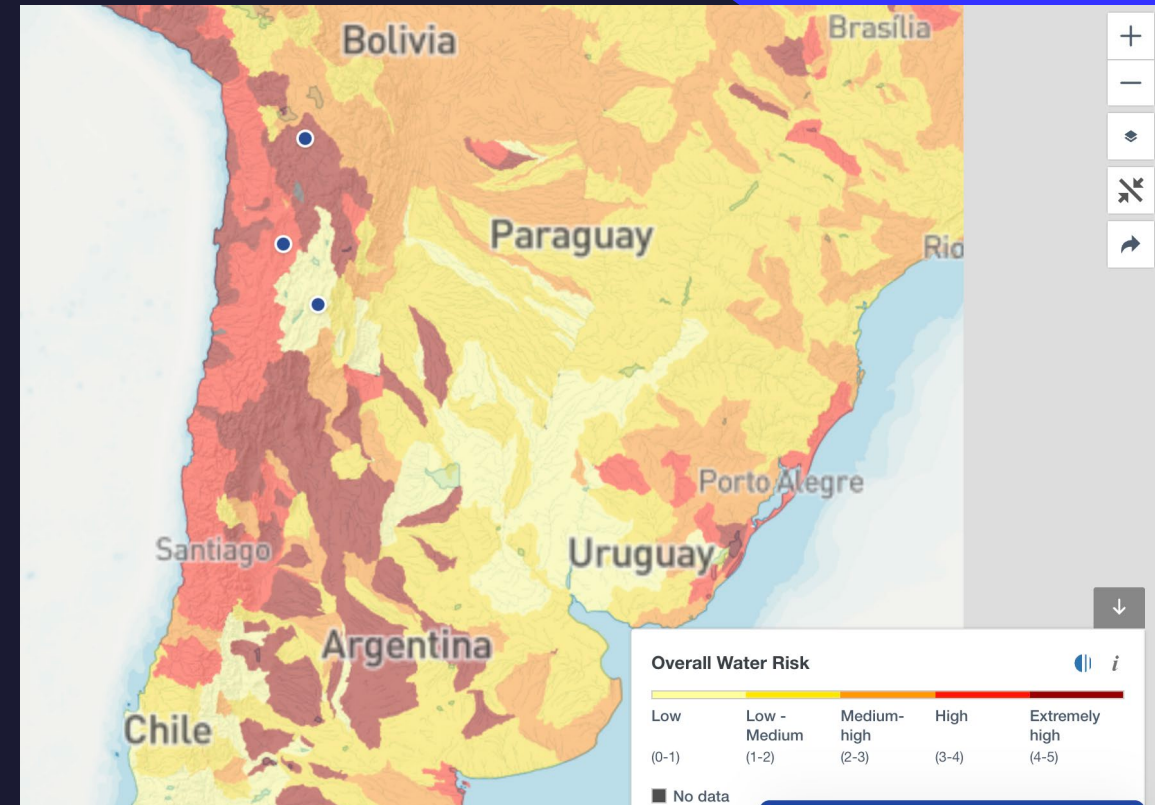
Environmental and social risk as macro-fiscal constraints

Water stress isn't a side issue, it's a fiscal deadline

- **Water:** All three basins face severe stress, Atacama and Uyuni are already at the limit.
- **Technology:** Chile and Argentina are adapting (DLE); Bolivia isn't.
- **Stakes:** This sets the clock on how long lithium revenue can actually last, and Bolivia's clock is running out fastest.

Why this matters for the fiscal story

- Water caps how long each country's fiscal regime, can keep generating income.
- **Bolivia is most exposed:** no DLE + worst water stress = its fiscal outlook is shaky both because the numbers are hidden *and* because the water may not last.



Source: WRI, Aqueduct Water Risk Atlas.



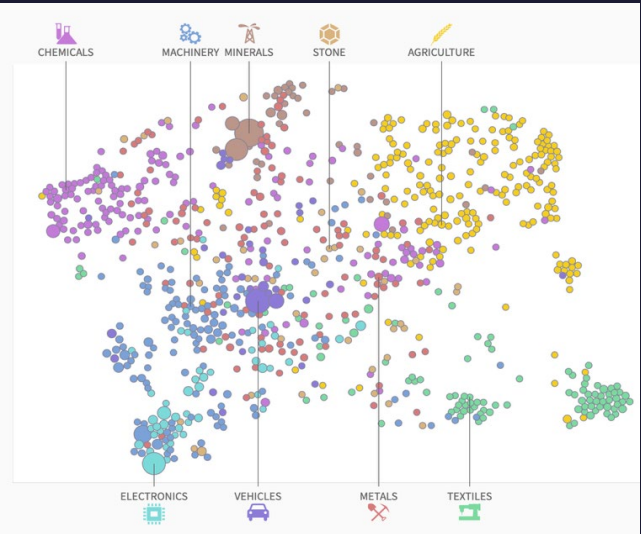
Diversification pathway and green industrial policy strategy

This chapter identify realistic diversification pathways for each country if lithium revenues are strategically deployed.

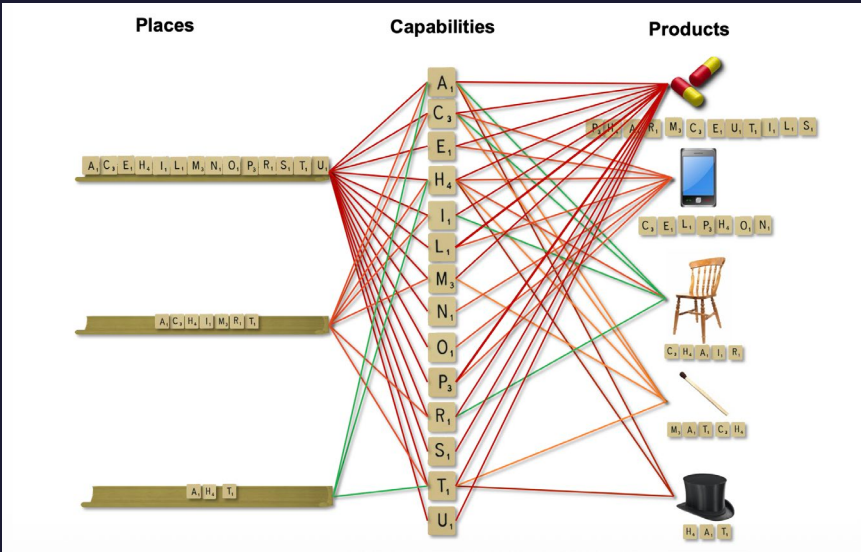
The analysis draws on two complementary tools from the Growth Lab at Harvard University: the Atlas of Economic Complexity (Hausmann et al., 2011), which provides product-space proximity measures and revealed comparative advantage data; and the Greenplexity tool (Growth Lab, 2024), which applies complexity thinking specifically to green economy sectors

Economic Complexity Analysis

Product space



The scrabble theory of economic development



Product Complexity Index (PCI): measures how complex and ubiquitous are the products that made by the country that makes the product.

From market share to Revealed Comparative Advantage (RCA)

share (%)	Wheat	Textiles	Motorcycles	Cell phones	Total exports
Country A	2.2%	8.9%	22.2%	66.7%	100.0%
Country B	57.7%	38.5%	3.8%	0.0%	100.0%
Country C	9.0%	90.5%	0.5%	0.0%	100.0%
World	19.3%	36.5%	11.9%	32.2%	100.0%

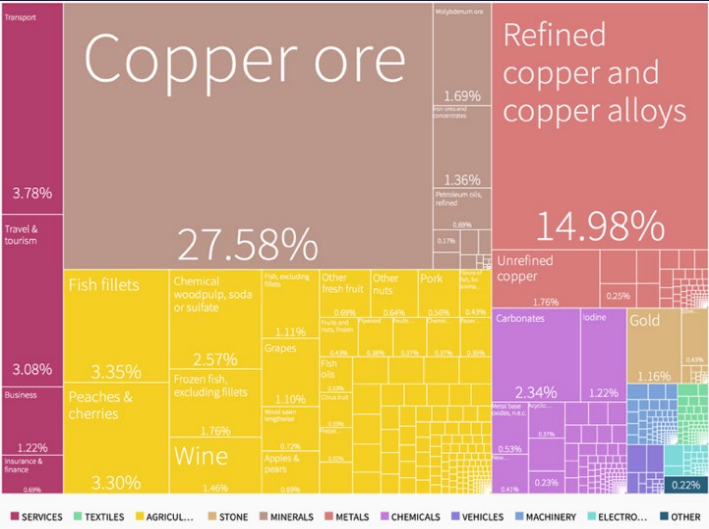
RCA	Wheat	Textiles	Motorcycles	Cell phones
Country A	0.11	0.24	1.87	2.07
Country B	2.99	1.05	0.32	0
Country C	0.47	2.48	0.04	0

RCA captures the extent to which a country is good at making a product.

$$RCA_{c,p} = \frac{\text{Country } c\text{'s fraction of exports in Product } p}{\text{World fraction of exports in Product } p}$$
$$= \frac{\text{Country } c\text{'s share in world exports of Product } p}{\text{Country } c\text{'s share Global exports}}$$

Diversification pathway – Chile

Export basket 2024



Rank	Product	Export (million US\$)
1	Copper ore and concentrates; copper matte; cement copper	\$28,872.27
2	Copper and copper alloys, refined or not, unwrought	\$17,589.61
3	Fruit, fresh or dried, nes	\$4,425.10
4	Fish, frozen, excluding fillets	\$2,884.00
5	Chemical wood pulp, soda or sulphate	\$2,703.05
6	Metallic salts and peroxy salts of inorganic acids	\$2,376.79
7	Ores and concentrates of other non-ferrous base metals	\$1,789.59

Product with highest RCA

Rank	Product	RCA	Market share
1	Natural sodium nitrate	79.7	34.0%
2	Copper ore and concentrates; copper matte; cement copper	62.7	29.3%
3	Fish fillets, fresh or chilled	41.2	18.2%
4	Copper and copper alloys, refined or not, unwrought	38.2	17.9%
5	Grapes, fresh or dried	21.8	10.1%

Product with highest PCI

Rank	Product	PCI	Export (\$)
1	Sound recording tape, discs	1.6	2,398,130
2	Sulphonamides, sultones and sultams	1.6	79,872
3	Analogue and hybrid data processing machines	1.5	2,011
4	Photographic and cinematographic apparatus and equipment, nes	1.5	2,559,464
5	Hormones, natural, or reproduce by synthesis, in bulk	1.5	99,263

highest-market-share complex products (PCI > 1)

Rank	Product	Rank market share	Global market share	Rank PCI	PCI	Export value (\$)
1	Halogen and sulphur compounds of non-metals	97	0.5%	89	1.0	4,679,483
2	Baby carriages and parts thereof, nes	148	0.2%	91	1.0	4,256,771
3	Inorganic esters, their salts and derivatives	180	0.1%	22	1.3	3,123,063
4	Radio receivers for motor-vehicles	218	0.1%	40	1.2	5,088,984
5	Electric shavers and hair clippers, parts thereof, nes	253	0.1%	20	1.3	3,548,674

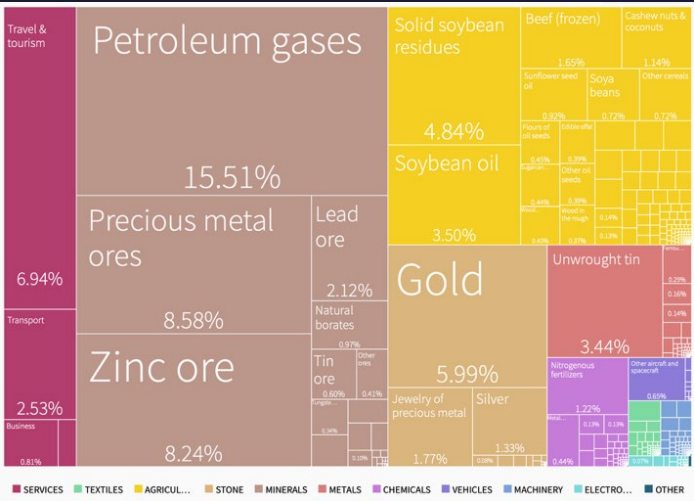
Takeaway:

Chile's highest-market-share complex products (PCI > 1) include halogen and sulphur compounds, baby-carriage components, inorganic esters, and electric shavers, a mixed basket where individual product lines matter less than the broader clusters they belong to: chemicals and light manufacturing.

Combined with copper's continued dominance of the export basket, this indicates real but narrow existing capability outside mining and agriculture.

Diversification pathway – Bolivia

Export basket 2024



Rank	Product	Export (million US\$)
1	Petroleum gases, nes, in gaseous state	\$1,629.96
2	Ores and concentrates of precious metals, waste, scrap	\$921.34
3	Zinc ores and concentrates	\$886.07
4	Gold, non-monetary (excluding gold ores and concentrates)	\$644.12
5	Oilcake and other residues (except dregs)	\$539.95
6	Soya bean oil	\$373.46
7	Tin and tin alloys, unwrought	\$367.92

Product with highest RCA

Rank	Product	RCA	Market share
1	Hat shapes, hat-forms, hat bodies and hoods	311.1	13.6%
2	Zinc ores and concentrates	225.8	8.3%
3	Tin and tin alloys, unwrought	178.4	6.6%
4	Tin ores and concentrates	129.5	4.6%
5	Ores and concentrates of precious metals, waste, scrap	119.0	4.4%

Product with highest PCI

Rank	Product	PCI	Export (\$)
1	Sound recording tape, discs	1.6	149,906
2	Photographic and cinematographic apparatus and equipment, nes	1.5	35,999
3	Printed circuits, and parts thereof, nes	1.4	1,863
4	Other machines-tools for working metal or metal carbides, nes	1.4	2,518
5	Counting devices non-electrical; stroboscopes	1.4	28,038

highest-market-share complex products (PCI > 1)

Rank	Product	Rank market share	Global market share	Rank PCI	PCI	Export value (\$)
1	Printing presses	146	0.0%	99	1.0	233,491
2	Oxygen-function acids, and their derivatives	180	0.0%	75	1.1	1,296,514
3	Pianos, other string musical instruments	183	0.0%	62	1.1	48,036
4	Parts, nes of the pumps and compressor falling within heading 7431	194	0.0%	78	1.1	281,762
5	Machines for extruding man-made textile; other textile machinery	205	0.0%	82	1.1	86,542

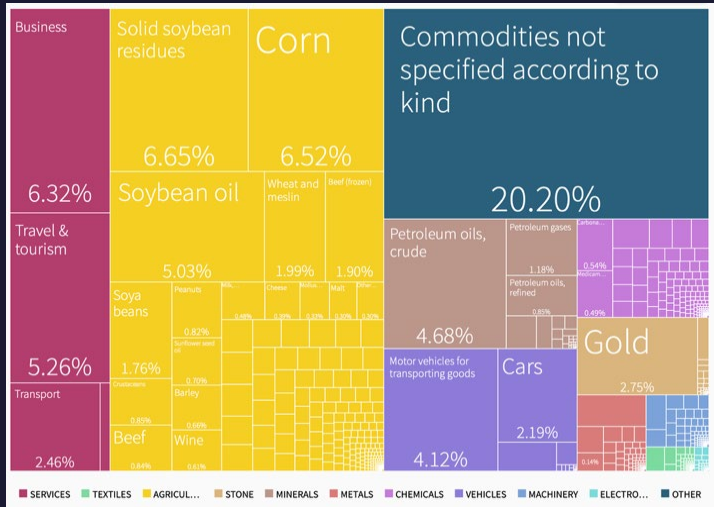
Takeaway:

Bolivia's highest-complexity products and its highest-market-share complex products (PCI > 1) are dominated by low-value, low-market-share manufactured goods — printing presses, pianos, and precision instruments — with global market shares that round to 0.0% in every case.

Read at face value, this is not evidence that Bolivia should build a piano industry; it is evidence of how thin Bolivia's non-extractive productive base currently is. The more useful signal is structural rather than product-specific: Bolivia has almost no existing foothold in complex manufacturing outside mining, which narrows realistic near-term diversification to processing and downstream activity close to its existing mineral base, rather than a leap into unrelated complex-product niches

Diversification pathway – Argentina

Export basket 2024



Rank	Product	Export (million us\$)
1	commodity not classified	\$17,123.44
2	Oilcake and other residues (except dregs)	\$6,525.71
3	Maize, unmilled	\$6,071.78
4	Soya bean oil	\$4,778.24
5	Crude petroleum and oils obtained from bituminous materials	\$4,618.92
6	Motor vehicles for the transport of goods or materials	\$4,244.48
7	Bovine meat, fresh, chilled or frozen	\$2,664.39

Product with highest RCA

Rank	Product	RCA	Market share
1	Soya bean oil	138.2	40.4%
2	Groundnuts, green	67.4	19.9%
3	Oilcake and other residues (except dregs)	57.8	17.1%
4	Maize, unmilled	46.6	13.8%
5	Groundnut (peanut) oil	28.2	8.3%

Product with highest PCI

Rank	Product	PCI	Export (\$)
1	Sound recording tape, discs	1.6	1,107,275
2	Sulphonamides, sultones and sultams	1.6	121,524
3	Photographic and cinematographic apparatus and equipment, nes	1.5	447,307
4	Hormones, natural, or reproduce by synthesis, in bulk	1.5	24,394,315
5	Free-piston generators for gas turbines and parts thereof, nes	1.5	9,227

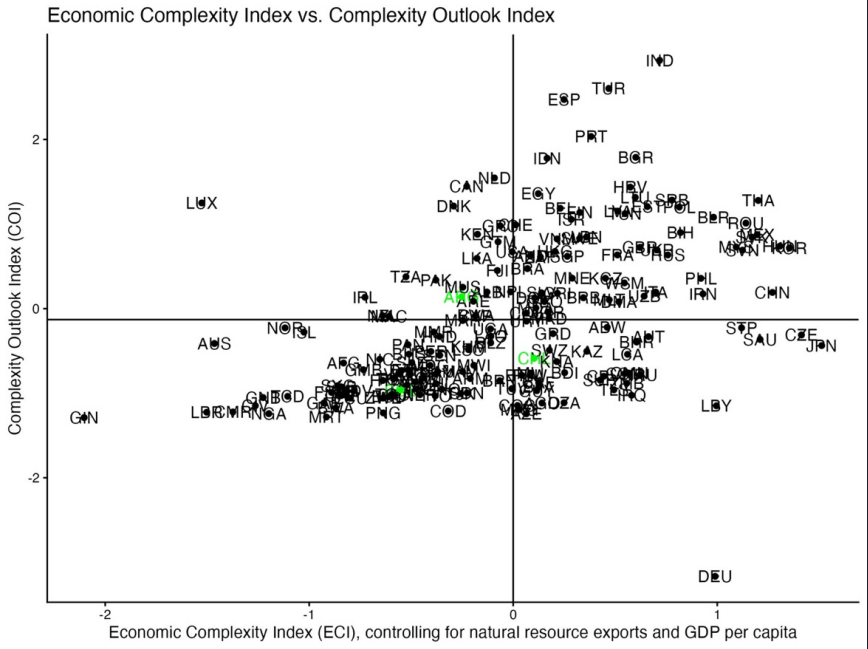
highest-market-share complex products (PCI > 1)

Rank	Product	Rank market share	Global market share	Rank PCI	PCI	Export value (\$)
1	Motor vehicles piston engines, headings: 722; 78; 74411 and 95101	134	0.2%	71	1.1	179,152,513
2	Halogen and sulphur compounds of non-metals	139	0.2%	89	1.0	2,456,340
3	Passenger motor vehicles (excluding buses)	150	0.2%	90	1.0	1,462,575,198
4	Hand polishing stone, grindstones, grinding wheels, etc	164	0.1%	92	1.0	7,261,867
5	Hormones, natural, or reproduce by synthesis, in bulk	176	0.1%	5	1.5	24,394,315
6	Other parts and accessories, for vehicles of headings 722, 781-783	188	0.1%	101	1.0	500,759,488

Takeaway:

Unlike Bolivia's, Argentina's highest-market-share complex products (PCI > 1) align with a genuine existing industry: motor-vehicle engines, passenger vehicles, and vehicle parts and accessories, consistent with its established automotive manufacturing base. This is the clearest case among the three countries where the complexity data point to a specific, already-anchored sector — transport equipment — as a plausible destination for lithium-linked industrial policy, rather than an artefact of the trade classification.

Diversification pathway and green industrial policy strategy



- **Bolivia:** scores low on both dimensions, leaving little room to improve product quality or reach nearby opportunities; its most realistic industrial-policy path is a small number of strategic bets close to its existing mineral base
- **Argentina:** combines a high complexity outlook with a comparatively low current complexity level, consistent with the transport-equipment opportunity identified above: a parsimonious industrial policy that helps firms move short distances into adjacent, similarly skilled activities.
- **Chile:** combines relatively high current complexity with a lower outlook, pointing toward a competitiveness policy that deepens and upgrades sectors where it already competes — including the copper- and chemicals-adjacent clusters— rather than a search for entirely new industries

Country	Greenplexity rank (2023)	Existing green clusters	Most proximate adjacent cluster
Chile	128	Metal ores; copper products; inorganic salts and oxides	Energetic materials (electric vehicle and nuclear-power value chains)
Bolivia	129	Metal ores; unwrought metal and powders; inorganic salts; industrial mechanical systems	Energetic materials and technical glass (electric vehicle and electric-grid value chains)
Argentina	66	Inorganic salts and oxides; fabricated metal components; industrial mechanical systems; primary metal	Polymer resins, energetic materials and plastics (fuel cell/hydrogen, wind, solar and battery value chains)

- Takeaway:
- Taken together, the economic-complexity and Greenplexity evidence points to three distinct, differentiated pathways rather than a single regional template.
1. **Argentina's** combination of an already-anchored transport-equipment sector and a comparatively strong green-complexity position makes vehicle and component manufacturing its clearest realistic destination for lithium-linked industrial policy.
 2. Chile's narrower but more complex existing base points toward deepening chemicals- and copper-adjacent clusters rather than building new industries from scratch.
 3. Bolivia's thin non-extractive productive base offers no comparable anchor sector yet; its realistic near-term option is processing and downstream activity close to its existing mineral base, not a leap into unrelated manufacturing.

To sum up:

- Lithium demand will probably **keep growing** in the coming 20 years, but the past shows **high volatility**, with Australia and China as the top producers and refiners, but more countries entering the market.
 - Big opportunity, narrow window → policy choices matter now
- Almost all demand growth comes from **EVs**, raising the open question of what happens to lithium demand once recycling and market saturation kick in.
- Chile, Argentina, and Bolivia faced the same price cycle but captured wildly different fiscal outcomes, showing that **regime design matters**.
- **Water stress** at Atacama and Uyuni is already maxed out, making it a fiscal deadline, not a side issue.
- Each country's realistic diversification path differs: **Argentina toward automotive, Chile toward chemicals/copper, and Bolivia toward downstream processing**.
- A Lithium trade agreement is unlikely since the three countries compete for investment, but there's **real potential for coordination on environmental standards, water stress, and transparency** → in April 2026, Chile's new president Kast and Argentina's Milei reactivated the 1997 Chile–Argentina Mining Integration and Complementation Treaty — cross-border infrastructure and logistics, not fiscal terms.
- The bigger risk isn't any one country's governance failure, but a **shared vulnerability to price and demand shocks moving faster than any national fiscal regime was built to absorb**.



Thank you all so much for listening 😊

