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Tianqi Lithium Industries Inc. | Asia Pacific

Volume Growth in Both Lithium Mining and Conversion; OW

Stock Rating	Industry View	Price Target
Overweight	Attractive	Rmb139.20

Tianqi is expanding both upstream resources and midstream lithium conversion capacity, and it benefits from SQM's ambitious expansion. We initiate on Tianqi-H at OW and resume coverage on Tianqi-A at OW.

Fully integrated converter with low-cost upstream assets: Tianqi Lithium (Tianqi) produces lithium products via spodumene mining, processing, and refining. It holds a 26% equity interest in Australia's Greenbushes Mine, one of the world's lowest-cost hard-rock mines, where it sources all of the spodumene concentrate to meet its processing capacity (i.e., 100% self-sufficient in volume). We estimate Greenbushes' spodumene concentrate output will achieve a 16% CAGR, 2021-25. In addition, Tianqi is conducting a feasibility study on recommencing development and production in China's Yajiang Cuola Mine. Further, the investments in Sociedad Química y Minera de Chile (SQM) give Tianqi access to the world's lowest-cost brine (at Atacama in Chile), as well as capacity expansion potential and scope for ASP hikes.

Expansion of conversion capacity in both Australia and China: Tianqi is expanding its lithium conversion capacity (in lithium hydroxide, lithium carbonate, and lithium metal) both at home and abroad. Upon completion of its current projects, total conversion capacity would reach 114.8ktpa by 2025, up from 2021's 44.8ktpa, representing a CAGR of 27%. A temporary surplus of spodumene concentrate procurement over consumption will be filled with external tolling.

Consistently high-quality products attract leading manufacturers: Tianqi's ability to develop and manufacture high-quality lithium compounds with consistency attracts leading global manufacturers of lithium-ion batteries and cathode materials; this includes long-term lithium hydroxide supply agreements with overseas strategic customers.

We initiate on the H-share and resume coverage on the A-share, both at Overweight, with respective price targets of HK$107.9/sh (derived from DCF analysis) and Rmb139.2/sh.

Key risks include: (1) a potential lithium price correction as supply increases; and (2) Tianqi's reliance on a single mine source for spodumene concentrate.

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Tianqi Lithium Industries Inc. (002466.SZ, 002466 CS)

Greater China Materials / China

Stock Rating	**Overweight**
Industry View	**Attractive**
Price target	Rmb139.20
Up/downside to price target (%)	27
Shr price, close (Aug 19, 2022)	Rmb109.20
52-Week Range	Rmb148.57-58.05
Sh out, dil, curr (mn)	1,477
Mkt cap, curr (mn)	US$25,358
EV, curr (mn)	US$25,382
Avg daily trading value (mn)	US$887

Fiscal Year Ending	**12/21**	**12/22e**	**12/23e**	**12/24e**
ModelWare EPS (Rmb)	1.41	13.18	7.68	2.95
EPS (Rmb)§	1.05	10.79	10.52	10.16
Revenue, net (Rmb mn)	7,663	45,298	41,388	16,779
EBITDA (Rmb mn)	4,649	37,730	33,786	11,005
ModelWare net inc (Rmb mn)	2,079	21,637	12,612	4,843
P/E	76.0	8.3	14.2	37.0
P/BV	12.4	3.9	3.1	2.8
RNOA (%)	21.8	216.5	105.8	40.2
ROE (%)	39.9	169.6	27.4	8.3
EV/EBITDA	34.0	4.3	4.3	12.8
Div yld (%)	1.0	5.0	6.6	2.2
FCF yld ratio (%)	(0.7)	1.9	9.3	1.1
Leverage (EOP) (%)	(37.9)	(67.1)	(89.8)	(92.0)

Unless otherwise noted, all metrics are based on Morgan Stanley ModelWare framework

Executive Summary

We initiate coverage on Tianqi H-share and resume coverage on the A-share, both with an Overweight rating.

A Lithium Miner and Converter with Volume Growth in Both Areas

According to Wood Mackenzie, an industry research consultancy, Tianqi was the world's largest producer of mined lithium and the fourth-largest (Asia's second-largest) lithium compound producer in 2021, as measured by output volume. Its main earnings drivers are changes in battery-grade lithium carbonate prices, and total spodumene concentrate output from the Greenbushes Mine.

The Only Chinese Producer with 100% Spodumene Concentrate Self-Sufficiency

Tianqi currently holds a 26% equity interest in Australia's Greenbushes Mine, one of the world's lowest-cost hard-rock mines, where it effectively sources all the spodumene concentrate that it needs to meet its self-owned lithium converting capacity (i.e., 100% self-sufficient in volume).

Volume Growth Part I: Upstream Resources

Greenbushes, Australia: (1) The construction of its Tailings Retreatment Plant (TRP – 280ktpa), for reclamation of mine tailings, was completed in early 2022, with the plant currently under commissioning. (2) The construction of its Chemical-Grade Plant 3 (CGP3 – 520ktpa) is ongoing, with completion slated for 2025, to provide further spodumene concentrate output growth. We estimate Greenbushes' spodumene concentrate output will achieve a CAGR of 16% in 2021-25.

Yajiang Cuola, China: Tianqi is currently conducting a feasibility study about recommencing the development and production in China's Yajiang Cuola Mine, and expects to complete the study and resume construction in 2H22 for completion in 2025.

Volume Growth Part II: Midstream Conversion

Tianqi is expanding its lithium conversion capacity (in lithium hydroxide, lithium carbonate, and lithium metal), both at home and abroad. Upon completion of its projects, total conversion capacity would reach 114.8ktpa, up from the current 44.8ktpa. A temporary surplus of spodumene concentrate procurement over consumption at Tianqi's self-owned lithium converting capacity will be filled by external tolling.

In addition to its own business, Tianqi currently owns 22.16% of Sociedad Química y Minera de Chile (SQM), a Chilean brine producer. Tianqi accounts for its investment in SQM as an equity investment, reflects its attributable net profit from SQM in investment income on the income statement, and receives dividends on a recurring basis.

Consistently High-Quality Products Attract Leading Manufacturers

Tianqi's ability to develop and manufacture lithium compounds at high levels of quality and consistency enable it to supply lithium chemical products to leading global manufacturers of lithium-ion batteries and cathode materials. In addition, it maintains long-term strategic supply agreements with customers for Kwinana's (Australia) lithium hydroxide output.

Near-Term Spot Prices to Stay Elevated Amid Both Demand Recovery and Supply Growth

Steadily improving cathode production lends support to lithium consumption: Per our recent channel checks with industry participants, the latest production plans of domestic LFP cathode producers (LFP cathodes are currently only produced in China) indicate that LFP cathode material output is set to improve notably in 3Q22-4Q22, before entering a more steady growth phase in 2023. Apart from this, global ternary cathode materials output will deliver milder growth over the quarters in 2022-23. As cathode production is the most direct downstream usage of lithium, the promising production plans suggest steady growth in lithium consumption in the coming quarters.

Sequential supply growth in-line with both lithium brine seasonality and new projects' ramp-up: Firstly, the key to lithium supply is upstream resources, rather than converting capacity. As a result, spurred by lucrative profits in lithium production, rising capital amounts are flowing into the industry's project development, and we expect supply growth to come online in all the forms of spodumene concentrate, lithium brine, and lepidolite concentrate. We expect volume contribution from these projects to gradually emerge in 3Q22-1H23.

Overall, considering greater near-term certainty in demand growth, as indicated by global cathode production plans amid more gradual increases in global lithium supply (as most volume contribution is skewed to 2023 and onwards), and elevated lithium producing cost supports due to further increases in feedstock prices (spodumene concentrate), we expect spot lithium prices in China to stay elevated in 3Q22-4Q22, and even see some further upside from here, before prices gradually decline in 2023.

Key Investment Concerns

(1) Can SQM's rights at Atacama be renewed beyond 2030, and on what terms? (2) Supply is on track to rise; how will lithium pricing be affected? (3) How might Tianqi be constrained by its current reliance on a single mine source? (4) Will potential tax expenses related to the Tianqi Lithium Energy Australia (TLEA) restructuring have a material impact?

We Value Tianqi Lithium's Equity Using a DCF Methodology

Our primary valuation methodology is a discounted cash flow (DCF) model, as we believe this approach can provide a longer-term view of the company's cash-flow-generating capability amid an environment in which lithium prices start to normalize, while the company's future projects come online sequentially. Under our DCF methodology, we value Tianqi Lithium H-share at HK$107.9/sh.

As a result, we initiate coverage on Tianqi Lithium H-share with an Overweight rating and a price target of HK$107.9/sh (derived from DCF analysis), and resume coverage on Tianqi Lithium A-share with an Overweight rating and a price target of Rmb139.2/sh (we use an A-H premium of 50%).

Exhibit 1: Tianqi H-share: We initiate coverage with an Overweight rating

Reuters: 9696.HK Bloomberg: 9696 HK				
Rating				**Overweight**
Price Target (HK$/sh)				**107.9**
Shr price. Close (Aug 19, 2022) (HK$/sh)				81.0
Fiscal Year ending	**2021**	**2022E**	**2023E**	**2024E**
ModelWare EPS (RMB/sh)	2.47	13.84	7.69	2.96
EPS, for consensus (RMB/sh)	2.47	13.84	7.69	2.96
Net Profit (RMBmn)	3,649	21,571	12,618	4,850
P/E, for consensus	28.2	5.0	9.1	23.6

Source: Refinitiv, company data, Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: Share prices in this report are of the market close on August 19, 2022, unless otherwise indicated. The slight difference between the MW EPS for the H-share and A-share is due to the different account rules – IFRS and PRC GAAP, respectively.

Exhibit 2: Tianqi Lithium: Summary of ratings and price targets

H-share rating & valuation			
Rating	**Overweight**		
Implied H-share NPV/share (HK$/sh)	**107.9**	**Share price of Tianqi - H (as of Aug 19, 2022) (HK$/sh)**	**81.0**
2023E EPS (Rmb/sh)	7.7		
Implied 2023E P/E (x)	12.1x	H-share target price upside (downside) (%)	33%

A-share rating & valuation			
Rating	**Overweight**		
Assumed A-H premium (%)	**50%**		
Implied A-share NPV/share (Rmb/sh)	**139.2**	**Share price of Tianqi - A (as of Aug 19, 2022) (Rmb/sh)**	**109.2**
2023E EPS (Rmb/sh)	7.7		
Implied 2023E P/E (x)	18.1x	A-share target price upside (downside) (%)	28%

Source: Refinitiv, Morgan Stanley Research. E = Morgan Stanley Research estimates.

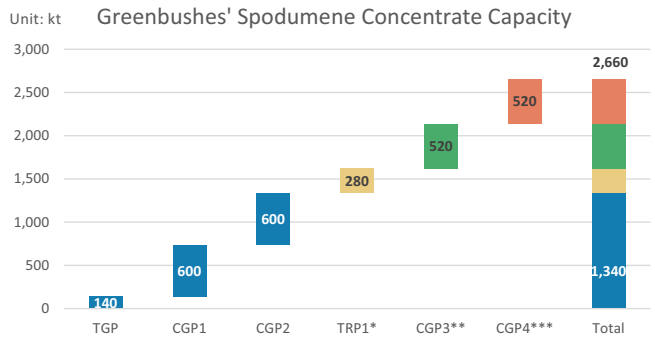
Investment Positives

We see three primary investment positives: (1) access to high-quality and low-cost upstream assets, i.e., Greenbushes Mine via the investment in TLEA and Atacama Salt Lake via the investment in SQM, where SQM expects rapid capacity ramp-up in the coming years; (2) steady ramp-up in lithium conversion capacity, both at home and abroad, to fill the gap between spodumene concentrate offtake and consumption; and (3) high-quality lithium products consistently attracting leading manufacturers of both cathode materials and lithium-ion batteries.

Access to High-Quality and Low-Cost Upstream Assets with Volume Growth

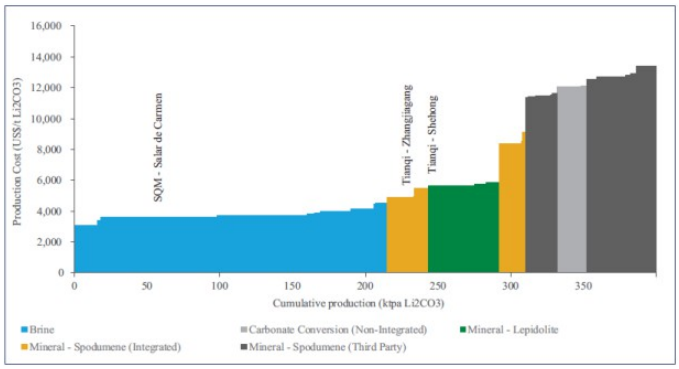
Tianqi currently holds a 26% equity interest in the Greenbushes Mine, one of the world lowest-cost hard-rock mines, where it effectively sources all the spodumene concentrate that it needs to meet its self-owned lithium converting capacity (100% self-sufficient in volume). The construction of its Tailings Retreatment Plant (TRP – 280ktpa), for reclamation of mine tailings, was completed in early 2022, with the plant currently under commissioning. Meanwhile, the construction of its Chemical-Grade Plant 3 (CGP3 – 520ktpa) is ongoing, with completion slated for 2025. An additional processing plant, CGP4 (520ktpa, per our estimate, assuming similar ore grade for feedstock and recovery rate at processing plants as CGP3), is planned to start construction in 2025 and expected to be operational by 2027.

Exhibit 3: Spodumene Concentrate Capacity Build-up at Greenbushes' Processing Plants



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi completed TRP construction in early 2022 and is currently commissioning the plant. (**): Tianqi expects CGP3 to complete construction by 2025. (***): Tianqi expects CGP4 to commence construction in 2025 and be operational by 2027.

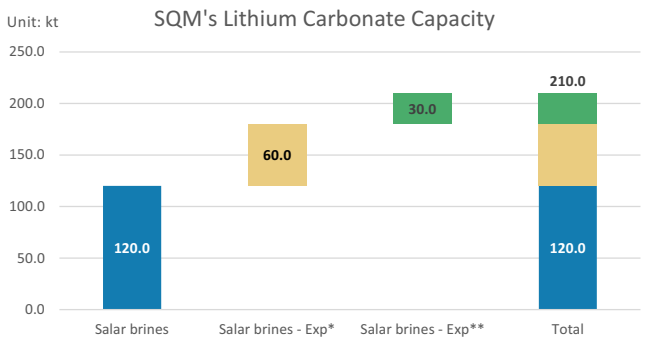
Exhibit 4: Spodumene Concentrate Production Cost Curve in 2021



Source: Wood Mackenzie.

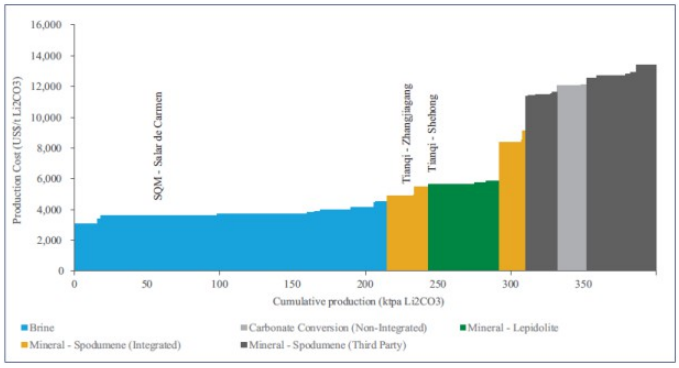
Its investments in SQM provide Tianqi access to the world's lowest-cost brine (Atacama in Chile), along with potential benefits from capacity expansion and ASP hikes there. In early March 2022, SQM reiterated its target to increase its lithium carbonate and lithium hydroxide capacity to 180ktpa and 30ktpa, respectively, and announced that it will begin working on a new project in Chile to further expand its lithium carbonate and lithium hydroxide capacity to 210ktpa and 40ktpa, respectively. More recently, in August 2022, the company reiterated such capacity expansion target.

Exhibit 5: SQM's Lithium Carbonate Capacity Build-up



Source: SQM, Morgan Stanley Research. Note (*): SQM expects to increase lithium carbonate capacity at Salar Brines to 180ktpa by 2022. (**): SQM expects to increase lithium carbonate capacity at Salar Brines further to 210ktpa by 2023.

Exhibit 6: Lithium Carbonate Cost Curve in 2021



Source: Wood Mackenzie.

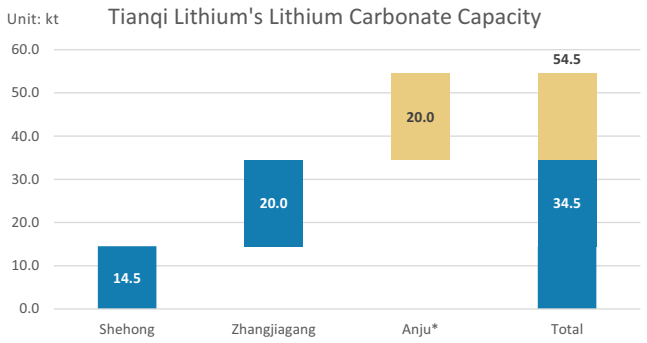
Furthermore, additional lithium hydroxide exposure will be gained via SQM's investments in the Mt. Holland Project (a 50%/50% joint venture between SQM and Wesfarmers with capacity of 50ktpa lithium hydroxide).

Tianqi is currently conducting a feasibility study on recommencing development and production in China's Yajiang Cuola Mine. It expects to complete the feasibility study and resume construction in 2H22, and complete construction in 2025.

Steady Ramp-up in Conversion Capacity in Both Australia and China

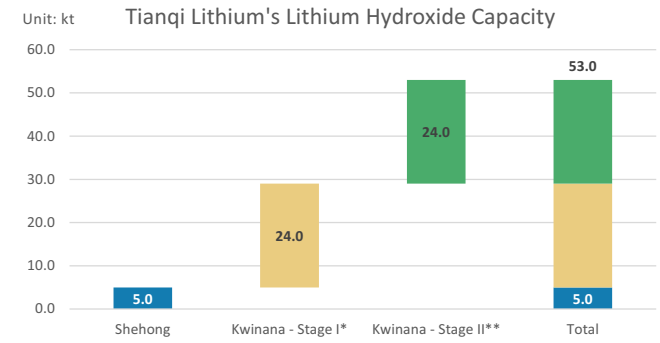
Tianqi is expanding its lithium conversion capacity (in lithium hydroxide, lithium carbonate, and lithium metal), both at home and abroad. Upon completion of all current projects, its total conversion capacity would reach 114.8ktpa, up from the current 44.8ktpa. A temporary surplus of spodumene concentrate procurement over consumption at Tianqi's self-owned lithium converting capacity will be filled by external tolling.

Exhibit 7: Lithium Carbonate Capacity Build-up



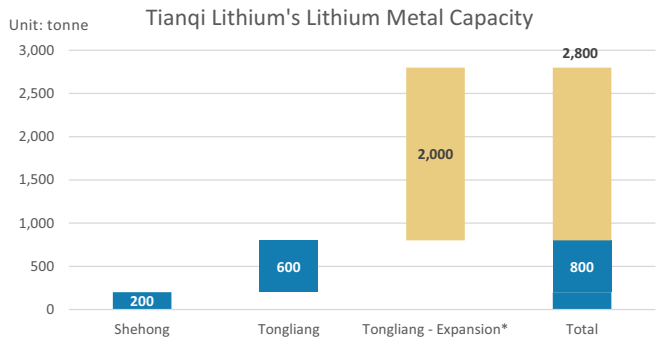
Source: Tianqi Lithium, Morgan Stanley Research. Note (*): Tianqi expects to commence commercial operations at Anju in 2024.

Exhibit 8: Lithium Hydroxide Capacity Build-up



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi expects to commence commercial operations at Kwinana Stage I project in 2H22. (**): Tianqi is currently conducting a feasibility study at Kwinana Stage II project, and expects to resume construction in 2H22.

Exhibit 9: Lithium Metal Capacity Build-up



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi expects to commence operations at the Tongliang expansion project starting from 4Q23.

Consistently High-Quality Products Attract Leading Manufacturers

The capability of developing and manufacturing lithium compounds of high quality and consistency enables Tianqi to supply lithium chemicals products to leading global manufacturers of lithium-ion batteries and cathode materials. In addition, Tianqi maintains long-term strategic supply agreements with customers for Kwinana's as well as Tianqi China's lithium hydroxide output, and Tianqi China's lithium carbonate output.

Exhibit 10: Long-term Lithium Chemicals Supply Contracts Signed with Downstream Customers

Customer	Date of Contract Signing	Effective Period	Contract / Agreement
LG Chem	June-22	2023 - 2026 (eligible 3-year extension)	Supply agreement is eligible to be extended by three years, if both parties could reach agreement on certain terms.
Dynanonic	June-22	July 2022 - Dec 2024	Volume negotiated on a monthly basis; Total annual procurement volume can be +-20% deviated from the previous negotiated volume.
northvolt	September-19	2020 - 2025	Annual base volume supplied to Northvolt is ≥5%-10% of lithium hydroxide output under Kwinana's full production. Additional volume could be supplied per Northvolt's demand.
LG Chem	August-19	2020 - 2022 (eligible 3-year extension)	Annual base volume supplied to LG Chem is ≥15% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per LG Chem's demand. Supply agreement is eligible to be extended by three years, if both parties could reach agreement on certain terms.
SK Innovation	April-19	July 2019 - Dec 2024	Annual base volume supplied to SKI and EcoPro is ~20%-25% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per SKI's demand.
EcoPro BM	April-19	July 2019 - Dec 2023	Annual base volume supplied to SKI and EcoPro is ~20%-25% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per EcoPro's demand.

Source: Tianqi Lithium, Morgan Stanley Research.

Investment Concerns

We see four primary investment concerns: (1) Will SQM be able to renew the Atacama mineral resources exploiting rights (which expire in 2030); if so, at what terms? (2) Supply is on track to rise; how will lithium pricing be affected? (3) How might Tianqi be constrained by its current reliance on a single mine source? (4) Will potential tax expenses related to the TLEA restructuring have a material impact?

Renewal of SQM's Rights at Atacama Beyond 2030 and Ongoing Political Discussions

SQM's subsidiary, SQM Salar, holds exclusive rights to exploit the mineral resource in the Salar de Atacama in northern Chile. These rights are owned by the Chilean Economic Development Corporation (CORFO) and leased to SQM Salar pursuant to a lease agreement that was first signed in 1993 and subsequently amended. The latest agreement has been in effect since April 10, 2018. It is reasonable to expect continuous amendments as mutually agreed by the parties until its current expiration date of December 31, 2030.

Today, 100% of SQM's lithium production is from Atacama, Chile. As a result, the discussion of higher royalties/taxes, or even potential for the nationalization of assets in Chile, remains an overhang.

We note that in a vote on Chile's Constitutional Convention floor in mid-May 2022, a plan to replace the nation's investor-friendly concession model with a system of temporary and revocable permits fell short of the two-thirds threshold needed to be included in a document that is scheduled to be put to a referendum on September 4, 2022, suggesting that the draft constitution could lack a dedicated mining statute.

As Tianqi has noted, if the carrying amount of the investments in SQM exceeds its recoverable amount, an impairment loss would be recognized. The recoverable amounts of SQM would be determined by value-in-use calculations, in which cash flow is projected based on SQM's historical financial information, operation plan, latest market information, independent technical review report, and other factors.

Potential Lithium Price Correction

Apart from the traditional forecasts for upstream lithium supply from mined resources and downstream demand from both battery (mainly in electric vehicle (EV) and 3C products) and non-battery (industrial-related) sources, rising raw material prices (including both battery raw materials and other base metals), and thus higher EV selling prices, could slow the momentum in the EV transition.

Coupled with the ongoing impact of COVID-19 on household spending, we see concerns on EV demand from weaker consumer sentiment and falling disposable incomes.

In terms of the market outlook and price forecasts, our Morgan Stanley global commodities team sees the current tightness continuing through most of 2022, but projects a return to a surplus market in 2023, and forecasts that the lithium price will trend lower in 2023 as supply increases. If supply additions occur more rapidly than expected, downward pressure on lithium chemicals could be amplified.

Reliance on a Single Mine Source from Australia

Despite having the Cuola mine (currently under feasibility study to recommence development and production) as a strategic reserve, Tianqi currently relies on the Greenbushes Mine for all of its lithium concentrate production and supply of lithium raw materials. Any disruption in mine operations, and thus lithium concentrate supply from Greenbushes, could materially affect Tianqi's lithium production business.

Potential Tax Expenses Related to TLEA Restructuring

In December 2020, Tianqi entered an investment agreement with IGO and IGO Lithium, pursuant to which IGO Lithium invested US$1.4bn in TLEA by way of a share subscription and obtained a 49% ownership interest in TLEA. The transaction required the Multiple Entry Consolidated (the MEC) group to undertake an 'internal restructure,' and the Australian Taxation Office (ATO) is currently focusing on arrangements whereby a restructure by an MEC group enables a tax-free exit from Australian investments.

Tianqi is currently engaging with the ATO in respect of the transaction to obtain certainty of the tax outcomes. Meanwhile, Tianqi reached a Tax Expenses Sharing Agreement with IGO in June 2021, jointly sharing the potential tax expense burden, as based on their equity interest portion in TLEA, within certain limits.

Tianqi has stated that total tax expenses on this front may reach A$167mn (excluding fines and interest), and additional fines and interest would be 25-50% of the aforementioned tax expenses. In addition, Tianqi noted that considering the sharing agreement reached with IGO, the attributable tax expenses may reach A$85.2mn.

Company Overview

Summary & Conclusions

Tianqi Lithium is a world-leading new energy materials company. Its operating lithium production bases are currently located in China and Australia.

Tianqi is the only lithium producer in China that has achieved 100% self-sufficiency in spodumene concentrates, the key raw materials in lithium chemicals that are produced via the hard rock production route, and that are currently sourced from its 51%-owned subsidiary, TLEA.

Tianqi operates in several critical stages of the lithium value chain (Exhibit 11), including: (1) spodumene mining and spodumene concentrate production, and (2) lithium compounds and derivatives production. Thus, Tianqi's products fall into two categories – lithium concentrate products and lithium compounds and derivatives products.

(1) Lithium concentrate products: chemical grade and technical-grade lithium concentrate. Tianqi, having fully consolidating Windfield since 2014, sells its technical-grade lithium concentrates primarily to Albemarle Germany, a shareholder of Windfield, as well as companies engaged in the glass, ceramics and porcelain industries, and it also sells half of the chemical-grade lithium concentrates produced from Greenbushes to Albemarle Germany under off-take agreements.

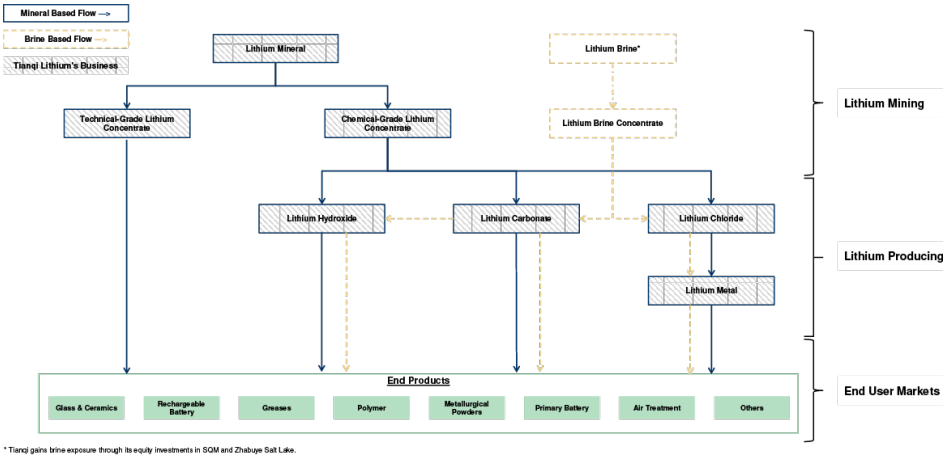
(2) Lithium compounds and derivatives products: lithium carbonate, lithium hydroxide, lithium chloride and lithium metal. Major customers of these products are battery material producers, manufacturers of pharmaceutical intermediaries, and manufacturers of alloys for use in aircraft.

Solid relationships with blue-chip downstream customers: According to Tianqi, it supplies its lithium chemicals products to three of the world's five-largest manufacturers of large-cell lithium-ion batteries, as well as to six of the world's ten-largest cathode manufacturers, as measured by market share in 2021.

Equity investments in SQM: Tianqi currently holds a 22.16% equity interest in SQM, a world-leading lithium chemicals producer in the overseas market. Tianqi accounts for the profit contribution from its SQM stake as investment income. In addition, SQM has a clear dividend payout policy that provides steady cash flows to Tianqi.

Investment in domestic new energy entities: Apart from positioning in lithium mining and lithium chemicals manufacturing, Tianqi also holds certain equity interests in companies involved in cathode materials and lithium-ion battery manufacturing.

Exhibit 11: Tianqi Lithium's Positioning Within the Value Chain



Source: Tianqi Lithium, Morgan Stanley Research.

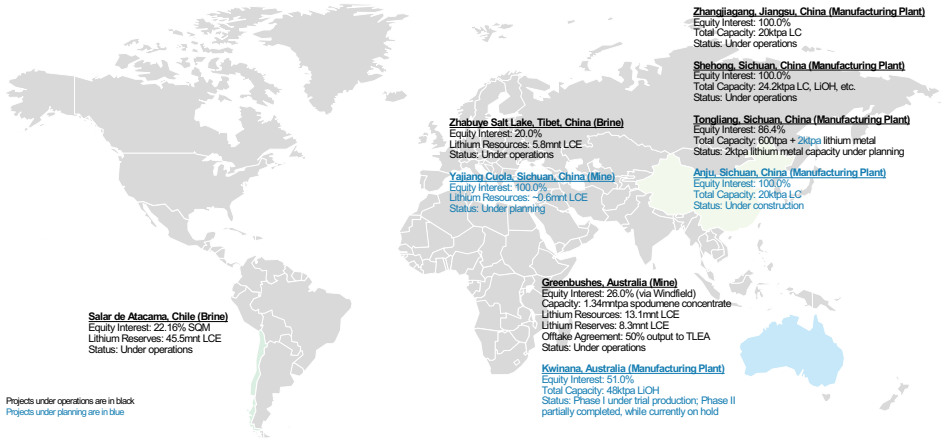
Positioning in China, Australia, and Chile

In terms of geographical positioning, currently all of Tianqi's commercially operating lithium converters are located in China (Sichuan, Jiangsu, and Chongqing).

All feedstock for lithium conversion is at present sourced from the Greenbushes mine in Australia. Tianqi's partially owned Kwinana Stage I project is now in the trial production stage, and this is the first hard-rock-based lithium converter coming online in the ex-China market. In late-May 2022, Tianqi announced that it had produced the first 10 tonnes of battery-grade lithium hydroxide, meeting all the required criteria. To commercialize the production line, produced lithium hydroxide will be sent to different customers for quality checks, and Tianqi expects such progress to take 4-8 months.

Furthermore, Tianqi currently holds a 22.16% equity interest in SQM, and SQM, based in Chile, is also a world-leading lithium chemicals producer (esp. lithium carbonate). SQM is currently ramping up its lithium carbonate and hydroxide capacity to 180ktpa and 30ktpa, respectively, from 120ktpa and 21.5ktpa in 2021, aiming to reach these levels in the coming months.

Exhibit 12: Map of Tianqi Lithium's Positioning (Upstream and Midstream), August 2022



Source: Tianqi Lithium, Morgan Stanley Research.

Key details about TLEA: In short, inclusion of a strategic partner into TLEA and the subsequent restructuring at TLEA's holdings has made a substantial difference in analyzing Tianqi and its future development potential in the overseas market.

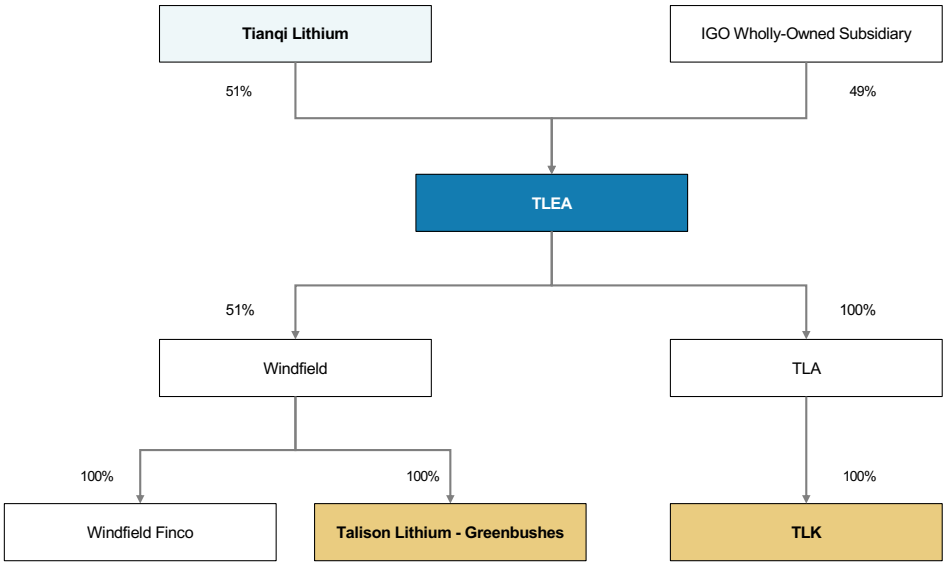
In December 2020, Tianqi and TLEA (previously Tianqi's wholly-owned subsidiary) entered a share subscription agreement with IGO and IGO Lithium, pursuant to which IGO subscribed for an increased share capital in TLEA and Tianqi thus restructured its equity interests in TLEA and (Tianqi Lithium Australia (TLA), a wholly-owned subsidiary of TLEA. The transaction and TLEA's restructuring were completed in early July 2021.

Upon completion of the transaction, Tianqi and IGO now hold a respective 51% and 49% equity interest in TLEA. Furthermore, TLEA holds a 51% equity interest in Windfield that holds a 100% equity interest in Talison Lithium (Greenbushes), and 100% equity interest in TLA, which effectively fully controls TLK (Kwinana operations).

According to the agreement reached by Tianqi and IGO, TLEA will **become the primary vehicle for lithium-related investments (excluding SQM-related) for IGO and Tianqi outside of China.**

Pursuant to the shareholders' deed for TLEA, its board comprises five directors, with IGO and Tianqi Lithium each appointing two nominees and one independent director appointed by Tianqi Lithium subject to consultation with IGO and the satisfaction of defined independence criteria. IGO also has the right to appoint the CFO of TLEA, while Tianqi has the right to appoint the CEO and COO.

Exhibit 13: Shareholding Structure of TLEA



Source: Tianqi Lithium, Morgan Stanley Research. Note: As of August 2022.

Roadmap in Analyzing Tianqi's Business Model

Here we provide a roadmap to analyze Tianqi Lithium's business model, mainly related to hard-rock-based lithium manufacturing.

Step 1: Sourcing spodumene concentrates from Talison, and subsequent direct sales of technical-grade products: Pursuant to the Talison Novation Deed, TLEA has been entitled to the rights and benefits under the Tianqi Lithium 'off-take agreement,' and has assumed the obligations and liabilities under such agreement, effective from early July 2021.

As an aside, the 'off-take agreements' govern the distribution of chemical-grade spodumene concentrate, while the 'distribution agreements' govern that of technical grade products.

Off-take agreements – sourcing chemical-grade products: Pursuant to the 'off-take agreements,' TLEA and Albemarle, the shareholders of Windfield (TLEA and Albemarle Germany) are now entitled to take up to an initial 50% of the annual production of chemical-grade spodumene concentrates from the Greenbushes Mine under materially identical terms.

Starting from September 2019, Windfield management determined that for the following three years, the selling prices of spodumene concentrates under the 'off-take agreements' shall be updated **every six months by reference to the FOB USD per ton price of the preceding quarter published by the Fastmarket, Benchmark Mineral Intelligence and Asian Metal.**

Distribution agreements – sourcing technical-grade products: Pursuant to the 'distribution agreements,' Tianqi and Albemarle are entitled to 50% of technical-grade spodumene concentrate output from Greenbushes, and subsequently, Tianqi sells technical-grade products to downstream customers directly without further processing.

According to the terms, such prices are updated annually and calculated based on the prevailing market price for that product, which will be determined with reference to the import prices of the various lithium products, also taking into consideration a few other factors.

More specifically, Tianqi and Albemarle shall provide their forecast prices for the first financial quarter (taking into account a reasonable distributor's margin), and then the weighted average of prices will be taken into account and calculated along with the relative pricing (based on 2018 pricing) of each technical grade product.

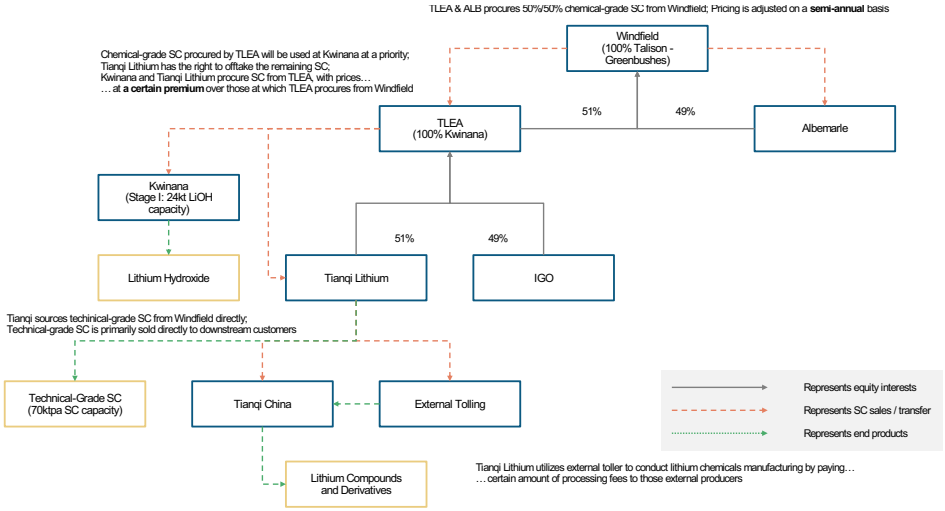
Step 2: Lithium producing at Kwinana operations, TLEA, and sales of the remaining spodumene concentrate to Tianqi: According to the agreement reached by Tianqi and IGO, chemical-grade spodumene concentrate sourced from Talison by TLEA will firstly be used in lithium production at Kwinana operations, and the rest will be sold to Tianqi at a certain premium.

Step 3: Lithium production at Tianqi China and external tollers: As mentioned in the previous step, the remaining spodumene concentrates sourced from Talison by TLEA will be sold to Tianqi. Considering the potential temporary shortfall in lithium conversion capacity in China, Tianqi may turn to external tollers for lithium conversion business, by paying them a certain amount of processing fees.

Such processing fees are normally negotiated every six months between Tianqi and external tollers. Tianqi is still responsible for marketing of finished products, and includes such volume in reported production volume, while not in sales volume.

Note: Despite its 26% equity interest, Tianqi still has a strong influence on Windfield via its holdings in TLEA, and, as a result, it fully consolidates Greenbushes' spodumene concentrate production and sales volume, while spodumene concentrate sales volume to the related parties, such as TLEA and Tianqi China's lithium conversion plants, has been internally eliminated from the financial statements.

Exhibit 14: Roadmap in Analyzing Tianqi Lithium's Business Model



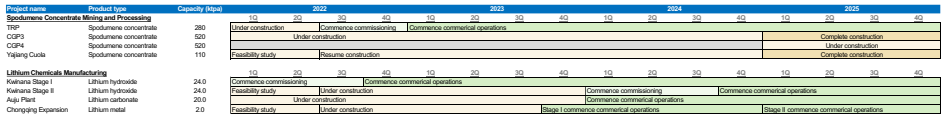
Source: Tianqi Lithium, Morgan Stanley Research. Note: As of June 2022.

Exhibit 15: Glance at Tianqi's Upstream and Midstream Capacity, by Plant, 2022

Name	Location	Primary Products	Status	Capacity (kt)
Ore Processing Plant				
TGP	Australia	Technical-grade lithium concentrate	Under operations	140
CGP1	Australia	Chemical-grade lithium concentrate	Under operations	600
CGP2	Australia	Chemical-grade lithium concentrate	Under operations	600
CGP3	Australia	Chemical-grade lithium concentrate	Under construction	520
CGP4	Australia	Chemical-grade lithium concentrate	Under planning	520
TRP	Australia	Chemical-grade lithium concentrate	Under commissioning	280
Total spodumene concentrate capacity				**2,660**
Lithium Manufacturing Plant				
Shehong	Sichuan, China	Lithium carbonate Lithium hydroxide Lithium metal Lithium chloride	Under operations	14.5 5.0 0.2 4.5
Shehong Total				**24.2**
Zhangjiagang	Jiangsu, China	Lithium carbonate	Under operations	20
Tongliang	Chongqing, China	Lithium metal	Under operations	0.6
Tongliang Expansion	Chongqing, China	Lithium metal	Under planning	2.0
Kwinana	Australia	Lithium hydroxide	Stage I under trial production	24+24
Anju	Sichuan, China	Lithium carbonate	Stage I under construction	20
Total lithium compound and derivative capacity				**114.8**

Source: Morgan Stanley Research.

Exhibit 16: Timetable of Tianqi's New Capacity



Project name	Product type	Capacity (ktpa)	2022				2023				2024				2025			
			1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Spodumene Concentrate Mining and Processing																		
TRP	Spodumene concentrate	280	Under construction		Commence commissioning		Commence commerical operations											
CGP3	Spodumene concentrate	520	Under construction												Complete construction			
CGP4	Spodumene concentrate	520													Under construction			
Yajiang Cuola	Spodumene concentrate	110	Feasibility study		Resume construction										Complete construction			
Lithium Chemicals Manufacturing			1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Kwinana Stage I	Lithium hydroxide	24.0	Commence commissioning				Commence commerical operations											
Kwinana Stage II	Lithium hydroxide	24.0	Feasibility study		Under construction						Commence commissioning				Commence commerical operations			
Auju Plant	Lithium carbonate	20.0	Under construction								Commence commerical operations							
Chongqing Expansion	Lithium metal	2.0	Feasibility study		Under construction						Stage I commence commerical operations				Stage II commence commerical operations			

Source: Morgan Stanley Research.

Spodumene Concentrate Mining and Processing

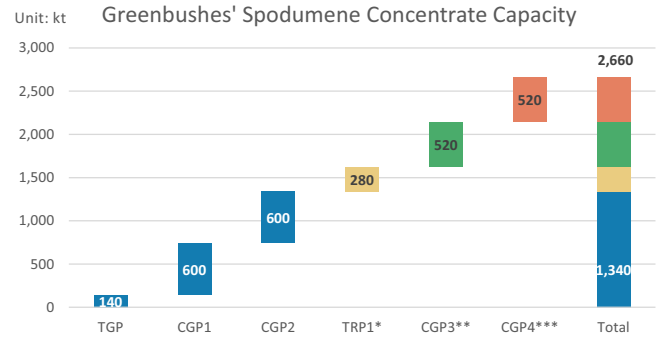
Talison, in which Tianqi effectively holds a 26.01% equity interest via its investments in TLEA and subsequent Windfield, owns a 100% equity interest in, and holds the lithium mining rights at the Greenbushes Mine, the only operating hard rock mine for Tianqi at the current stage.

Current operating plants and capacity: The Greenbushes Mine currently has three processing plants that convert lithium ores into lithium concentrates. They are the Technical-Grade Plant (TGP), the Chemical-Grade Plant No. 1 (CGP1), and the Chemical-Grade Plant No. 2 (CGP2). Low iron technical-grade concentrates are produced at the TGP, while chemical-grade concentrates that contain higher levels of iron are produced at CGP1 and CGP2. Tianqi expects total spodumene concentrate production capacity to reach 1.34 mntpa spodumene concentrate upon completion of the CGP2 ramp-up (by 4Q22), along with yield improvements, among which chemical-grade spodumene concentrates output reaches 1.20mntpa under designated capacity.

Future expansion plans: (1) Talison is currently commissioning the Tailings Retreatment Plant (TRP) for reclamation of mine tailings, construction of which was completed in early 2022, and the plant will add annual production capacity of spodumene concentrate of 0.28mnt when fully operational; (2) Tianqi commenced the construction of CGP3 (annual capacity at 520kt spodumene concentrate) in 2019, with construction slated to complete in 2025, taking annual lithium concentrate production capacity to over 2.1mntpa (1TGP + 3CGP+ 1TRP); (3) an additional processing plant, CGP4, whose producing capacity is estimated to be 520ktpa spodumene concentrate (assuming similar ore grade for feedstock, recovery rate at processing plants as CGP3), slated for construction starting from 2025, and expected to be operational by 2027; and (4) Apart from Greenbushes, Tianqi is conducting a feasibility study on recommencing development and production in Yajiang Cuola Mine, eyeing a resumption of construction in 2H22, and completing the construction of its Stage I project by 2025.

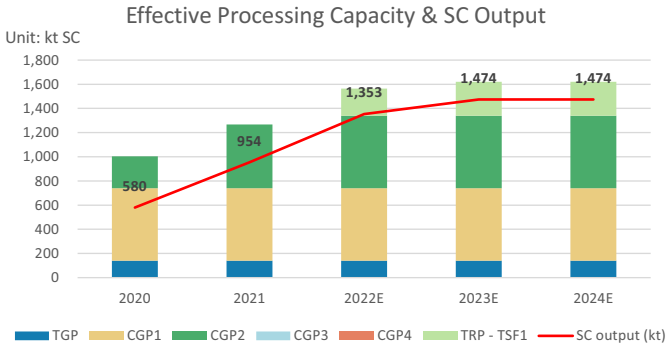
Taking into account the aforementioned spodumene concentrate capacity ramp-up at Greenbushes, we forecast spodumene concentrate output in 2022-24 to reach 1.35mnt, 1.47mnt and 1.47mnt, respectively, mainly considering the contribution from the TRP currently under commissioning, and CGP2 undergoing a ramp-up period. Longer term, spodumene concentrate output may reach as high as 2.1mnt, per our estimate, when both CGP3 and CGP4 are put into operation.

Exhibit 17: Spodumene Concentrate Capacity Build-up at Greenbushes' Processing Plants



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi completed TRP construction in early 2022, and is currently commissioning the project. (**): Tianqi expects CGP3 to complete construction by 2025. (***): Tianqi expects CGP4 to commence construction from 2025 and be operational by 2027.

Exhibit 18: Effective Processing Capacity and Spodumene Concentrate Output at Greenbushes

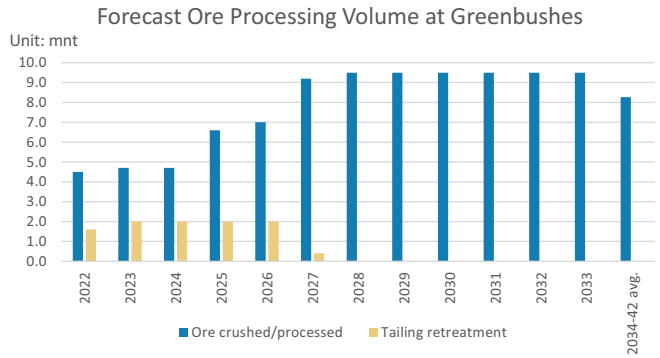


Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

According to a Behre Dolbear Australia (BDA, a minerals industry consultancy) report, ore crushed/processed volume will increase steadily into 2028 when CGP4 is completely operational. In addition, we note that TRP serves as a small mine with a short life of mine (five years), considering comparatively limited tailing reserves.

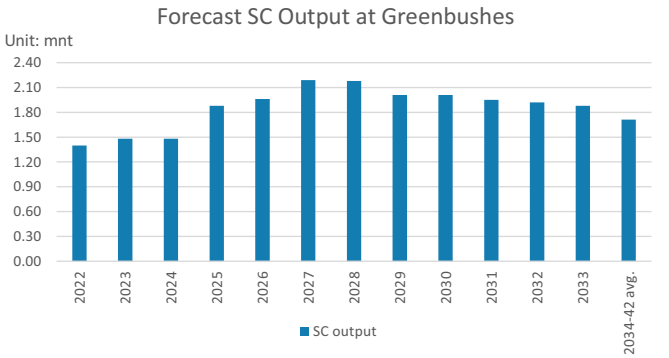
Accordingly, spodumene concentrate output at Greenbushes is expected to reach peak levels of around 2.2mnt spodumene concentrate in 2027-28, before gradually declining to 1.7mnt, longer term.

Exhibit 19: Spodumene Processing Volume Forecast at Greenbushes' Processing Plants – BDA Report



Source: BDA Report (forecast), Tianqi Lithium, Morgan Stanley Research.

Exhibit 20: Spodumene Concentrate Output Forecast at Greenbushes – BDA Report



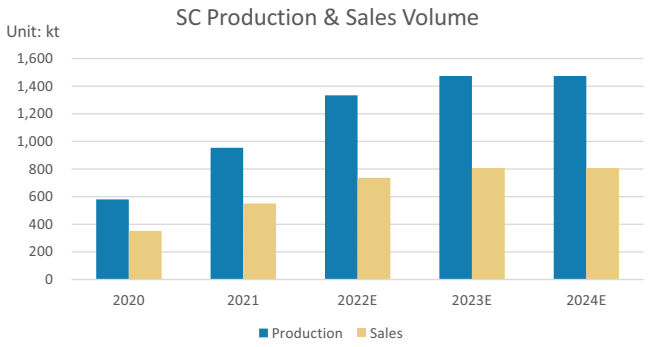
Source: BDA Report (forecast), Tianqi Lithium, Morgan Stanley Research.

In terms of sales volume (excluding volume internally consumed by Kwinana, Tianqi China's operations, and external tollers assigned by Tianqi), we forecast it to reach 0.74mnt in 2020, 0.81mnt in 2023, and 0.81mnt in 2024. Putting it in another way, sales volume for spodumene concentrate recorded in Tianqi's consolidated financial statements contains (1) spodumene concentrates sold from Talison to Albemarle, and (2) external sales volume of technical-grade spodumene concentrates sourced from Talison by Tianqi.

Considering the overall market condition of lithium hard rock, and pricing mechanism of both 'offtake-agreements' and 'distribution agreements' adopted by shareholders of Windfield, we expect Tianqi's realized lithium concentrates ASP in 2022-24 will reach Rmb19,375/t, Rmb22,291/t, and Rmb7,811/t, respectively.

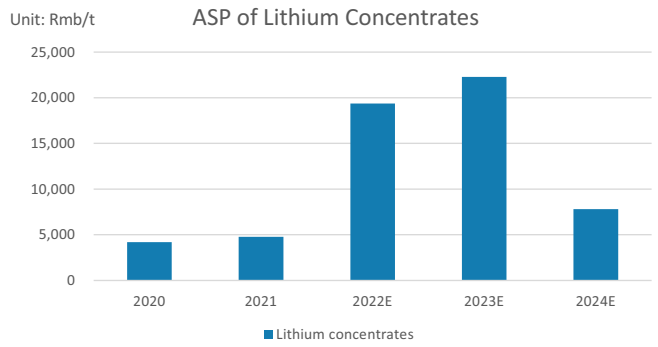
According to IGO's June quarter 2022's announcement, chemical-grade spodumene concentrate price for the first half of its fiscal year FY23 (i.e., the second half of CY22) has been reset to US$4,187/t FOB, compared with the previous half year's US$1,770/t FOB.

Exhibit 21: Spodumene Concentrate Production and Sales Volume



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 22: ASP of Lithium Concentrates Sales



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

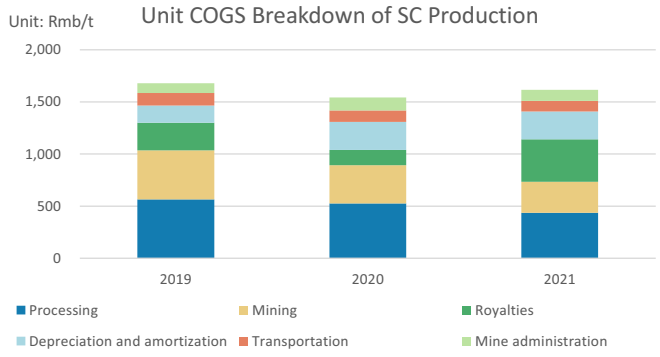
COGS of lithium concentrate sales mainly constitute production costs, including mining costs, processing costs, royalties, depreciation and amortization, transportation and mine administration and shipping costs, etc., deducting internal elimination of TLEA's usage for spodumene concentrate in lithium chemicals production.

We have reclassified unit COGS into three subcategories – cash production costs (excl. royalties), royalties, and depreciation and amortization, and make assumptions for them separately.

Royalty costs represent the cost of royalties paid to the Australian government for mining operations at the Greenbushes Mine. In Western Australia, a royalty of 5% of the royalty value (market value based, as determined by the Minister under the Mining Regulations) of concentrate sales is payable for lithium mineral production. As a result, royalties contained in unit COGS largely move in-line with the trend in market prices of spodumene concentrate.

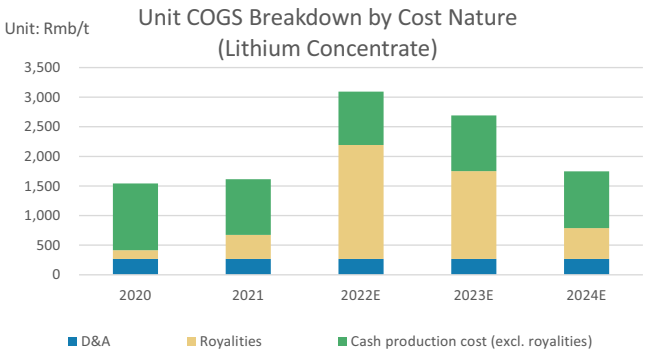
Coupled with our assumption for cash production costs, and based on the most recent cost profile and potential changes in foreign exchange rates, we expect unit COGS of Tianqi's lithium concentrate production (prior to internal elimination) to reach Rmb3,093/t, Rmb2,690/t, and Rmb1,746/t, in 2022-24, respectively.

Exhibit 23: Unit COGS Breakdown of Spodumene Concentrate Production at Greenbushes



Source: Tianqi Lithium, Morgan Stanley Research.

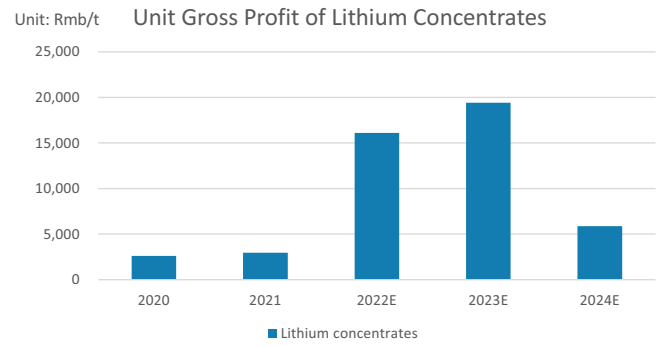
Exhibit 24: Unit COGS of Lithium Concentrate Sales, by Cost Nature



Source: Tianqi Lithium, Morgan Stanley Research.

Given our forecasts for ASP and unit COGS, we expect unit gross profit of lithium concentrates in 2022-24 to reach Rmb16,102/t, Rmb19,421/t, and Rmb5,884/t, respectively, compared with 2021's Rmb2,968/t.

Exhibit 25: Unit Gross Profit of Lithium Concentrates Sales



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Lithium Chemicals Manufacturing

Current operating plants and capacity: Tianqi currently operates three lithium compounds and derivatives manufacturing plants in China, located in Shehong, Sichuan; Zhangjiagang, Jiangsu; and Tongliang, Chongqing; total capacity has reached 44.8ktpa – namely 34.5ktpa of lithium carbonate, 5.0ktpa of lithium hydroxide, 4.5ktpa of lithium chloride (mainly used as raw materials for lithium metal production, and thus limited external sales), and 0.8ktpa tonnes of lithium metal.

Future expansion plans: (1) Kwinana Project Stage I (24.0ktpa lithium hydroxide) in Australia has been in the trial production stage; (2) Kwinana Project Stage II (24.0ktpa lithium hydroxide, with scale and product matching that of the first stage) is under feasibility study, and Tianqi expects to resume project construction in 2H22; (3) the construction of Phase I of Anju Project Stage I (20.0kt lithium carbonate) resumed in 1Q22; and (4) Tongliang Plant plans to further expand lithium metal capacity by 2ktpa, with construction of Phase I (0.8ktpa) scheduled to commence in 2H22.

Exhibit 26: Summary of Lithium Compounds and Derivatives Capacity, by Plant

Total Capacity (tonne)	Location	2019	2020	2021	2022E	2023E	2024E	2025E
Lithium Carbonate								
Shehong	Sichuan, China	14,500	14,500	14,500	14,500	14,500	14,500	14,500
Zhangjiagang	Jiangsu, China	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Anju	Sichuan, China	0	0	0	0	20,000	20,000	20,000
Total		**34,500**	**34,500**	**34,500**	**34,500**	**54,500**	**54,500**	**54,500**
Lithium Hydroxide								
Shehong	Sichuan, China	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Kwinana - Stage I	Australia	0	0	0	24,000	24,000	24,000	24,000
Kwinana - Stage II	Australia	0	0	0	0	0	24,000	24,000
Total		**5,000**	**5,000**	**5,000**	**29,000**	**29,000**	**53,000**	**53,000**
Lithium Metal								
Shehong	Sichuan, China	200	200	200	200	200	200	200
Tongliang	Chongqing, China	600	600	600	600	1,400	1,400	2,600
Total		**800**	**800**	**800**	**800**	**1,600**	**1,600**	**2,800**
Lithium Chloride								
Shehong	Sichuan, China	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Total		**4,500**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**
Sum of Above		**44,800**	**44,800**	**44,800**	**68,800**	**89,600**	**113,600**	**114,800**

Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 27: Summary of Lithium Compounds and Derivatives Output, by Plant

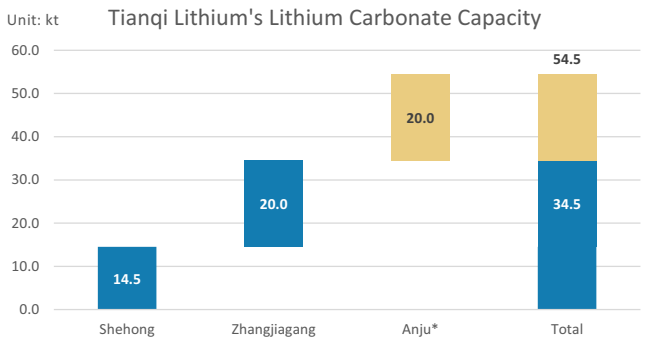
Output (tonne)	Location	2019	2020	2021	2022E	2023E	2024E	2025E
Lithium Carbonate								
Shehong	Sichuan, China	15,027	10,328	13,887	14,500	14,500	14,500	14,500
Zhangjiagang	Jiangsu, China	18,500	18,000	19,200	20,000	20,000	20,000	20,000
Anju	Sichuan, China	0	0	0	0	0	11,250	20,000
Total		**33,527**	**28,328**	**33,087**	**34,500**	**34,500**	**45,750**	**54,500**
Lithium Hydroxide								
Shehong	Sichuan, China	4,969	4,883	5,042	5,000	5,000	5,000	5,000
Kwinana - Stage I	Australia	0	0	0	4,500	20,000	24,000	24,000
Kwinana - Stage II	Australia	0	0	0	0	0	6,000	18,000
Total		**4,969**	**4,883**	**5,042**	**9,500**	**25,000**	**35,000**	**47,000**
Lithium Metal								
Shehong	Sichuan, China	78	81	79	80	100	120	140
Tongliang	Chongqing, China	504	456	504	510	510	850	1,700
Total		**582**	**537**	**583**	**590**	**610**	**970**	**1,840**
Lithium Chloride								
Shehong	Sichuan, China	4,659	4,303	4,984	4,500	4,500	4,500	4,500
Total		**4,659**	**4,303**	**4,984**	**4,500**	**4,500**	**4,500**	**4,500**
Sum of Above		**43,737**	**38,051**	**43,696**	**49,090**	**64,610**	**86,220**	**107,840**

Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

(1) Lithium carbonate: Currently, Tianqi produces lithium carbonate at both its Shehong base (14.5ktpa capacity) and in Zhajiagang (20.0ktpa capacity), with the majority of products being battery-grade lithium carbonate. Upon completion of Anju's Stage I 20ktpa battery-grade lithium carbonate capacity, Tianqi's lithium carbonate capacity will reach 54.5ktpa, up from the current level of 34.5ktpa. The company has been accelerating the development progress for the project, targeting to complete construction of Stage I by 2023, and bring it online in 2024.

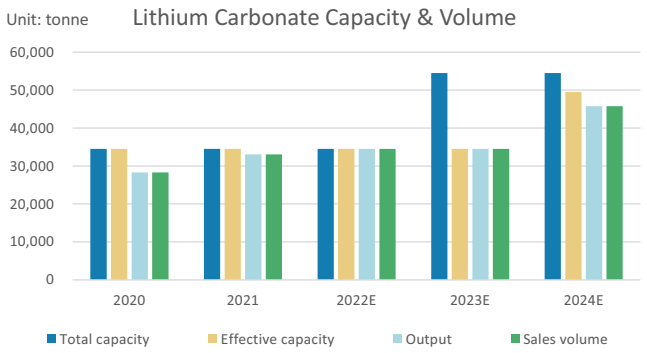
Considering the overall changes in effective capacity, and estimated capacity utilization rates, we expect the company's lithium carbonate output to reach 34.5kt, 34.5kt, and 45.8kt in 2022-24, respectively.

Exhibit 28: Lithium Carbonate Capacity Build-up



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi expects to commence commercial operations at Anju in 2024.

Exhibit 29: Lithium Carbonate Capacity & Volume



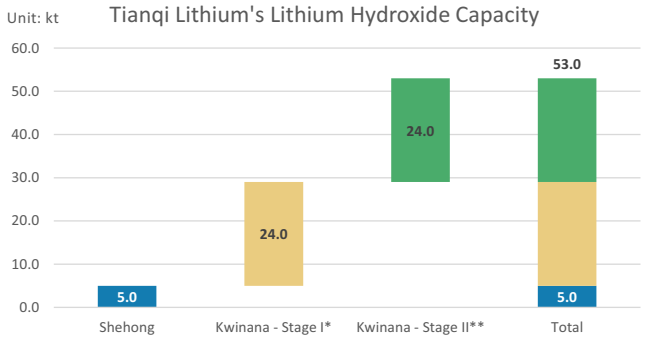
Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

(2) Lithium hydroxide: At present, Shehong base remains the only commercially operating lithium hydroxide plant (5ktpa capacity) within Tianqi. Kwinana Stage I (24ktpa capacity), wholly owned by TLEA, and thereby 51% owned by Tianqi, is currently under trial production and expected to reach full capacity in late 2022 to early 2023. In addition, products produced from the plant are currently going through the accreditation period with the overseas customers, with the period expected to be around a half year. Upon construction completion of Stage I and Stage II plants at Kwinana, each being 24ktpa lithium hydroxide, Tianqi's consolidated lithium hydroxide capacity will increase to 53ktpa, up from the current level of 5ktpa.

Based on IGO's public disclosures in December 2020, it had expected the Stage II Project to commission within 2024, with remaining capex being US$190mn as of the end of 2020, while Tianqi is still working on the feasibility study for the project.

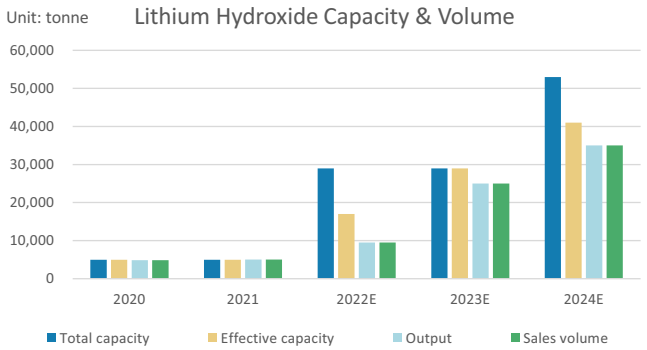
Considering the overall changes in effective capacity (mainly from Kwinana Stage I) and estimated capacity utilization rates, we expect the company's lithium hydroxide output to reach 9.5kt, 25.0kt, and 35.0kt in 2022-24, respectively.

Exhibit 30: Lithium Hydroxide Capacity Build-up



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi expects to commence commercial operations at Kwinana Stage I project in 2H22. (**): Tianqi is currently conducting a feasibility study at Kwinana Stage II project, and expects to resume construction in the second half of 2022.

Exhibit 31: Lithium Hydroxide Capacity & Volume



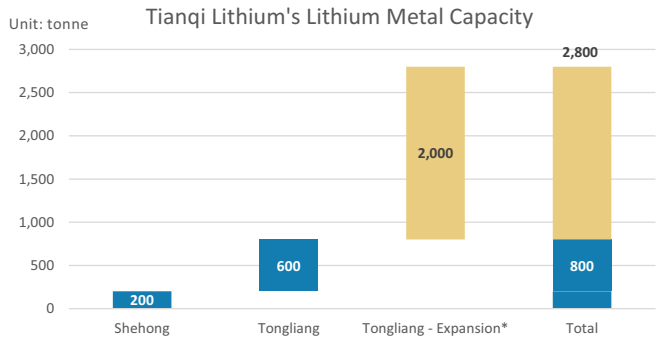
Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

(3) Lithium metal: Tianqi's current lithium metal producing capacity has reached 800t, mainly in Tongliang Plant (600t) and Shehong Base (200t). The Tongliang Plant plans to expand capacity by 2,000t, with the expansion project expected to commence

operations starting from 4Q23. The expansion will be completed in two stages, with Stage I (800t) to be completed and commence operations starting from late 2023, and Stage II (1,200t) to be completed and commence operations starting from 2025. Construction of Stage I (800t) will commence in 2H22.

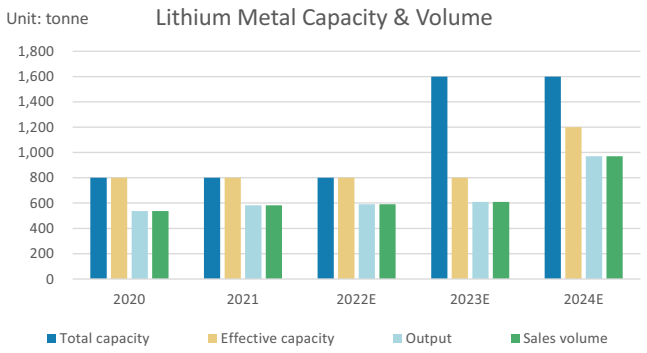
Considering the development progress for Tongliang Plant's expansion project and the potential changes in capacity utilization rates at the existing operations, we expect overall output to reach 590t, 610t, and 970t in 2022-24, respectively.

Exhibit 32: Lithium Metal Capacity Build-up



Source: Tianqi Lithium, Morgan Stanley Research. Note: Capacity highlighted in blue is currently under operation. (*): Tianqi expects to commence operations at the Tongliang expansion project starting from 4Q23.

Exhibit 33: Lithium Metal Capacity & Volume



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

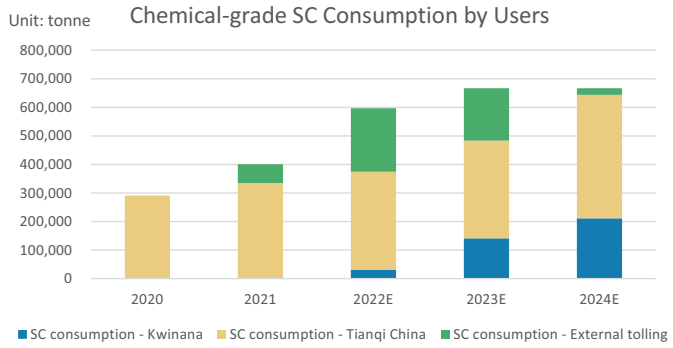
To sum up, considering the aforementioned new capacity and expansion plans, we expect Tianqi's lithium compounds and derivatives output from its self-owned factories to reach 49.1kt, 64.6kt, and 86.2kt in 2022-24, respectively, compared with 43.7kt in 2021, with the additions primarily coming from Kwinana Stage I, Anju Stage I and Tongliang, Kwinana Stage II, and potentially higher capacity utilization rates at lithium metal factories.

External tolling business: As mentioned, under the 'off-take agreement,' TLEA sources half of the chemical-grade spodumene concentrate output produced at the Greenbushes Mine from Talison. These spodumene concentrates will be used at Kwinana operations at a priority, with the remaining resold to Tianqi. As there is some shortfall in Tianqi's lithium conversion in China and the estimated volume sourced from TLEA, Tianqi will outsource part of lithium compounds and derivatives manufacturing business to external converters under the agreed tolling arrangements to produce enough products and thus meet the demand of its downstream customers.

Per our estimate, considering (1) chemical-grade spodumene concentrate output at Greenbushes, (2) capacity ramp-up progress at Kwinana operations, and (3) capacity ramp-up at conversion capacity in China (i.e., Anju Stage I and Tongliang expansion project), we expect Tianqi will have external tollers convert 222.8kt, 183.8kt, and 23.4kt spodumene concentrates in 2022-24, respectively.

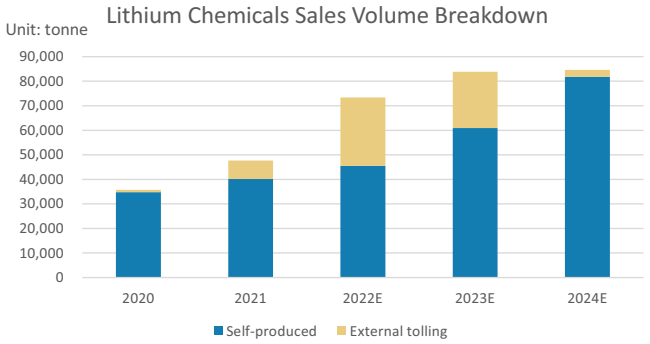
Assuming all of these tolling volumes will be lithium carbonate, and considering both self-produced and externally tolled lithium chemicals, we expect overall lithium compounds and derivatives sales volume (all shown in actual tonnage) to reach 73.3kt, 83.9kt, and 84.6kt in 2022-24, respectively.

Exhibit 34: Chemical-grade Spodumene Concentrate Consumption, by User



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 35: Lithium Compounds and Derivatives Sales Volume – Self-Produced & External Tolling



Source: Morgan Stanley Research. E = Morgan Stanley Research estimates.

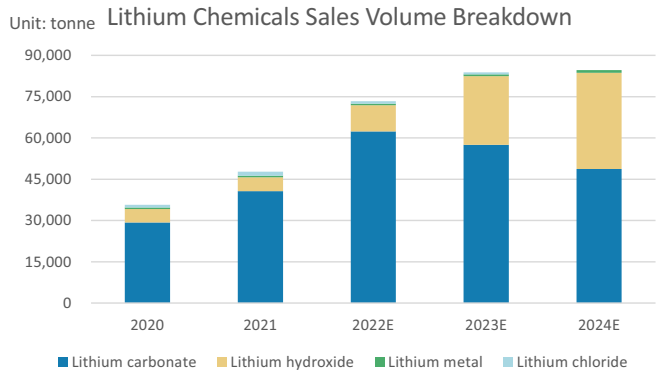
More specifically, sales volume of lithium carbonate will reach 62.4kt, 57.5kt, and 48.7kt, and that of lithium hydroxide will be 9.5kt, 25.0kt, and 35.0kt, in 2022-24, respectively, compared with 40.7kt and 5.0kt realized in 2021, respectively, per our estimates.

Factoring in our assumption for existing operational capacity in China, external tolling business, and capacity ramp-up at Kwinana Stage I, we expect ASP of lithium compounds and derivatives to reach Rmb422.9k/t, Rmb279.0k/t, and Rmb123.7k/t in 2022-24, respectively, compared with 2021's Rmb104.0k/t.

Tianqi's lithium chemicals' pricing mechanism can be mainly divided into three types: (1) spot sales to the domestic market; (2) spot sales to the overseas market; and (3) long-term sales to the overseas market, with the previous two mainly referenced against the prices published by domestic third-party pricing agencies when the contracts are signed. Furthermore, as for spot sales, there is normally a one-month difference between contract-signing and cargo delivery, and, as a result, changes in the spot prices are realized on Tianqi's income statements with a one-month lag.

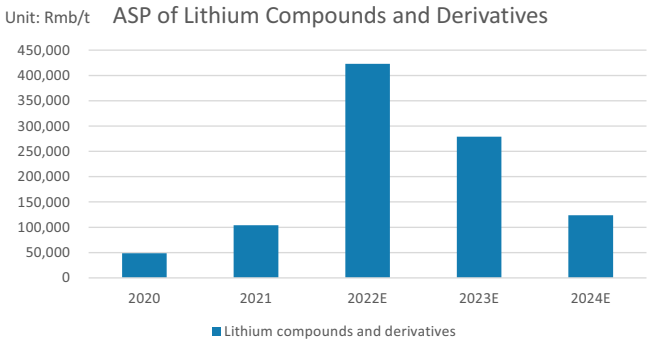
The pricing mechanism for long-term contracts with downstream customers is not the same for each. Normally, prices are adjusted on a monthly or quarterly basis, referenced against the movements in such benchmark prices reported by various overseas pricing agencies, including Fast Market, Benchmark Intelligence, and Platts, for the preceding month or quarter.

Exhibit 36: Sales Volume of Lithium Compounds and Derivatives, by Product



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 37: ASP of Lithium Compounds and Derivatives Sales



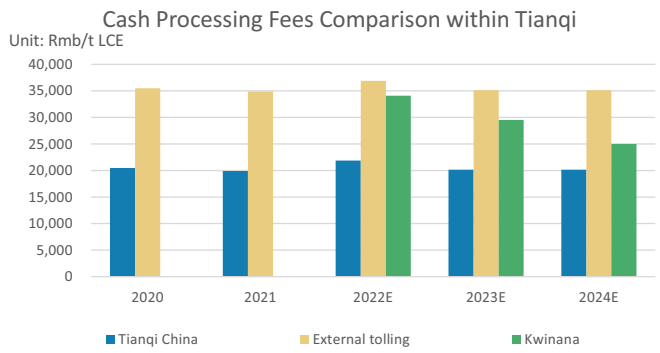
Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

We break down unit COGS for lithium compounds and derivatives sales by cost nature into three subcategories: (1) spodumene concentrate costs (mainly related with production costs at Greenbushes); (2) unit cash processing fees; and (3) unit D&A.

More specifically, higher unit cash processing fees assumption has been made for Kwinana's initial ramp-up period in 2022-23, and external tolling business, given additional processing fees paid to tollers. On the other hand, we expect unit cash processing fees for Tianqi's own conversion capacity in China to remain largely stable in the future.

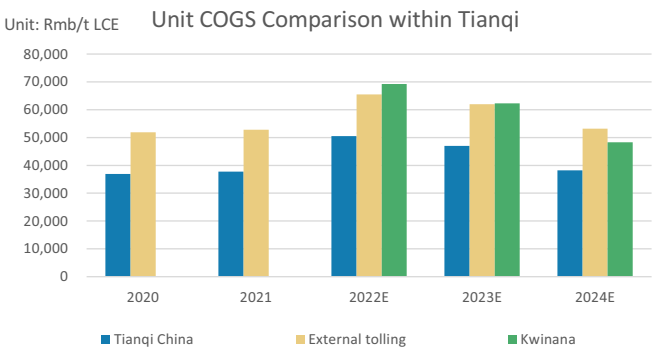
Higher unit depreciation and amortization assumption has been made to Kwinana operations, considering its greater capex intensity versus Tianqi's lithium converters in China. Coupled with higher cash processing fee forecasts, we expect unit COGS of lithium chemicals produced at Kwinana to stay at around the highest levels among the different operations within Tianqi in 2022-23.

Exhibit 38: Cash Processing Fees Comparison for Lithium Compounds and Derivatives Sales within Tianqi



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 39: Unit COGS Comparison for Lithium Compounds and Derivatives Sales within Tianqi

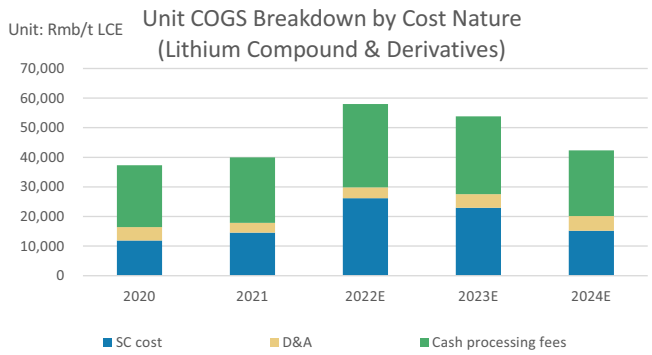


Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Reflecting these, we forecast unit COGS of lithium compounds and derivatives sales under an LCE basis to be Rmb58.0k/t, Rmb53.8k/t, and Rmb42.3k/t in 2022-24, respectively, compared with 2021's Rmb40.0k/t.

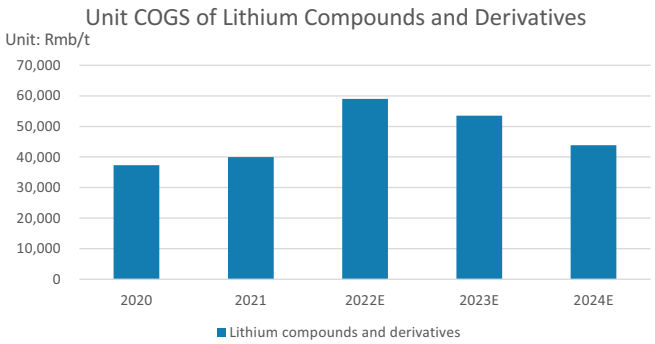
Converting our cost assumptions from an LCE tonnage basis to actual tonnage, in-line with the reporting structure, we forecast unit COGS of lithium compounds and derivatives sales to reach Rmb59.0k/t, Rmb53.5k/t, and Rmb43.9k/t in 2022-24, respectively, compared with 2021's Rmb40.0k/t.

Exhibit 40: Unit COGS of Lithium Compounds and Derivatives Sales (Under LCE Basis)



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

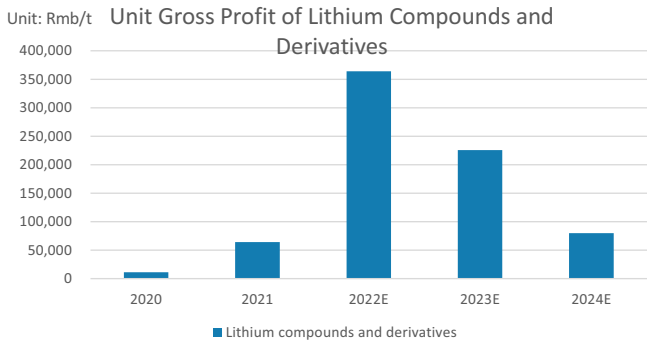
Exhibit 41: Unit COGS of Lithium Compounds and Derivatives Sales



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Given our forecasts for ASP and unit COGS, we expect unit gross profit of lithium compounds and derivatives to reach Rmb363.9k/t, Rmb225.5kt, and Rmb79.9k/t in 2022-24, respectively, compared with 2021's Rmb64.0k/t.

Exhibit 42: Unit Gross Profit of Lithium Compounds and Derivatives Sales



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Solid Relationships with Blue-Chip Downstream Customers

The capability of developing and manufacturing lithium compounds of high quality and consistency enables Tianqi to supply its lithium chemicals products to three of the five largest manufacturers of large-cell lithium-ion batteries in the world, as well as six of the ten largest cathode manufacturers in the world, as measured by market share in 2021, according to the company.

In 2019, Tianqi entered several long-term strategic supply agreements – with Northvolt, LG Chem, SKI, and EcoPro, in lithium hydroxide produced from Kwinana. Although Kiwinana's operations are currently still in the trial production stage, Tianqi has been shipping lithium hydroxide from its Shehong Plant to some of these long-term customers, to meet their requirements for lithium chemicals.

The pricing mechanism for long-term contracts that Tianqi enters with downstream customers varies for each. Currently, Tianqi has been starting to undertake the supply agreements with Northvolt and SKI, with products produced at its production bases in China, and shipped to the overseas customers. Prices are normally adjusted on a monthly (for SKI-related orders) or quarterly (for Northvolt-related orders) basis, referenced against the movements in such benchmark prices reported by various overseas pricing agencies, including Fast Market, Benchmark Intelligence, and Platts, for the preceding month or quarter.

Tianqi expects the pricing mechanism to be implemented with LG Chem and EcoPro in the future to be similar to the one used with SKI, with prices to be adjusted on a monthly basis.

Exhibit 43: Long-term Lithium Chemicals Supply Contracts Signed with Downstream Customers

Customer	Date of Contract Signing	Effective Period	Contract / Agreement
LG Chem	June-22	2023 - 2026 (eligible 3-year extension)	Supply agreement is eligible to be extended by three years, if both parties could reach agreement on certain terms.
Dynanonic	June-22	July 2022 - Dec 2024	Volume negotiated on a monthly basis; Total annual procurement volume can be +-20% deviated from the previous negotiated volume.
northvolt	September-19	2020 - 2025	Annual base volume supplied to Northvolt is 25%-10% of lithium hydroxide output under Kwinana's full production. Additional volume could be supplied per Northvolt's demand.
LG Chem	August-19	2020 - 2022 (eligible 3-year extension)	Annual base volume supplied to LG Chem is ≥15% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per LG Chem's demand. Supply agreement is eligible to be extended by three years, if both parties could reach agreement on certain terms.
SK Innovation	April-19	July 2019 - Dec 2024	Annual base volume supplied to SKI and EcoPro is ~20%-25% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per SKI's demand.
EcoPro BM	April-19	July 2019 - Dec 2023	Annual base volume supplied to SKI and EcoPro is ~20%-25% of lithium hydroxide output under Kwinana's full capacity. Additional volume could be supplied per EcoPro's demand.

Source: Tianqi Lithium, Morgan Stanley Research.

Furthermore, in May 2022, Tianqi signed a strategic cooperation agreement and a lithium carbonate supply agreement with China Aviation Lithium Battery (CALB), a high-tech enterprise specializing in the development, production, sales and market application of lithium batteries, battery management systems and related integrated products and lithium battery materials in China.

According to the agreement, both companies will cooperate on resource development, lithium chemicals conversion, new materials, battery components and battery cell manufacturing, resource recycling and utilization, etc., from May 2022 to April 2027. In addition, according to the lithium carbonate supply agreement, Tianqi will supply battery-grade lithium carbonate to CALB from June 2022 to December 2022.

More recently, in June 2022, Tianqi signed a strategic cooperation agreement with Shenzhen Dynanonic, a leading cathode manufacturer in China, where Tianqi will supply lithium carbonate in batches to Dynanoic during the period of July 2022 to Dec 202, per Dynanoic's consumption requirements.

Strategic Investments in SQM

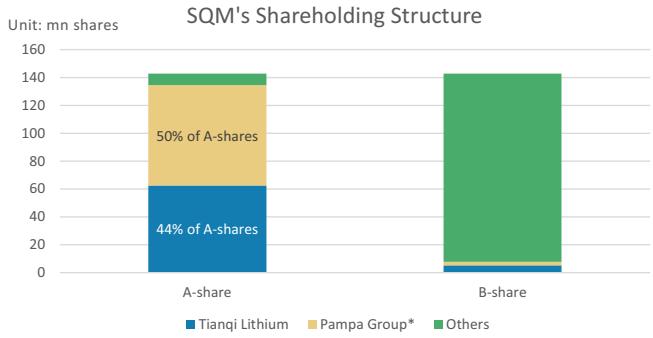
Acquisition of SQM's B-shares in 2016: On September 26, 2016, Tianqi entered an SQM Share Purchase Agreement with SCP to acquire 5,516,772 B-shares of SQM, representing 4.58% of B-shares outstanding and 2.10% of total shares (A-shares & B-shares) outstanding, and an option that enabled Tianqi to further purchase SQM's B-shares held by SCP, but Tianqi did not exercise such option.

Acquisition of SQM's A-shares in 2018: On May 17, 2018, Tianqi entered an SQM Share Purchase Agreement with Nutrien to acquire 62,556,568 A-shares of SQM, which represents an approximately 23.77% equity interest in SQM, from Nutrien, an Independent Third Party, for consideration of US$65 per share in cash. The total consideration for the acquisition was approximately US$4.07bn. The SQM transaction was completed on December 3, 2018. Immediately following the completion of the SQM transaction, Tianqi held 62,556,568 A-shares and 5,516,772 B-shares of SQM, altogether representing approximately 25.86% of the total issued capital of SQM, becoming the second-largest shareholder of SQM.

Tianqi's shareholding in SQM was subsequently diluted from 25.86% to 22.16%, as of August 2022, as a result of SQM's capital increase (while Tianqi did not participate in the shares subscription) in April 2021 and disposal of SQM's B-shares in 2021-22.

SQM's share structure (A-shares and B-shares) and board member structure: As of December 31, 2021, SQM had two classes of shares traded on the Santiago Stock Exchange, namely 142.8mn A-shares and 142,8mn B-shares, of which approximately 47% of B-shares are traded on the New York Stock Exchange in the form of American Depositary Receipts. Both shares have the same economic rights (i.e., both receive equal dividends) and voting rights, except in relation to the election of the board of SQM, whereby A-share holders elect seven of the eight board members through a cumulative voting mechanism, while B-share holders elect the remaining one board member.

Exhibit 44: SQM's Shareholding Structure (A-shares and B-shares) as of December 31, 2021



Source: SQM, Morgan Stanley Research.

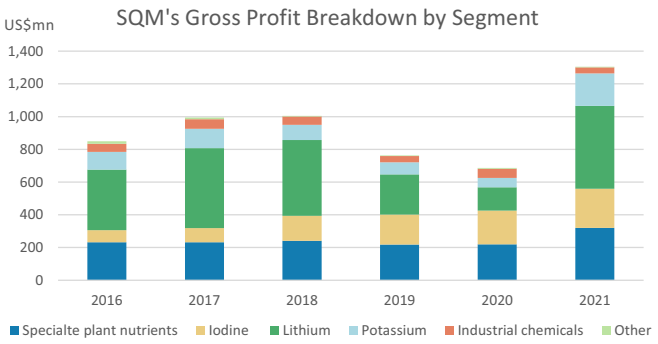
As of December 31, 2021, SQM had two classes of shares, namely 142,819,552 Series A shares and 142,818,904 Series B shares.

Tianqi's position in SQM: Pursuant to the FNE Agreement (an extra-judicial settlement) reached between Tianqi and the Chilean National Economic Prosecutor's Office (FNE), Tianqi is not able to exercise any control or have any decisive influence over SQM or its underlying business, and it currently does not have any offtake agreements or any other arrangements with SQM with respect to its lithium resources. That said, it has the right to nominate up to three members to the board of directors of SQM. As of February 2022, three of the independent directors were nominated by Tianqi. As an aside, such FNE Agreement has an effective term of four years and will be automatically renewed for two years thereafter, and is expected to expire around 2024.

In contrast to Tianqi and other lithium producers in China, SQM has exposure to other chemicals as well, apart from lithium chemicals. We primarily attribute the notable changes in the lithium segment's gross profits to volatile prices, considering steadily increasing lithium capacity over the past several years, rising from 48ktpa to 180ktpa lithium carbonate capacity by 2022.

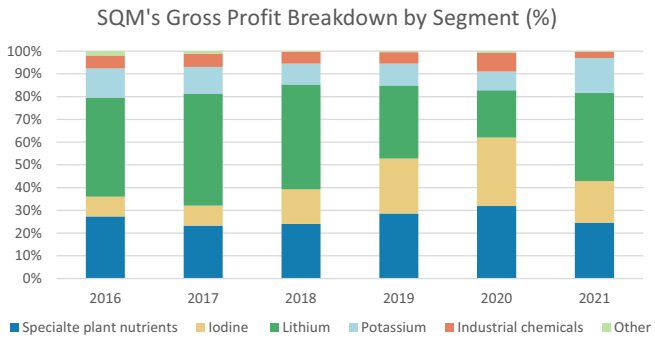
As a result of changes in prices and thus profitability, during 2016-21, gross profit from lithium chemicals accounted for 20-50% of SQM's total gross profit.

Exhibit 45: Gross Profit Breakdown, by Segment, for SQM



Source: SQM, Morgan Stanley Research.

Exhibit 46: Gross Profit Breakdown, by Business Segment



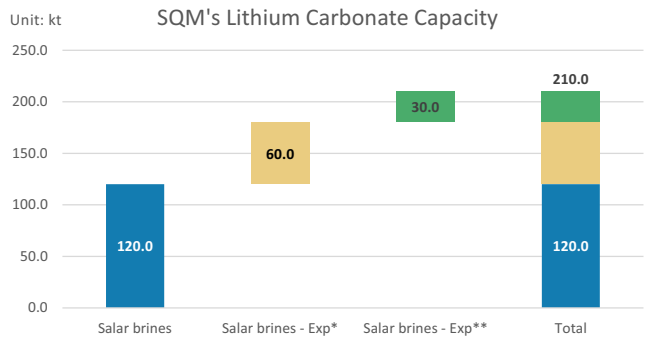
Source: SQM, Morgan Stanley Research.

SQM's current operating capacity and future capacity plans: In early March 2022, SQM announced that it will begin working on a new project at the Carmen Lithium facility in Chile to increase efficiencies and quality, and further expand its lithium carbonate and lithium hydroxide capacity to 210kt and 40kt, respectively, there. More recently, in August 2022, the company reiterated such capacity expansion target.

Apart from continuous expansion in Atacama, in February 2021, SQM's board of directors approved the investment in the Mt. Holland Project in its (50%/50%) joint venture with Wesfarmers. Upon completion, the project will be able to produce 50.0kt of lithium hydroxide on an annual basis.

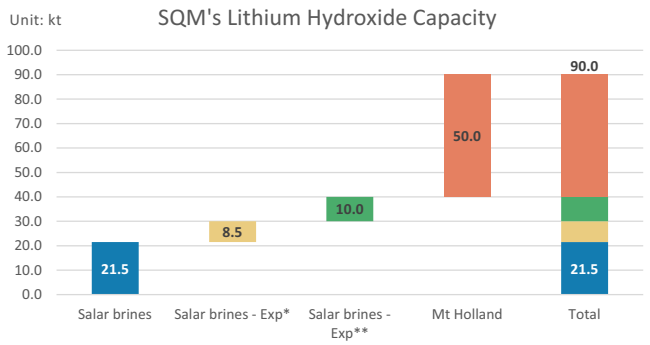
As an aside, SQM's lithium hydroxide produced in Salar brines (Atacama) is using its own lithium carbonate as feedstock.

Exhibit 47: SQM's Lithium Carbonate Capacity Build-up



Source: SQM, Morgan Stanley Research. Note: (*): SQM expects to increase lithium carbonate capacity at Salar Brines to 180ktpa by 2022. (**): SQM expects to increase lithium carbonate capacity at Salar Brines further to 210ktpa by 2023.

Exhibit 48: SQM's Lithium Hydroxide Capacity Build-up



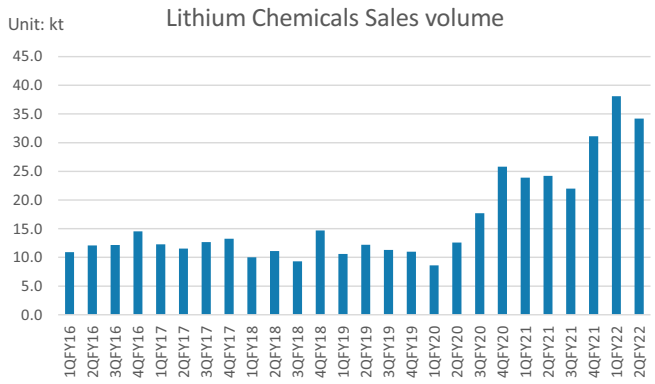
Source: SQM, Morgan Stanley Research. Note: Mt Holland is a 50/50 JV between SQM & Wesfarmers, with lithium hydroxide. (*): SQM expects to increase lithium hydroxide capacity at Salar Brines to 30ktpa by 2022. (**): SQM expects to increase lithium hydroxide capacity at Salar Brines further to 40ktpa by 2023. Note: capacity being 50ktpa. So far, there's no specific timeline for the project.

Thanks to strong demand growth and continuous conversion capacity expansion, SQM's 1H22 lithium chemicals sales volume reached 72kt, with the annual run-rate hitting 144kt.

Realized sales volume and ASP for lithium chemicals: SQM expects to achieve total sales volume of at least 145kt in 2022, compared with 101kt in 2021, representing a year-on-year growth of approximately 44%.

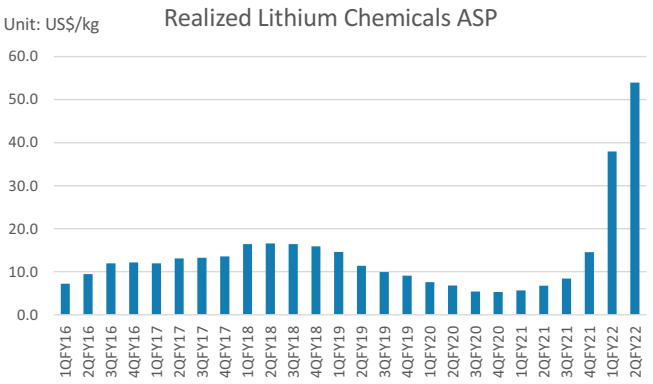
Further, thanks to improving market dynamics, SQM's realized ASP for lithium chemicals sales has been increasing steadily, with the 2Q22 reading coming in at US$54.0/kg, compared with only US$9.3/kg for 2021. Furthermore, SQM has guided that in terms of sales contract mix for 2022, it will have (1) 15% contracted at a fixed or variable price with ceiling, (2) 70% contracted at variable price, and (3) 15% not contracted, indicating that further ASP hikes are possible if the overall market balance remains tight.

Exhibit 49: SQM's Quarterly Realized Lithium Chemical Sales Volume



Source: SQM, Morgan Stanley Research.

Exhibit 50: SQM's Quarterly Realized Lithium Chemicals ASP



Source: SQM, Morgan Stanley Research.

Lease payment agreement (CORFO-related): SQM's subsidiary SQM Salar holds exclusive rights to exploit the mineral resource in the Salar de Atacama in northern Chile. These rights are owned by the Chilean Economic Development Corporation (CORFO) and leased to SQM Salar pursuant to the Lease Agreement, which was first signed in 1993, and subsequently amended.

The latest agreement became effective on April 10, 2018. It is reasonable to expect continuous amendments as mutually agreed by the parties until its current expiration date of December 31, 2030. SQM makes lease payments to CORFO, which are associated with the sale of different products produced in the Salar de Atacama, including lithium carbonate, lithium hydroxide and potassium chloride.

Exhibit 51: Lease Payment Agreement between SQM and CORFO in SQM's Major Products

Lease Payment Agreement between SQM and CORFO					
Li2CO3		LiOH		KCL	
US$/MT	*%*	*US$/MT*	*%*	*US$/MT*	*%*
<4,000	6.8%	<5,000	6.8%	<300	3.0%
4,000-5,000	8.0%	5,000-6,000	8.0%	300-400	7.0%
5,000-6,000	10.0%	6,000-7,000	10.0%	400-500	10.0%
6,000-7,000	17.0%	7,000-10,000	17.0%	500-600	15.0%
7,000-10,000	25.0%	10,000-12,000	25.0%	>600	20.0%
>10,000	40.0%	>12,000	40.0%		

Source: SQM, Morgan Stanley Research. Note: Effective from April 2018.

Below, we conduct some sensitivity analyses on the effective lease rate under different lithium prices.

Exhibit 52: Effective Lease Rates for Lithium Chemicals under Different Prices

Lease Payment Sensitivity Analysis - Li2CO3		
ASP (US$/t)	Lease fee (US$/t)	Effective lease rate
10,000	1,372	14%
14,000	2,972	21%
18,000	4,572	25%
22,000	6,172	28%
26,000	7,772	30%
30,000	9,372	31%
34,000	10,972	32%
38,000	12,572	33%
42,000	14,172	34%
46,000	15,772	34%
50,000	17,372	35%

Lease Payment Sensitivity Analysis - LiOH		
ASP (US$/t)	Lease fee (US$/t)	Effective lease rate
10,000	1,030	10%
14,000	2,330	17%
18,000	3,930	22%
22,000	5,530	25%
26,000	7,130	27%
30,000	8,730	29%
34,000	10,330	30%
38,000	11,930	31%
42,000	13,530	32%
46,000	15,130	33%
50,000	16,730	33%

Source: Morgan Stanley Research.

Dividend payout policy: Pampa Group, the largest shareholder of SQM, and Tianqi, the second-largest shareholder of SQM, normally reach an agreement among shareholders on a periodic basis, which includes the dividend policy.

For example, SQM's final dividend policy for 2021 was amended, per the resolution to the extraordinary shareholders' meeting held on November 17, 2021, and the dividend payout ratio was primarily determined by several financial metrics, as shown in Exhibit 53, and a special dividend of US$1.4/sh was paid in December 2021.

Exhibit 53: SQM's Dividend Policy (Financial Metrics Based)

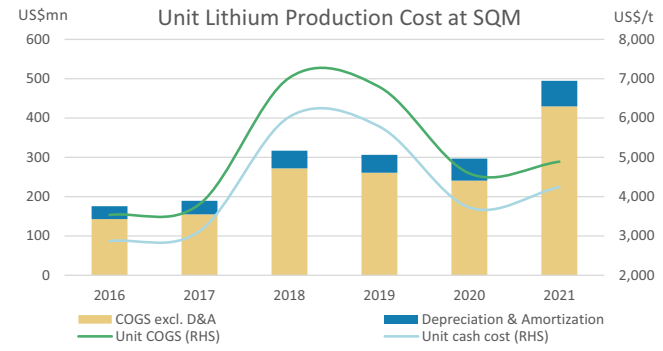
Dividend Policy for 2021 (amended on November 17, 2021)					
Dividend Payout (% of Net Income) would be :			100%	80%	60%
1	Current Asset / Current Liabilities	≥	2.5	2.0	1.5
2	All Liabilities - Cash - Other Current Financial Assets / Total Equity	≤	0.85	0.95	1.05
If none financial parameters are met, dividend payout would be 50% of the 2021 net income.					

Dividend Payout (% of Net Income) is expected to be 100% based on 2021 financials					
1	Current Asset / Current Liabilities	=	4.62	≥	2.5
2	All Liabilities - Cash - Other Current Financial Assets / Total Equity	=	0.43	≤	0.85

Source: SQM, Morgan Stanley Research.

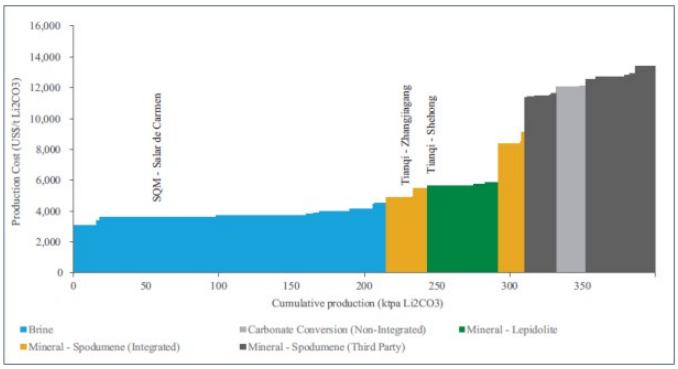
Compelling cost advantages in lithium carbonate producing: Unit COGS or unit cash costs for lithium produced at SQM have been range-bound, between US$3k-7k/t, very low levels globally, thanks to large-scale operations, the high lithium concentration and low contaminants (Mg) in the brines, and the high evaporation rates.

Exhibit 54: Unit Lithium Production Costs at SQM since 2016



Source: SQM, Morgan Stanley Research.

Exhibit 55: Lithium Carbonate Cost Curve in 2021



Source: Wood Mackenzie.

(Reverse) impairment on the investments in SQM: In 2019, after considering the adverse macroeconomic changes, lithium product price and delay of production capacity expansion, Tianqi recorded impairment losses of Rmb5.24bn on the equity investments in SQM. Later on, considering the improving market outlook starting from late 2020, Tianqi reversed impairment losses of Rmb1.60bn for the period ended December 31, 2021, under IFRS. Such reversal cannot be recognized under PRC GAAP, due to the different sets of accounting rules.

If the carrying amount of an asset exceeds its recoverable amount, an impairment loss is recognized. The recoverable amounts of SQM are determined by value-in-use calculations, where cash flow is projected based on SQM's historical financial information, operation plan, latest market information and independent technical review report, among other factors.

Investments in Domestic New Energy Entities

SAPT: As of February 2022, Tianqi held a 9.91% equity interest in Shanghai Aerospace Power Technology Co., Ltd. (SAPT), a new energy company in China that primarily operates in the development and manufacture of advanced lithium-based batteries for a range of applications, including EVs and electric locomotives.

SES: As of February 2022, Tianqi held a 9.34% equity interest in SES Holdings Pte. Ltd. (SES), specializing in the development and manufacture of solid-state batteries with ultra-high energy density using ultra-thin lithium-metal foil, as well as electrolyte and anode materials.

XTC New Materials: As of February 2022, Tianqi held a 2.25% equity interest in XTC New Energy Materials (Xiamen) Co., Ltd. (XTC New Energy Material), focusing on the development and manufacture of lithium-ion battery cathode materials, mainly producing lithium cobalt oxide, nickel-cobalt-manganese based ternary materials, etc.

WeLion: As of February 2022, Tianqi held a 3.45% equity interest in Beijing WeLion New Energy Technology Co., Ltd. (WeLion), focusing on the development and manufacture of hybrid solid/liquid electrolyte batteries and all-solid lithium batteries. Furthermore, in May 2022, Tianqi announced that it plans to form a joint venture with WeLion, in which Tianqi accounted for 51% of registered capital to engage in anode (lithium metal based) manufacturing related business.

Financial Summary

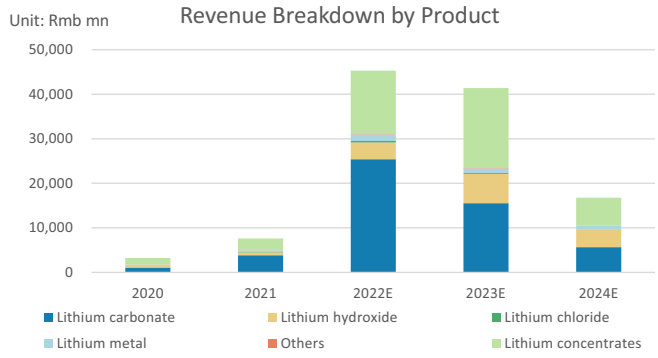
Summary & Conclusions

As we mentioned earlier, Tianqi's products can be divided into two categories, i.e., technical-grade spodumene concentrate and lithium compounds and derivative products, with the latter further dividable into lithium carbonate, lithium hydroxide, lithium metal, and lithium chloride.

Based on our assumption of lithium output at the self-owned factories, and external tolling volume mainly for production of lithium carbonate, we expect lithium compound and derivatives manufacturing to remain the largest revenue contributor, and within this, the portion of lithium hydroxide will increase.

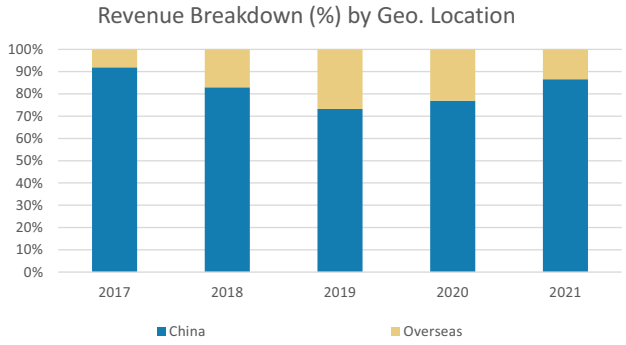
During 2017-21, China's local market remained Tianqi's major target market, with revenue contribution staying within a range of 70-90%. With Kwinana operations starting commercial production from late 2022, we expect revenue contribution from the overseas market to edge up from then.

Exhibit 56: Revenue Breakdown, by Product



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 57: Revenue Breakdown of Main Business, by Geographic Location



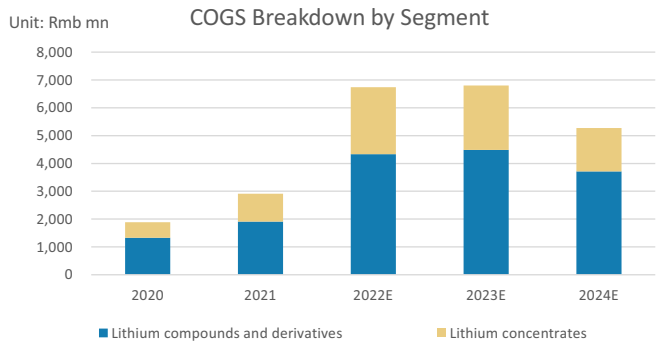
Source: Tianqi Lithium, Morgan Stanley Research.

As Tianqi is able to fully consolidate Talison into its consolidated financial statements and the subsequent internal transactions have been eliminated (i.e., TLEA procures spodumene concentrates from Talison), only COGS related with sales of all the technical-grade concentrates and Albemarle's portion of chemical-grade concentrates are reported.

As a result, COGS for lithium compounds and derivatives are lower as well, as prices for spodumene concentrate only represent its production cost rather than selling price.

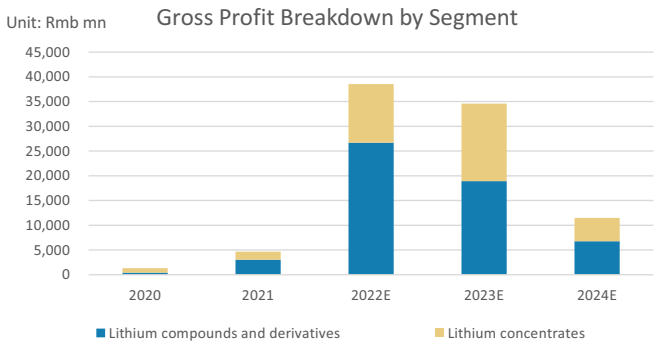
We expect Tianqi's gross profit to reach Rmb38.1bn, Rmb34.2bn, and Rmb11.4bn in 2022-24, respectively, compared with 2021's Rmb4.7bn.

Exhibit 58: COGS Breakdown, by Segment



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 59: Gross Profit Breakdown, by Segment

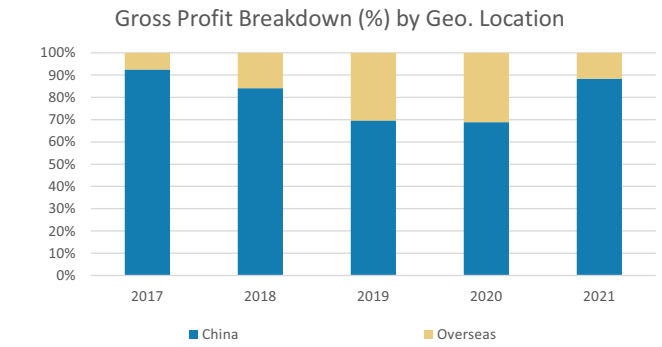


Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Similar to the previously mentioned revenue breakdown by geographic location, during 2017-21, China's local market remained Tianqi's major target market, and its gross profit contribution stayed above 70%.

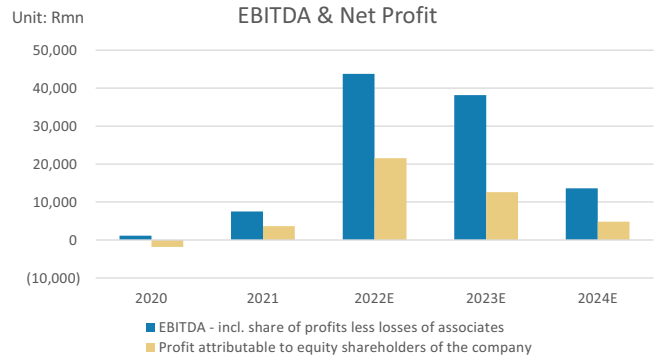
Adjusting the minority interests attributable to Albemarle (49% equity interest in Windfield) and IGO (49% equity interest in TLEA, 24.99% equity interest in Windfield, and 49% equity interest in TLA), we expect Tianqi's net profit to reach Rmb21.6bn, Rmb12.6bn, and Rmb4.9bn in 2022-24, respectively, compared with 2021's Rmb3.6bn. The improvement in 2022-23 is mainly driven by elevated lithium prices and higher lithium sales volume, aided by continuous capacity ramp-up at the Greenbushes Mine.

Exhibit 60: Gross Profit Breakdown of Main Business, by Geographic Location



Source: Tianqi Lithium, Morgan Stanley Research.

Exhibit 61: EBITDA and Net Profit Attributable to Shareholders



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Debt Schedule and Maturity Date

In October 2018, to finance acquisition of the equity interest in SQM, Tianqi entered into two facilities agreements (Syndicated Loan A and Syndicated Loan B) and a further facility agreement (Syndicated Loan C), and drew down all of them, amounting to US$3.5bn.

In December 2020, Tianqi entered an amendment and extension deed, and amended and restated the facility agreement with the lenders of the Syndicated Loan A and Syndicated Loan C, pursuant to which the lenders conditionally agreed to modify the terms of the loans. The maturity date of the Syndicated Loan A and Syndicated Loan C

was then extended to November 26, 2021, with conditional automatic extension, and the maturity date of **the Syndicated Loan B was extended to November 29, 2023.**

As all required conditions were fulfilled in late November 2021, the maturity date of **the Syndicated Loan A and Syndicated Loan C were further extended to November 25, 2022.**

Considering the previous repayments made to Syndicated Loan A and Loan C, we estimate that **as of 1Q22, the balance of the outstanding syndicated loans (A+B+C) is US$1.37bn, or Rmb9.3bn (USDCNY @ 6.80).**

In late-July 2022, Tianqi announced that **it had fully repaid the remainder of the Syndicated Loan**, using the proceeds from recently completed H-share IPO.

Capex Plan, by Project Pipeline

In our view, Tianqi would need to further spend development capex on upstream mining resources and supplementary facilities - (1) Greenbushes; and (2) Yajiang Cuola – and on midstream lithium conversion capacity (1) Anju; (2) Kwinana; and (3) Tongliang. In addition, sustaining capex will be mainly required for its operations at the Greenbushes Mine and domestic lithium conversion capacity.

Upstream project 1: Greenbushes: According to the BDA report, total capex of A$1,797mn is forecasted over the life of mine for the Greenbushes Mine from January 1, 2022, to the end of 2041. Specifically, A$440mn (part of total investments of A$516mn) and A$537mn is budgeted for the construction of processing plants (CGP3 and CGP4). Furthermore, Tianqi lifted the overall budget for CGP3 by A$69mn – to A$627mn – in its 2021 annual report, considering rising staff expenses, equipment upgrades, higher construction costs, etc. Also, IGO, the counterparty at the Greenbushes Project, expects remaining capital cost of A$500-550mn at end-March 2022, in-line with the number suggested by the heightened capex guidance provided by Tianqi.

In addition, A$115mn, A$99mn, and A$14mn are budgeted for such supplementary facilities as an expanded tailings storage facility (TSF4), an expanded mine services area (MSA), and a 132kV power project.

Upstream project 2: Yajiang Cuola: According to Tianqi's 2021 report, total capex budgeted for Yajiang Cuola Stage I was Rmb399mn, with ~Rmb100mn spent already. That said, there might be some difference in the future, as the total budget was made several years back and the company is conducting a feasibility study on recommencing the development and production of the mine.

Midstream project 1: Kwinana Stage I & Stage II: With Stage I already in trial production, there is limited outstanding capex. Meanwhile, as stated by IGO in its public disclosures in December 2020, it expected the Stage II Project to commission within 2024, with remaining capex being US$190mn as of the end of 2020. We note that Tianqi is still working on the feasibility study for Stage II of the project and expects to resume construction in the second half of 2022.

Midstream project 2: Anju Stage I: Total budget for Anju Stage I (20.0ktpa battery-grade lithium carbonate) was set at Rmb1.43bn, and the company does not expect much difference at the current stage. The remaining capex at the end of 2021 was Rmb1.37bn.

Midstream project 3: Tongliang expansion project: Tianqi plans to expand 2ktpa lithium metal capacity at its Tongliang Plant in Chongqing to benefit from future development in solid-state lithium batteries. As the capex budget for the expansion project has not been announced yet, our assumptions are based on the company's historical depreciation and amortization levels, sales volume of lithium chemicals, assumed life of use of 20 years and certain discounts to reflect existing capacity expansion instead of new capacity construction, to arrive at our capex assumption.

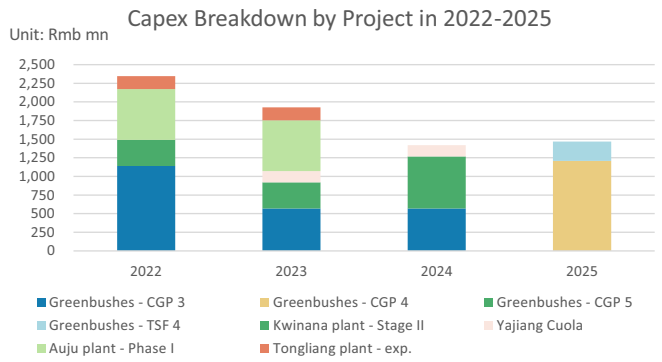
In Exhibit 62 and Exhibit 63, we provide the expected timeline for the aforementioned project capex in 2022-25, with major development capex expected to be spent in 2022-23. Meanwhile, we note that capex related with supplementary facilities (i.e., tailing storage facilities, power project, etc.) at the Greenbushes Mine will also be mainly spent during these two years.

Exhibit 62: Outstanding Capex for Major Projects

Split by project & by period (Rmb mn)	Total budget	Spent as of FY21	Remaining
Greenbushes - CGP 3	2,821	538	2,282
Greenbushes - CGP 4	2,417	0	2,417
Greenbushes - CGP 5	0	0	0
Greenbushes - TSF 4	518	0	518
Kwinana plant - Stage II	2,535	1,138	1,397
Yajiang Cuola	399	98	301
Auju plant - Phase I	1,431	66	1,365
Auju plant - Phase II	0	0	0
Tongliang plant - exp.	346	0	346
Sum	**13,930**	**5,291**	**8,639**

Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 63: Capex Breakdown, by Project

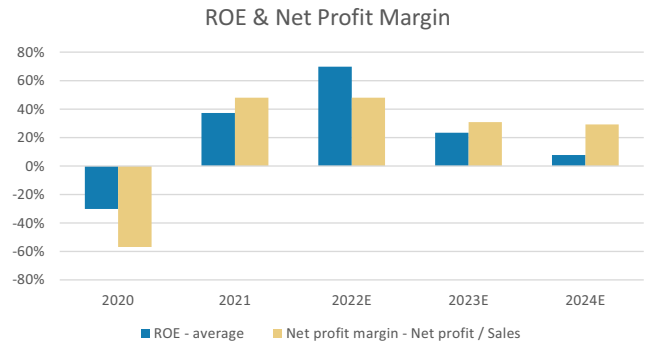


Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

A Glance at Key Financial Metrics

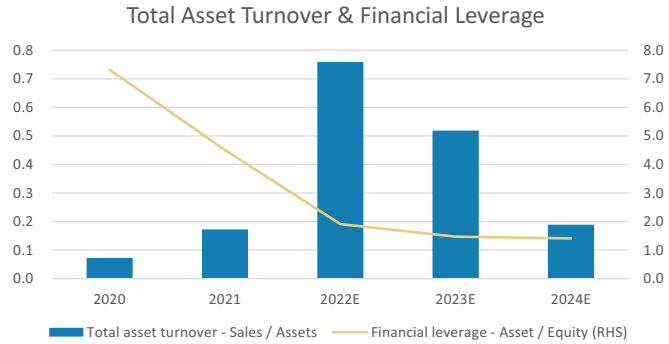
Overall, we expect net profit margin to be higher than 45% in 2022, and over 25% in 2023-24. Considering the funding usage in debt repayment and project development, we have not assumed any dividend payout in 2022-24, and this may lead to lower asset turnover (due to higher equity and thus assets). In addition, we expect financial leverage (asset-to-equity ratio) to decline, given the company's further deleveraging efforts. These are the major reasons why ROE declines at more rapid pace than net profit margin, per our forecasts.

Exhibit 64: ROE and Net Profit Margin



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: Net profit margin herein is calculated by dividing net profit attributable to shareholders by total revenue. ROE (average) herein is calculated by dividing net profit attributable to shareholders by average shareholder equities.

Exhibit 65: DuPont Analysis – Total Asset Turnover & Financial Leverage

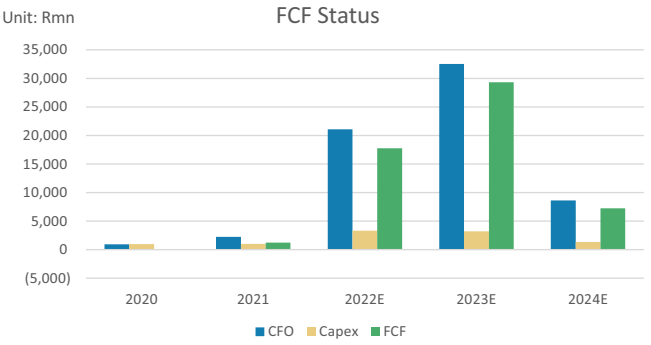


Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Aided by a strong earnings profile, especially in 2022-23, the company's cash-flow-generating capability should improve notably, and thus generate much higher free cash flows, per our assessment. In addition, dividends received from SQM should further improve the overall cash position.

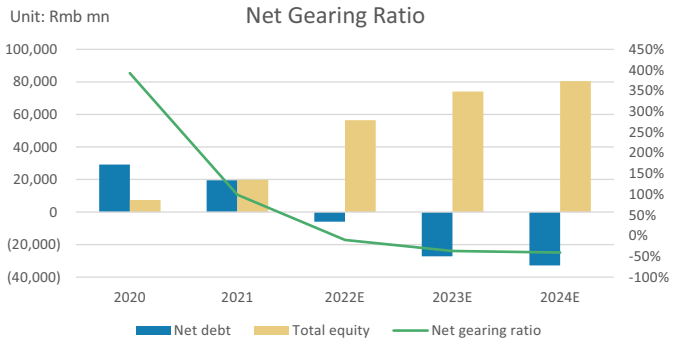
As a result, without assuming further major M&A events, we expect Tianqi to become net cash positive in 2022-24.

Exhibit 66: Free Cash Flow Status



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 67: Net Gearing Ratio (Net Debt / Total Equity)



Source: Tianqi Lithium, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Sensitivity Analysis

We conduct a sensitivity analysis on the impact of the changes of different variables on Tianqi's net profits in 2022-23. Apart from flexing the variables stated in each table, there are mainly three underlying assumptions here: (1) spodumene concentrate sourced from TLEA will be used in Kwinana's plants at a priority, and Tianqi is entitled to the remaining portion; (2) there is no difficulty for Tianqi to find external tollers to process the excess spodumene concentrate beyond its own conversion capacity; and (3) products produced under external tolling agreements are primarily lithium carbonate (assumption).

Based on our analysis, changes in battery-grade lithium carbonate prices and total spodumene concentrate output from Greenbushes are the primary earnings drivers.

Exhibit 68: Earnings Impact from Changes in Realized Lithium Carbonate and Lithium Hydroxide ASP in China

2022E	China BG LC ASP				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-18.5%	-9.9%	-1.3%	7.2%	15.8%
-10.0%	-17.8%	-9.2%	-0.7%	7.9%	16.5%
0.0%	-17.2%	-8.6%	0.0%	8.6%	17.2%
10.0%	-16.5%	-7.9%	0.7%	9.2%	17.8%
20.0%	-15.8%	-7.2%	1.3%	9.9%	18.5%

China BG LiOH ASP

2023E	China BG LC ASP				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-19.5%	-10.5%	-1.5%	7.5%	16.4%
-10.0%	-18.7%	-9.7%	-0.8%	8.2%	17.2%
0.0%	-18.0%	-9.0%	0.0%	9.0%	18.0%
10.0%	-17.2%	-8.2%	0.8%	9.7%	18.7%
20.0%	-16.4%	-7.5%	1.5%	10.5%	19.5%

China BG LiOH ASP

Source: Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: BG represents battery-grade; LC and LiOH represents lithium carbonate and lithium hydroxide; ASP represents average selling price.

We note that the positive impact of rising ASP and volume from Kwinana on Tianqi's net profit is minimal because that profit generated at Kwinana needs to flow into the minority shareholder, whereas there is no need to also split profit earned from Tianqi China's operations and external tolling business.

Exhibit 69: Earnings Impact from Changes in Kwinana's Realized Lithium Hydroxide Output and ASP

2022E	Kwinana LiOH ASP				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-0.1%	0.1%	0.4%	0.6%	0.9%
-10.0%	-0.4%	-0.1%	0.2%	0.5%	0.8%
0.0%	-0.6%	-0.3%	0.0%	0.3%	0.6%
10.0%	-0.9%	-0.5%	-0.2%	0.2%	0.5%
20.0%	-1.1%	-0.8%	-0.4%	0.0%	0.4%

Kwinana Stage I LiOH vol.

2023E	Kwinana LiOH ASP				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-0.9%	0.4%	1.7%	3.0%	4.2%
-10.0%	-2.0%	-0.6%	0.8%	2.3%	3.7%
0.0%	-3.2%	-1.6%	0.0%	1.6%	3.2%
10.0%	-4.4%	-2.6%	-0.8%	0.9%	2.7%
20.0%	-5.5%	-3.6%	-1.7%	0.2%	2.2%

Kwinana Stage I LiOH vol.

Source: Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: LiOH represents lithium hydroxide; ASP represents average selling price.

We note our assumption that Tianqi's realized spodumene concentrate ASP will move largely in-line with the prices Talison sells to two of its shareholders (TLEA and Albemarle). Putting this another way, the implied assumption would be that Tianqi's realized ASP for its technical-grade spodumene concentrate moves in a similar trend as Talison's realized ASP in all of its spodumene concentrate sales.

Exhibit 70: Earnings Impact from Changes in Greenbushes' Total Spodumene Concentrate Output and Tianqi's Realized Spodumene Concentrate ASP

2022E	Greenbushes total SC output				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-17.7%	-7.4%	2.9%	13.2%	23.5%
-10.0%	-19.1%	-8.9%	1.4%	11.7%	22.0%
0.0%	-20.6%	-10.3%	0.0%	10.3%	20.6%
10.0%	-22.0%	-11.7%	-1.4%	8.8%	19.1%
20.0%	-23.4%	-13.1%	-2.9%	7.4%	17.7%

SC realized ASP

2023E	Greenbushes total SC output				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	-18.1%	-5.9%	6.4%	18.6%	30.9%
-10.0%	-21.3%	-9.0%	3.2%	15.4%	27.6%
0.0%	-24.4%	-12.2%	0.0%	12.2%	24.4%
10.0%	-27.6%	-15.4%	-3.2%	9.0%	21.2%
20.0%	-30.8%	-18.6%	-6.4%	5.8%	18.0%

SC realized ASP

Source: Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: SC represents spodumene concentrate; ASP represents average selling price.

Exhibit 71: Earnings Impact from Changes in Kwinana's Unit Cash Cost (ex. Spodumene Concentrate) and Unit External Tolling Fee

2022E	Kwinana unit cash cost (excl. SC)				
Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
-20.0%	0.4%	0.3%	0.3%	0.2%	0.2%
-10.0%	0.2%	0.2%	0.1%	0.1%	0.1%
0.0%	0.1%	0.0%	0.0%	0.0%	-0.1%
10.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%
20.0%	-0.2%	-0.2%	-0.3%	-0.3%	-0.4%

Unit external tolling fee

2023E	Kwinana unit cash cost (excl.		
Change %	-20.0%	-10.0%	0.0%
-20.0%	1.0%	0.7%	0.4%
-10.0%	0.8%	0.5%	0.2%
0.0%	0.6%	0.3%	0.0%
10.0%	0.4%	0.1%	-0.2%
20.0%	0.2%	-0.1%	-0.4%

Unit external tolling fee

Source: Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: SC represents spodumene concentrate.

The impact of output changes at Tianqi's self-produced lithium carbonate and hydroxide on net profit is limited mainly because: (1) external tollers will fill in the gap between spodumene concentrate sourced from TLEA by Tianqi and its own requirement for spodumene concentrate at its domestic plants; and (2) the assumed external tolling fee is not high.

Exhibit 72: Earnings Impact from Changes in Self-Produced Lithium Carbonate (LC) and Lithium Hydroxide (LiOH) Output

2022E	Output of self-produced LC				
Output of self-produced LiOH in China	Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
	-20.0%	-0.5%	-0.4%	-0.2%	0.0%	0.2%
	-10.0%	-0.4%	-0.3%	-0.1%	0.1%	0.3%
	0.0%	-0.4%	-0.2%	0.0%	0.2%	0.4%
	10.0%	-0.3%	-0.1%	0.1%	0.3%	0.4%
	20.0%	-0.2%	0.0%	0.2%	0.4%	0.5%

2023E	Output of self-produced LC				
Output of self-produced LiOH in China	Change %	-20.0%	-10.0%	0.0%	10.0%	20.0%
	-20.0%	-0.8%	-0.5%	-0.2%	0.1%	0.4%
	-10.0%	-0.7%	-0.4%	-0.1%	0.2%	0.5%
	0.0%	-0.6%	-0.3%	0.0%	0.3%	0.6%
	10.0%	-0.5%	-0.2%	0.1%	0.4%	0.7%
	20.0%	-0.4%	-0.1%	0.2%	0.5%	0.8%

Source: Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: LC and LiOH represents lithium carbonate and lithium hydroxide.

Financial Summary Table

Exhibit 73: Financial Summary – Under IFRS

Key Drivers (tonne / Rmb/t - excl. VAT)	2019	2020	2021	2022E	2023E	2024E
Spodumene concentrate production volume	764,571	579,974	953,971	1,334,092	1,474,200	1,474,200
Spodumene concentrate sales volume	345,507	352,747	551,190	737,046	807,100	807,100
Lithium compounds and derivatives production volume	43,736	38,050	43,696	49,090	64,610	86,220
Lithium compounds and derivatives sales volume	40,848	35,701	47,711	73,338	83,852	84,643
Spodumene concentrate ASP	5,540	4,195	4,785	19,375	22,291	7,811
Lithium compounds and derivatives ASP	71,051	48,606	103,964	422,915	279,001	123,739
Spodumene concentrate unit gross profit	3,809	2,622	2,968	16,102	19,421	5,884
Lithium compounds and derivatives unit gross profit	33,813	11,266	63,973	363,877	225,489	79,862

Income Statement (Rmb mn)	2019	2020	2021	2022E	2023E	2024E
Revenue	4,816	3,215	7,598	44,877	41,003	16,623
Gross Profit	2,697	1,327	4,688	38,135	34,199	11,354
SG&A	(455)	(435)	(499)	(799)	(730)	(864)
EBITDA	(2,432)	989	6,756	38,132	33,822	11,077
EBIT	(2,766)	621	6,302	37,745	33,424	10,528
PBT	(4,478)	(1,053)	5,579	42,690	37,369	12,837
Net Profit	**(5,480)**	**(1,125)**	**4,206**	**33,432**	**29,110**	**10,265**
Net profit Attributable to Shareholders	**(5,981)**	**(1,831)**	**3,649**	**21,571**	**12,618**	**4,850**

Balance Sheet (Rmb mn)	2019	2020	2021	2022E	2023E	2024E
Cash & Equivalents	3,931	788	1,766	14,582	33,423	36,462
Receivables - Notes & Accounts	1,024	892	3,370	11,660	4,236	4,458
Inventories	917	851	872	3,114	1,733	1,876
Total Assets	**46,666**	**42,288**	**45,800**	**72,547**	**85,755**	**90,182**
Payables - Notes & Accounts	1,942	2,039	1,536	4,228	2,370	2,822
Borrowings	33,863	30,153	21,563	8,915	6,415	3,915
Total Liabilities	**37,760**	**34,860**	**26,007**	**16,051**	**11,693**	**9,645**
Shareholders Equity	6,960	5,201	14,357	47,502	60,120	64,971
Minority Interest	1,946	2,226	5,436	8,994	13,942	15,566
Total Liabilities and Equity	**46,666**	**42,288**	**45,800**	**72,547**	**85,755**	**90,182**

Cash Flow (Rmb mn)	2019	2020	2021	2022E	2023E	2024E
Depreciation & Amortisation	341	377	458	410	418	557
Changes in working capital	286	53	(2,047)	(7,841)	6,947	87
Net cash inflow from operating	2,047	916	2,233	21,056	32,529	8,600
Capex	3,735	963	1,001	3,302	3,202	1,352
Net cash flows from investing	**(3,338)**	**(520)**	**(65)**	**1,843**	**737**	**964**
New borrowing	6,482	4,265	3,751	0	0	0
Net cash generated from financing	**4,003**	**(3,508)**	**(1,148)**	**(10,083)**	**(14,425)**	**(6,526)**
Effect of the changes in FX	17	(30)	(42)	0	0	0
Change in cash	**2,712**	**(3,113)**	**1,020**	**12,816**	**18,841**	**3,038**

Per Share Data (Rmb)	2019	2020	2021	2022E	2023E	2024E
EPS (Rmb)	-4.41	-1.24	2.47	13.84	7.69	2.96
ModelWare EPS	(4.41)	(1.24)	2.47	13.84	7.69	2.96
Consensus EPS				14.09	8.25	6.11
Diff. to Consensus EPS (%)				-2%	-7%	-52%
DPS	0.00	0.00	0.00	0.00	0.00	0.00
BVPS	5.14	3.52	9.72	30.47	36.63	39.59

Profitability Ratios %	2019	2020	2021	2022E	2023E	2024E
ROE (Average)	-70.0%	-30.1%	37.3%	69.7%	23.4%	7.8%
EBITDA Margin	-50.5%	30.8%	88.9%	85.0%	82.5%	66.6%
EBIT Margin	-57.4%	19.3%	82.9%	84.1%	81.5%	63.3%
PBT Margin	-93.0%	-32.8%	73.4%	95.1%	91.1%	77.2%
Net Profit Margin	-124.2%	-56.9%	48.0%	48.1%	30.8%	29.2%
Net Debt / Equity %	330.4%	392.6%	98.9%	-10.4%	-36.8%	-40.7%
Interest Cover (EBITDA) (x)	-1.2	0.5	4.5	54.0	88.8	47.1
Working Capital % of Sales	0.0%	-9.2%	35.6%	23.5%	8.8%	21.1%
Days Sales AR outstanding	58	58	42	43	50	45
Days in Inventory	127	171	108	108	130	125
Days Payable outstanding	123	165	102	121	142	135
Cash Conversion	62	64	48	30	38	35

Valuation Multiples (x)	2019	2020	2021	2022E	2023E	2024E
P/E	-15.8	-56.2	28.2	5.0	9.1	23.6
P/BV	13.6	19.8	7.2	2.3	1.9	1.8
EV/Sales	26.1	41.8	16.8	2.5	2.5	5.8
EV/EBITDA	-51.7	135.7	18.9	2.9	3.0	8.8
FCF Yield %	-1.8%	0.0%	1.2%	16.3%	25.7%	6.3%
Dividend Yield %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

EV/EBITDA Analysis	2019	2020	2021	2022E	2023E	2024E
Latest Closing Price (HKD/sh)	81.00	81.00	81.00	81.00	81.00	81.00
Eq share o/s (mn)	1,355	1,477	1,477	1,559	1,641	1,641
Market Cap (Rmb mn)	**94,415**	**102,895**	**102,895**	**108,611**	**114,327**	**114,327**
Net Debt	29,424	29,158	19,576	(5,889)	(27,230)	(32,768)
Minority Interest	1,946	2,226	5,436	8,994	13,942	15,566
Enterprise Value (Rmb mn)	**125,785**	**134,280**	**127,906**	**111,717**	**101,039**	**97,126**
EBITDA (Rmb mn)	(2,432)	989	6,756	38,132	33,822	11,077
EV/EBITDA	(51.7)	135.7	18.9	2.9	3.0	8.8
FCF (Rmb mn)	(1,688)	(47)	1,232	17,754	29,327	7,248

Source: Company data, Morgan Stanley Research. E = Morgan Stanley Research estimates. Note: Net profit margin herein is calculated by dividing net profit attributable to shareholders by total revenue. ROE (average) herein is calculated by dividing net profit attributable to shareholders by average shareholder equities.

Peer Comparison

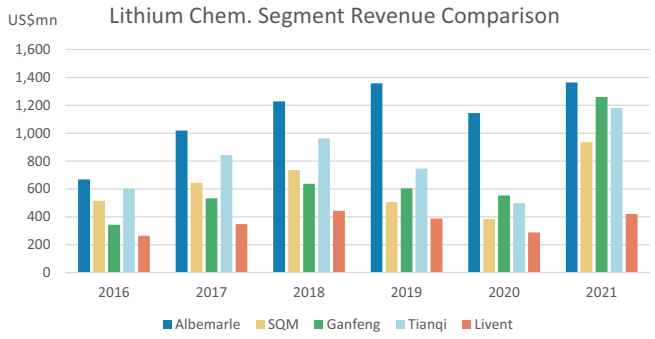
In this section we compare Tianqi Lithium with Albemarle, SQM, Ganfeng Lithium and Livent in terms of their lithium chemicals segment revenue, lithium chemicals segment revenue as a percentage of total revenue, lithium chemicals (lithium carbonate and lithium hydroxide) conversion capacity, lithium chemicals (lithium carbonate and lithium hydroxide) volume, lithium chemicals segment gross profit, and gross profit margin.

Financials and Key Operating Metrics

In 2021, revenue from the lithium chemicals segment for Albemarle, Ganfeng Lithium, and Tianqi Lithium reached a similar level, while, in the prior few years, Albemarle was comparatively well ahead of the others in terms of lithium chemicals segment revenue.

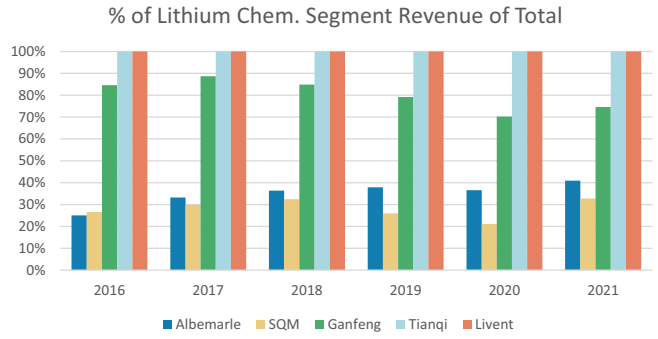
As Albemarle and SQM are also involved in some other chemicals business, the portion of revenue from their lithium chemicals segments was mostly lower than 40% in 2016-21, while Ganfeng Lithium, Tianqi Lithium, and Livent saw much higher portions.

Exhibit 74: Lithium Chemicals Segment Revenue Comparison



Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research. Note: For Tianqi Lithium, revenue for sales of lithium concentrate is also accounted here.

Exhibit 75: Lithium Chemicals Segment Revenue as a % of Total

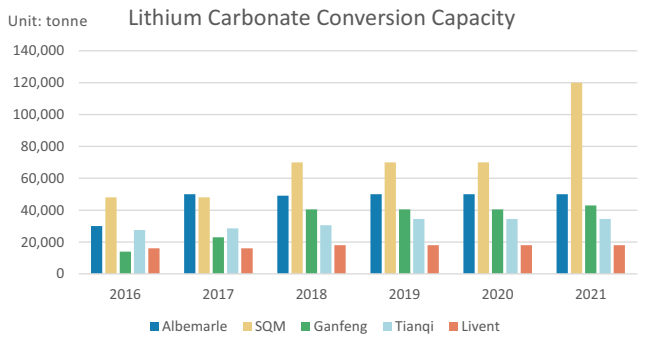


Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research. Note: For Tianqi Lithium, revenue for sales of lithium concentrate is also accounted here.

In terms of lithium carbonate conversion capacity, SQM has been taking a leading position, with capacity reaching 120ktpa at the end of 2021, compared with the others at below 50ktpa.

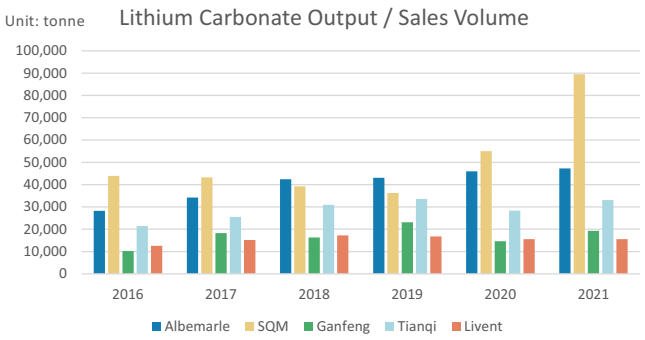
Large lithium carbonate conversion capacity has also been partially reflected in SQM's lithium carbonate sales volume, although it is still undergoing the capacity ramp-up process. Furthermore, as noted, SQM, in the medium term, has been targeting higher lithium carbonate capacity.

Exhibit 76: Lithium Carbonate Conversion Capacity



Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research.

Exhibit 77: Lithium Carbonate Output / Sales Volume

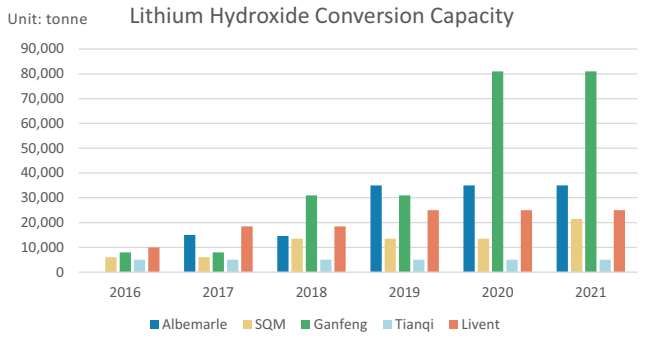


Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research. Note: Sales volume is assumed for Albemarle and SQM, while for Ganfeng Lithium, Tianqi Lithium and Livent, output volume is used here. External tolling volume for Albemarle is not included here, and sales volume is based on Morgan Stanley Research's estimates.

Ganfeng Lithium has a leading position in lithium hydroxide conversion capacity, followed by Albemarle and Livent. All five of these producers have been ramping up their lithium hydroxide capacity either via acquisition (Albemarle), new construction (Albemarle, Ganfeng Lithium, and Tianqi Lithium), or capacity expansion (SQM and Livent).

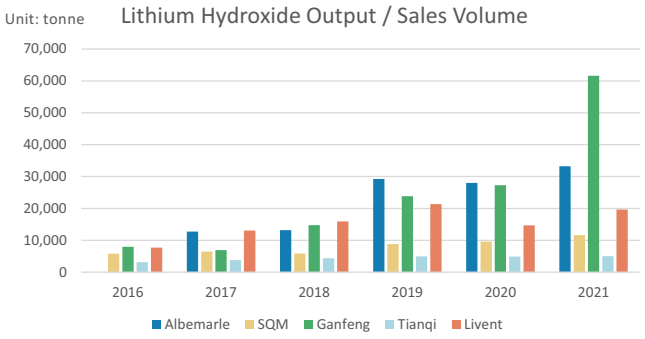
Ganfeng Lithium's new lithium hydroxide capacity commissioned in late 2020 to early 2021 led to notable volume contribution in 2021. SQM saw some volume growth, while self-produced volume for others remained largely the same during the year.

Exhibit 78: Lithium Hydroxide Conversion Capacity



Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research.

Exhibit 79: Lithium Hydroxide Output / Sales Volume

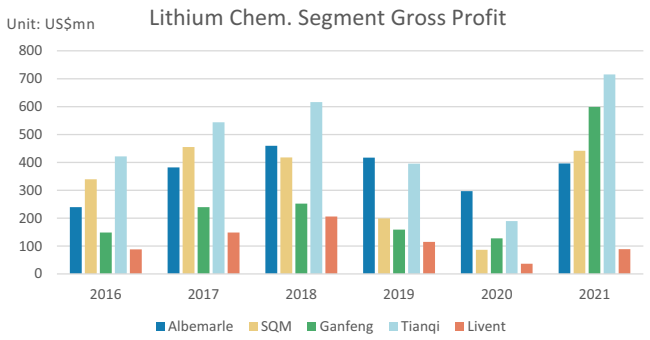


Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research. Sales volume is assumed for Albemarle and SQM, while for Ganfeng Lithium, Tianqi Lithium and Livent, output volume is used here. External tolling volume for Albemarle is not included here, and sales volume is based on Morgan Stanley Research's estimates.

In terms of lithium chemicals segment gross profit, Tianqi Lithium realized the highest amount among these five producers in 2021, while noting that due to the special accounting treatments (i.e., fully consolidated Talison and TLEA). This has to a certain extent overestimated the company's profit on an attributable basis.

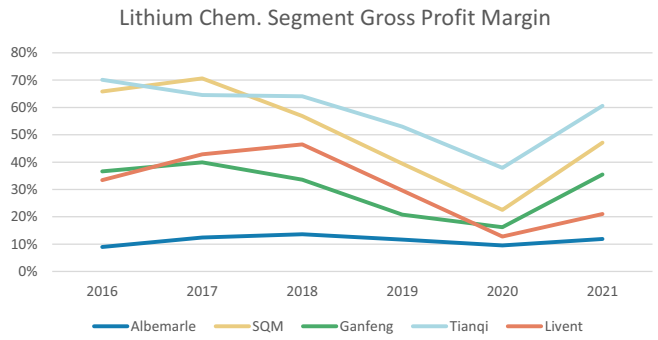
All five of these producers saw gross profit margin recovery in 2021, with a comparatively large magnitude at Tianqi Lithium, SQM, and Ganfeng Lithium.

Exhibit 80: Lithium Chemicals Segment Gross Profit



Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research.

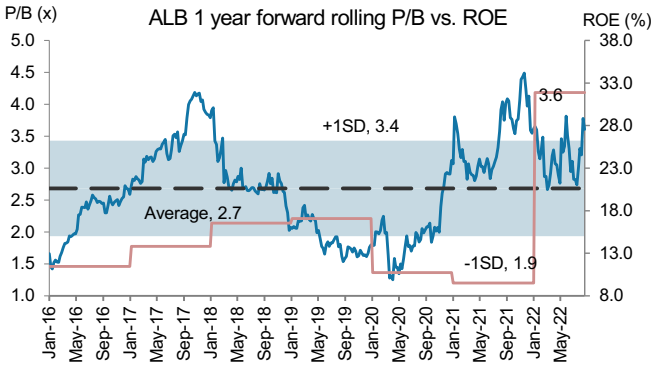
Exhibit 81: Lithium Chemicals Segment Gross Profit Margin



Source: Albemarle, SQM, Ganfeng Lithium, Tianqi Lithium, Livent, Morgan Stanley Research.

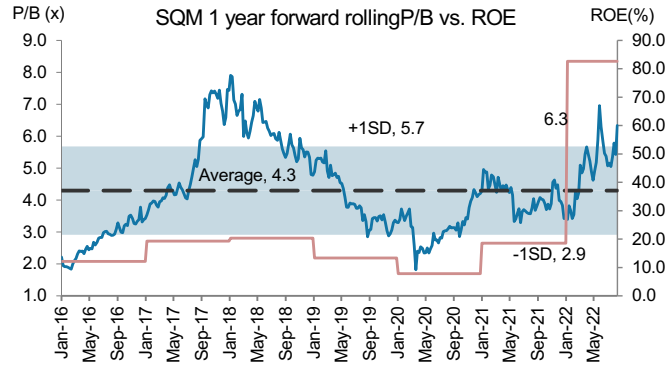
Valuation (P/B vs ROE)

Exhibit 82: Albemarle: 1-Year Forward P/B vs Current-Year ROE



Source: Refinitiv.

Exhibit 83: SQM: 1-Year Forward P/B vs Current-Year ROE



Source: Refinitiv.

Valuation

Summary & Conclusions

Our primary valuation methodology is discounted cash flow (DCF), as we believe it provides a longer-term view of the company's cash-flow-generating capability amid an environment in which lithium prices start to normalize while the company's future projects come online sequentially. Under our DCF methodology, we value Tianqi Lithium H-share at HK$107.9/sh.

As a result, we initiate coverage on Tianqi Lithium H-share with an Overweight rating and a price target of HK$107.9/sh (derived from DCF analysis), and resume coverage on Tianqi Lithium A-share with an Overweight rating and a price target of Rmb139.2/sh (we use an A-H premium of 50%). The implied 2023E P/E for Tianqi Lithium H-share is 12.1x.

The implied valuation for Tianqi Lithium H-share is higher than levels at which other Chinese peers currently trade, which we think is justified, considering Tianqi's 100% self-sufficiency in spodumene concentrate and steady output growth in self-produced lithium chemicals (Exhibit 90). Per our estimates, Greenbushes' spodumene concentrate output will achieve a 16% CAGR, 2021-25. In addition, Tianqi's total conversion capacity would reach 114.8ktpa by 2025, up from 2021's 44.8ktpa, representing a 27% CAGR.

In addition, Tianqi's 22.16% equity investment in SQM enables it to access overseas markets, local pricing mechanisms, and possible earnings revisions in the future. Meanwhile, compared with SQM, Tianqi is less exposed to potential geopolitical issues in Chile. As a result, we view the implied valuation as reasonable.

Exhibit 84: Summary of Tianqi Lithium Ratings and Price Targets

H-share rating & valuation			
Rating	**Overweight**		
Implied H-share NPV/share (HK$/sh)	**107.9**	**Share price of Tianqi - H (as of Aug 19, 2022) (HK$/sh)**	**81.0**
2023E EPS (Rmb/sh)	7.7		
Implied 2023E P/E (x)	12.1x	H-share target price upside (downside) (%)	33%
A-share rating & valuation			
Rating	**Overweight**		
Assumed A-H premium (%)	**50%**		
Implied A-share NPV/share (Rmb/sh)	**139.2**	**Share price of Tianqi - A (as of Aug 19, 2022) (Rmb/sh)**	**109.2**
2023E EPS (Rmb/sh)	7.7		
Implied 2023E P/E (x)	18.1x	A-share target price upside (downside) (%)	28%

Source: Refinitiv, Morgan Stanley Research estimates.

Methodology: DCF Valuation

We use a DCF model to derive the equity value of Tianqi's own business, and the equity value in the investments in SQM is calculated based on the latest closing price. We have assigned a holding discount of 30%, which is at the upper end of the 20-30% range that H-share investors usually assign to non-consolidated equity investments. We think this is justified since Tianqi is not able to exercise any control or have any decisive influence over SQM or its underlying business. It also currently does not have any off-take agreements or other arrangements with SQM with respect to its lithium resources.

Within the DCF model, a WACC of 10.2% and a terminal growth rate for free cash flows of 5.0% is applied for Tianqi's own business beyond our forecast period of 2023-32. This terminal growth rate can be justified by continuously increasing EV penetration rates globally and higher lithium content usage in the next frontier of lithium-ion battery technologies.

Exhibit 85: DCF Valuation - Tianqi Lithium H-share

DCF key assumptions										
Risk Free Rate	2.8%			Target Gearing Ratio			40%			
Expected market return	10.9%			Cost of Debt			4.6%			
Beta	1.48			Tax rate			25%			
Cost of Equity	15%									
WACC	**10.2%**			**Terminal Growth**			**5.0%**			
DCF model	0	1	2	3	4	5	6	7	8	9
Unit: Rmb mn	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
EBITDA	33,822	11,077	9,094	9,893	9,794	10,330	9,614	9,934	10,683	10,603
(-) Tax @ 25% tax rate	(8,455)	(2,769)	(2,273)	(2,473)	(2,448)	(2,583)	(2,404)	(2,483)	(2,671)	(2,651)
(+) Change in working capital	6,947	87	278	(658)	680	(939)	1,288	(1,365)	1,095	(987)
(-) Capex	(3,202)	(1,352)	(2,202)	(2,252)	(976)	(1,012)	(1,066)	(1,124)	(1,184)	(1,248)
FCF	**29,111**	**7,042**	**4,896**	**4,510**	**7,049**	**5,797**	**7,432**	**4,961**	**7,923**	**5,717**
PV of FCF	29,111	6,389	4,030	3,368	4,776	3,563	4,144	2,510	3,636	2,381
Sum of PV FCF	63,907									
PV of Terminal Value - Terminal growth rate @ 5.0%	48,132									
Bridge between Enterprise Value and Equity Value (Rmb mn)										
(-) Net Debt	(27,230)									
(-) Minority Interest	13,942									
(+) Investments in SQM										
Share price of SQM (as of Aug 19, 2022) (US$/sh)	90.07									
Shares outstanding (mn)	286									
USDCNY	6.76									
Holding discount	30%									
Equity interest	22.2%									
Equity value from the investments in SQM (Rmb mn)	27,012									
Enterprise Value (Rmb mn) - Terminal growth rate @ 5.0%	**112,039**									
Equity Value (Rmb bn) - Terminal growth rate @ 5.0%	**152.3**			**Equity Value (HK$bn)**			**177.1**			
Shares outstanding (mn)	1,641									
RMB/HKD	1.16									
H-share rating & valuation										
Rating	Overweight									
Implied H-share NPV/share (HK$/sh)	**107.9**			**Share price of Tianqi - H (as of Aug 19, 2022) (HK$/sh)**			**81.0**			
2023E EPS (Rmb/sh)	7.7									
Implied 2023E P/E (x)	12.1x			H-share target price upside (downside) (%)			33%			

Source: Refinitiv Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 86: Comps Table for Global Major Lithium Producers and Lithium Miners

Comps Table - Based on estimates from Refinitiv Eikon		P/E 2022E / FY22E	P/E 2023E / FY23E	P/E 2024E / FY24E	EV/EBITDA 2022E / FY22E	EV/EBITDA 2023E / FY23E	EV/EBITDA 2024E / FY24E	P/B 2022E / FY22E	P/B 2023E / FY23E	ROE 2022E / FY22E	ROE 2023E / FY23E
Ticker	Company Name (EN)	x	x	x	x	x	x	x	x	%	%
China											
1772.HK	Ganfeng Lithium - H	8.3	7.5	7.5	9.7	8.6	8.4	3.5	2.5	52.9	40.9
002460.SZ	Ganfeng Lithium - A	12.0	10.8	9.9	10.5	8.9	10.6	5.1	3.7	47.8	37.5
002240.SZ	Chenxgin Lithium	9.2	8.7	6.4	NA	NA	NA	5.2	3.6	57.3	43.9
002738.SZ	Sinomine Resource	13.0	7.9	5.7	NA	NA	NA	6.0	4.0	44.9	43.7
600499.SH	Keda Industrial	6.8	6.1	5.9	NA	NA	NA	3.1	2.3	53.3	41.2
000792.SZ	Qinghai Salt Lake	9.5	10.7	9.8	7.5	7.6	7.0	6.8	4.2	76.9	40.9
002756.SZ	Yongxing Special Materials	10.0	9.3	8.2	8.3	7.3	8.1	6.3	4.4	59.0	42.8
002497.SZ	Sichuan Yahua Industrial	8.8	7.7	6.4	NA	NA	NA	3.5	2.6	40.7	35.3
Simple Average		**10.3**	**8.8**	**7.6**	**9.0**	**8.1**	**8.5**	**6.3**	**4.0**	**60.2**	**45.4**
Overseas											
ALB.N	ALB	12.9	11.1	12.6	9.1	7.7	9.4	4.2	3.3	31.9	31.7
SQM.N	SQM	8.4	8.3	9.0	5.6	5.9	6.3	6.1	4.8	82.6	76.8
LTHM.K	Livent	20.6	14.6	19.7	12.9	9.5	11.6	3.8	3.1	27.1	26.6
AKE.AX	Allkem	18.4	8.5	8.2	8.5	4.1	3.9	2.2	1.6	16.6	22.3
PLS.AX	Pilbara Minerals	13.2	5.6	7.7	8.0	2.5	3.6	6.1	2.9	57.5	65.8
MIN.AX	Mineral Resources	24.5	4.8	6.2	9.9	3.2	4.1	3.4	2.3	13.8	53.5
IGO.AX	IGO	25.3	7.4	9.4	12.8	7.6	7.7	2.9	2.2	12.1	31.3
Simple Average		**17.6**	**8.6**	**10.4**	**9.5**	**5.8**	**6.7**	**4.1**	**2.9**	**34.5**	**44.0**

Source: Refinitiv. Note: Company estimates herein are all sourced from Refinitiv as on August 19, 2022. For Australia-listed companies, FY22E represents July 2021-June 2022, and FY23 represents July 2022-June 2023. For the companies highlighted in yellow, they currently are mainly exposed to lithium spodumene mining business.

A-Shares of Dual-listed Companies Trade at Certain Premia over Their H-shares Within Non-Ferrous Space.

As shown in Exhibit 91, (1) the A-H premium of most dual-listed non-ferrous stocks normally narrows when commodity prices are in an upcycle or stay elevated, and (2) the A-H premiums for most of these stocks have been declining over the past few years.

Despite a relatively short H-share listing period, considering that Ganfeng Lithium is the only dual-listed company within the lithium space in both the A- and H-share markets, it is worth taking a closer at how its A-H premium has changed since its IPO in late 2018. Ganfeng A-share is currently trading at a 48% premium over Ganfeng H-share.

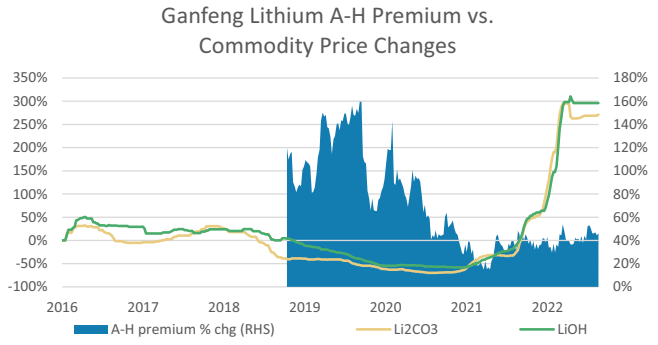
Exhibit 87: A-H Premium / H-A Discount of Dual-Listed Non-Ferrous Companies and Relevant Commodity Price Changes since 2016

Dual-Listed	Ganfeng Lithium				Zijin Mining				China Moly				Jiangxi Copper			Chalco			
Non-Ferrous Companies	H-A discount	A-H premium	LI2CO3	LiOH	H-A discount	A-H premium	Copper	Gold	H-A discount	A-H premium	Copper	Co(OH)2	H-A discount	A-H premium	Copper	H-A discount	A-H premium	Aluminum	Alumina
2016	N.A.	N.A.	12%	32%	-36%	59%	4%	18%	-65%	191%	4%	11%	-46%	84%	4%	-44%	81%	14%	28%
2017	N.A.	N.A.	12%	20%	-34%	53%	31%	19%	-48%	93%	31%	188%	-39%	64%	31%	-31%	47%	32%	62%
2018	N.A.	N.A.	-10%	11%	-30%	44%	39%	20%	-39%	68%	39%	298%	-45%	81%	39%	-29%	43%	29%	88%
2019	-53%	117%	-47%	-31%	-23%	31%	28%	31%	-38%	63%	28%	52%	-42%	72%	28%	-37%	59%	27%	69%
2020	-40%	70%	-68%	-58%	-27%	36%	31%	67%	-38%	56%	31%	58%	-46%	87%	31%	-45%	85%	29%	46%
2021	-25%	33%	-6%	-4%	-17%	21%	98%	70%	-30%	44%	98%	210%	-47%	91%	98%	-34%	53%	72%	76%
2022	-29%	42%	254%	262%	-13%	15%	#N/A	74%	-36%	57%	#N/A	329%	-47%	89%	#N/A	-39%	66%	#N/A	#N/A
Summary:																			
Avg. since 2016	-37%	66%			-26%	37%			-42%	81%			-44%	81%		-37%	62%		
Avg. since 2018	-37%	68%			-22%	29%			-38%	57%			-45%	84%		-37%	61%		
Avg. since 2020	-31%	48%			-19%	24%			-34%	52%			-47%	89%		-40%	68%		
Latest - latest-Aug 2022	-32%	46%			-11%	13%			-40%	66%			-50%	99%		-46%	84%		

Source: Morgan Stanley Research. Note: Commodity price changes herein represent the changes compared with the beginning of 2016.

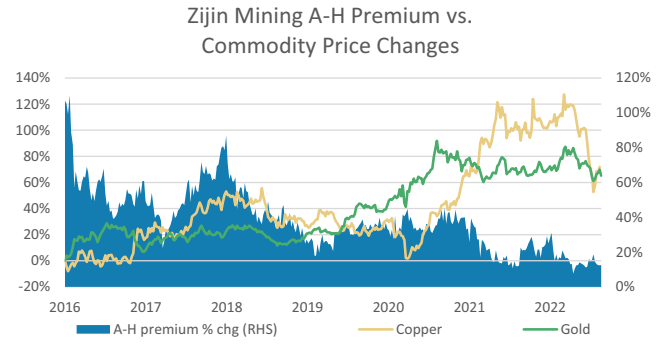
Starting from the inception of Ganfeng's H-share listing, its A-H premium expanded in 2019-20 when prices of lithium chemicals further softened. That said, entering 2020, EV penetration rates increased steadily on global government subsidies and the rising availability of models in the market, and lithium demand rebounded as a result. Coupled with subdued capex in lithium upstream resources during the downcycle, lithium prices in China's market bottomed in late 2020, and the A-H premium has declined to relatively low levels.

Exhibit 88: Ganfeng Lithium A-H Premium vs Price Changes in China's Spot Lithium Carbonate and Lithium Hydroxide



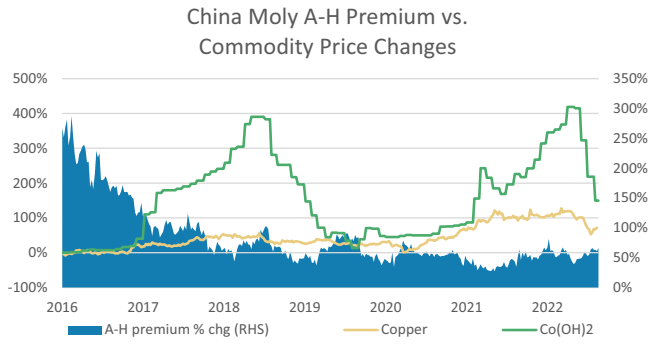
Source: Ganfeng Lithium, Refinitiv, Morgan Stanley Research.

Exhibit 89: Zijin Mining A-H Premium vs Price Changes in Gold and Copper



Source: Zijin Mining, Refinitiv, Morgan Stanley Research.

Exhibit 90: China Moly A-H Premium vs Price Changes in Copper and Cobalt Hydroxide



Source: China Moly, Refinitiv, Morgan Stanley Research.

Our A-share price target for Tianqi Lithium of Rmb139.2/sh uses an A-H premium of 50%, which is similar to Ganfeng Lithium's A-H premium since 2020, when the lithium market starts to recover from the last downcycle.

Exhibit 91: Summary of Tianqi Lithium (A-share) Rating and Price Target

A-share rating & valuation			
Rating	Overweight		
Assumed A-H premium (%)	50%		
Implied A-share NPV/share (Rmb/sh)	139.2	Share price of Tianqi - A (as of Aug 19, 2022) (Rmb/sh)	109.2
2023E EPS (Rmb/sh)	7.7		
Implied 2023E P/E (x)	18.1x	A-share target price upside (downside) (%)	28%

Source: Refinitiv, Morgan Stanley Research. E = Morgan Stanley Research estimates.

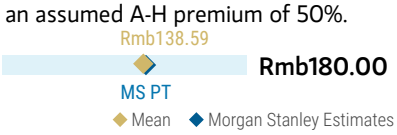
Risk Reward – Tianqi Lithium Industries Inc. (002466.SZ)

Volume growth in both upstream resources and midstream conversion capacity

PRICE TARGET Rmb139.20

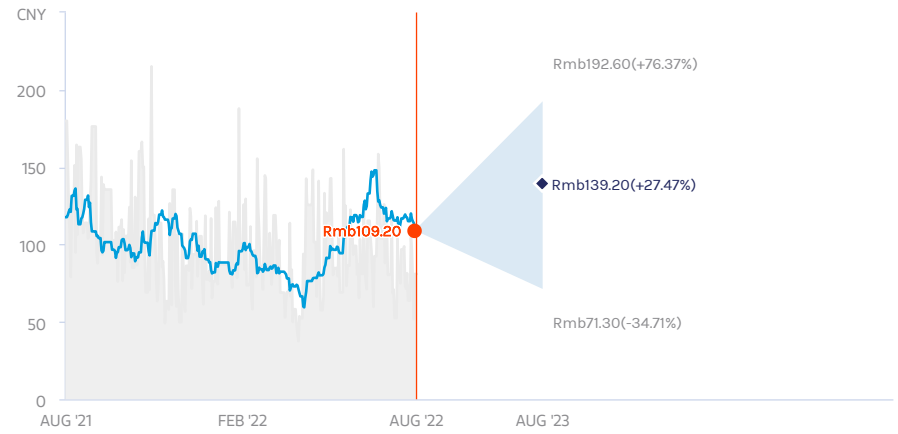
Within the DCF model, a WACC of 10.2% and a terminal growth rate for free cash flows of 5.0% is applied for Tianqi's own business beyond our forecast period of 2023-32. This terminal growth rate can be justified by continuously increasing EV penetration rates globally, and higher lithium content usage in the next frontier of lithium-ion battery technologies.
Our A-share price target for Tianqi Lithium is based on an assumed A-H premium of 50%.

Consensus Price Target Distribution



Source: Refinitiv, Morgan Stanley Research

RISK REWARD CHART



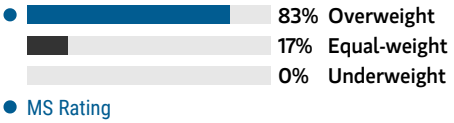
Key: Historical Stock Performance Current Stock Price Price Target

Source: Refinitiv, Morgan Stanley Research

OVERWEIGHT THESIS

(1) Access to high-quality and low-cost upstream assets with volume growth.
(2) Expansion of conversion capacity in both Australia and China.
(3) Consistently high-quality products attract leading manufacturers.
(4) We rate the shares OW relative to our coverage considering better industry demand outlook, and thus supportive pricing environment.

Consensus Rating Distribution



Source: Refinitiv, Morgan Stanley Research

Risk Reward Themes

Electric Vehicles: *Positive*

View descriptions of Risk Rewards Themes here

BULL CASE Rmb192.60

25.1x 2023 P/E

Smaller-than-expected lithium price correction expected in 2023; Quicker-than-expected ramp-up at Tianqi's own projects; Lower-than-expected manufacturing costs, especially at overseas projects.

BASE CASE Rmb139.20

18.1x 2023 P/E

Mild lithium price correction expected in 2023; Tianqi's own projects could ramp up on time, per the company guidance; Manufacturing costs under control.

BEAR CASE Rmb71.30

9.3x 2023 P/E

Larger-than-expected lithium price correction expected in 2023; Later-than-expected ramp-up at Tianqi's own projects; Higher-than-expected manufacturing costs, especially at overseas projects.

Risk Reward – Tianqi Lithium Industries Inc. (002466.SZ)

KEY EARNINGS INPUTS

Drivers	2021	2022e	2023e	2024e
Spodumene concentrate output volume (000 tonne)	954.0	1,334.1	1,474.2	1,474.2
Realized spot battery-grade lithium carbonate	108,576.9	408,503.0	271,374.6	116,388.8
Realized spot battery-grade lithium hydroxide	104,308.3	396,445.3	262,070.3	116,388.8

INVESTMENT DRIVERS

- Industry lithium prices (lithium carbonate, lithium hydroxide etc.)
- Spodumene concentrate output volume from Greenbushes
- Output growth in both Tianqi China and Kwinana
- Cost controls in lithium chemicals producing

GLOBAL REVENUE EXPOSURE

100% Mainland China

Source: Morgan Stanley Research Estimate
View explanation of regional hierarchies here

MS ALPHA MODELS

2/5 MOST — 3 Month Horizon

Source: Refinitiv, FactSet, Morgan Stanley Research; 1 is the highest favored Quintile and 5 is the least favored Quintile

RISKS TO PT/RATING

RISKS TO UPSIDE

(1) Higher-than-expected lithium prices
(2) Higher-than-expected output growth in upstream resources
(3) Higher-than-expected output growth in midstream conversion

RISKS TO DOWNSIDE

(1) Lower-than-expected lithium prices
(2) Lower-than-expected output growth in upstream resources
(3) Lower-than-expected output growth in midstream conversion

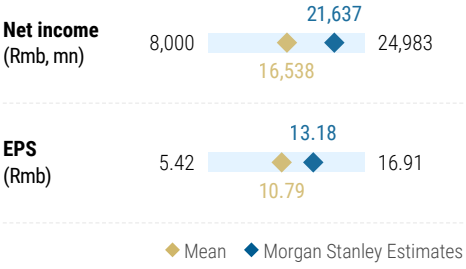
OWNERSHIP POSITIONING

Inst. Owners, % Active 99.3%

Source: Refinitiv, Morgan Stanley Research

MS ESTIMATES VS. CONSENSUS

FY Dec 2022e



Source: Refinitiv, Morgan Stanley Research

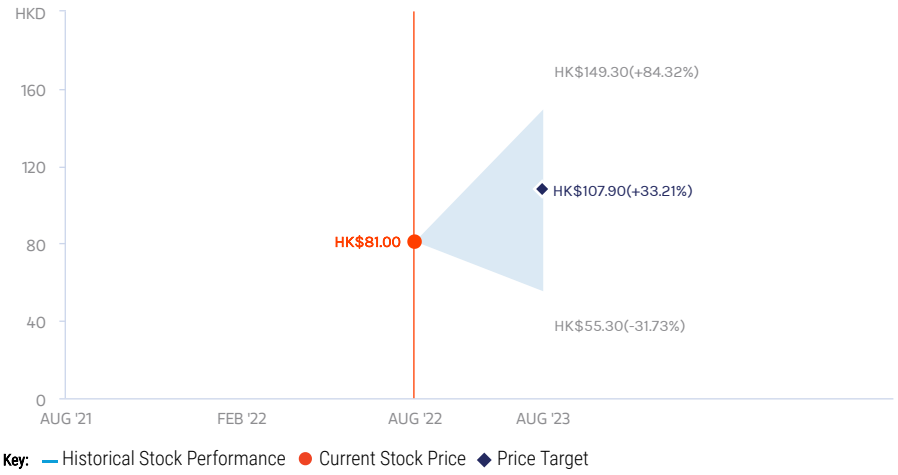
Risk Reward – Tianqi Lithium Industries Inc. (9696.HK)

Volume growth in both upstream resources and midstream conversion capacity

PRICE TARGET HK$107.90

Within the DCF model, a WACC of 10.2% and a terminal growth rate for free cash flows of 5.0% is applied for Tianqi's own business beyond our forecast period of 2023-32. This terminal growth rate can be justified by continuously increasing EV penetration rates globally, and higher lithium content usage in the next frontier of lithium-ion battery technologies.

RISK REWARD CHART



Source: Refinitiv, Morgan Stanley Research

OVERWEIGHT THESIS

(1) Access to high-quality and low-cost upstream assets with volume growth.
(2) Expansion of conversion capacity in both Australia and China.
(3) Consistently high-quality products attract leading manufacturers.
(4) We rate the shares OW relative to our coverage considering better industry demand outlook, and thus supportive pricing environment.

Risk Reward Themes

Electric Vehicles: *Positive*

View descriptions of Risk Rewards Themes here

BULL CASE HK$149.30

16.7x 2023 P/E

Smaller-than-expected lithium price correction expected in 2023; Quicker-than-expected ramp-up at Tianqi's own projects; Lower-than-expected manufacturing costs, especially at overseas projects.

BASE CASE HK$107.90

12.1x 2023 P/E

Mild lithium price correction expected in 2023; Tianqi's own projects could ramp up on time, per the company guidance; Manufacturing costs under control.

BEAR CASE HK$55.30

6.2x 2023 P/E

Larger-than-expected lithium price correction expected in 2023; Later-than-expected ramp-up at Tianqi's own projects; Higher-than-expected manufacturing costs, especially at overseas projects.

Risk Reward – Tianqi Lithium Industries Inc. (9696.HK)

KEY EARNINGS INPUTS

Drivers	2021	2022e	2023e	2024e
Spodumene concentrate output volume (000 tonne)	954.0	1,334.1	1,474.2	1,474.2
Realized spot battery-grade lithium carbonate	108,576.9	408,503.0	271,374.6	116,388.8
Realized spot battery-grade lithium hydroxide	104,308.3	396,445.3	262,070.3	116,388.8

INVESTMENT DRIVERS

- Industry lithium prices (lithium carbonate, lithium hydroxide etc.)
- Spodumene concentrate output volume from Greenbushes
- Output growth in both Tianqi China and Kwinana
- Cost controls in lithium chemicals producing

GLOBAL REVENUE EXPOSURE

100% Mainland China

Source: Morgan Stanley Research Estimate
View explanation of regional hierarchies here

RISKS TO PT/RATING

RISKS TO UPSIDE

(1) Higher-than-expected lithium prices
(2) Higher-than-expected output growth in upstream resources
(3) Higher-than-expected output growth in midstream conversion

RISKS TO DOWNSIDE

(1) Lower-than-expected lithium prices
(2) Lower-than-expected output growth in upstream resources
(3) Lower-than-expected output growth in midstream conversion

MS ESTIMATES VS. CONSENSUS

FY Dec 2022e

Net income (Rmb, mn)

◆ 21,637

Note: There are not sufficient brokers supplying consensus data for this metric

EPS (Rmb)

◆ 13.18

Note: There are not sufficient brokers supplying consensus data for this metric

◆ Mean ◆ Morgan Stanley Estimates

Source: Refinitiv, Morgan Stanley Research

Asset Profile

Upstream Lithium Resources

As of now, the Greenbushes Mine has been the only source where Tianqi directly and indirectly procures upstream lithium resources, or, more specifically, spodumene concentrate. Apart from this, Tianqi is currently considering resumption of construction work at Yajiang Cuola in 2H22 to unlock upstream resources in the domestic market. Further, Tianqi's 20% equity interest in Shigatse Zhabuya provides access to Zhabuye Salt Lake in the Tibet Autonomous Region, China.

Tianqi also currently indirectly holds a 22.16% equity interest in SQM, enabling Tianqi to benefit from notable volume growth and steady ASP improvement from lithium chemicals there. In addition, SQM has been maintaining high dividend payout ratios, with dividend payout ratios higher than 85% in the past five years, which provides Tianqi with steady cash flows.

Exhibit 96: Summary of Greenbushes Mine and Yajiang Cuola Mine

Mine Name		Greenbushes Mine		Yajiang Cuola Mine
		Central Lode & Kapanga	TSF1	
Ownership (%)		26.01%		100%
Acquisition Date		May-14		October-08
Operation Status		Under operations		Pending for future development
Location		Greenbushes, Australia		Cuola, Yajiang, China
Type of Resources		Spodumene		Spodumene
Lithium Resources (mnt LCE)	Measured	0.04		
	Indicated	10.3	0.5	0.5
	Inferred	2.7	0.1	0.2
	Total	**13.1**	**0.6**	**0.6**
	Grade (Li2O %)	1.6%	1.3%	1.3%
Lithium Reserves (mnt LCE)	Proven	0.04		
	Probable	8.2	0.4	
	Total	**8.3**	**0.4**	
	Grade (Li2O %)	2.0%	1.4%	

Source: Tianqi Lithium, Morgan Stanley Research. Note: As of December 31, 2021, for Central Lode, its indicated resources were 188.5mnt of ore at 1.8% Li2O, and inferred resources were 104.6mnt of ore at 1.0% Li2O, giving a total mineral resource of 293.1mnt ore at 1.5% Li2O. As of December 31 2021, for Kapanga, its indicated resources were 38.6mt of ore at 1.8% Li2O and inferred resources were 3.9mnt at 1.9% Li2O, giving a total mineral resource of 42.5mnt of ore at 1.8% Li2O.

Windfield – Greenbushes (26.0% equity interest)

The Greenbushes Mine is located in Greenbushes, approximately 250km south of Perth, Western Australia, and 90km southeast of the port of Bunbury, a major bulk handling port. Through its 51% equity interest in TLEA, which itself holds a 51% equity interest in Windfield, Tianqi Lithium effectively held a 26.01% equity interest in the Greenbushes Mine, the world's largest hard rock mine as measured by production volume and size of reserves in 2021. It was also one of the lowest cost producers in 2021, per Wood Mackenzie.

Resources and reserves: The majority of lithium resources and reserves at the Greenbushes Mine are located at Central Lode and Kapanga, and the rest is located at TSF1. According to the BDA report, Central Lode and Kapanga contained 13.1mnt LCE of lithium resources (including measured, indicated, and inferred) and 8.3mnt LCE of proven and probable lithium reserves as of December 31, 2021. Lithium oxide grades of the resources and reserves at Central Lode and Kapanga were reported at 1.6% and 2.0%, respectively. Meanwhile, TSF1 has 0.6mnt LCE of indicated and inferred lithium resources, and 0.4mnt LCE of probable lithium reserves.

Considering further exploration at Central Lode and a discovery of new resources at Kapanga, as well as continuous mining activities, total mineral resources at Greenbushes changed from 22Mt at a grade of 3.7% Li2O in 2010, to 340.5Mt, at 1.6% Li2O, as of December 31, 2021.

According to the BDA report, the remaining life of mine of the Greenbushes Mine is estimated to be around 21 years based on the ore reserves as on December 31, 2021, when the expansion projects currently undertaken, planned, and considered are all taken in account.

Exhibit 97: Map of Greenbushes

Source: Tianqi Lithium.

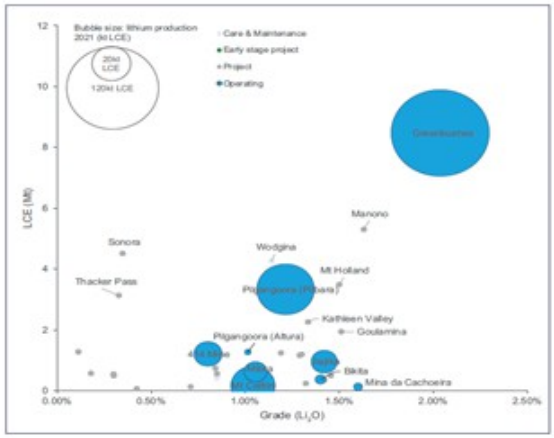
Exhibit 98: Map of Greenbushes

Source: IGO.

According to Wood Mackenzie, Greenbushes Mine has the largest lithium mineral reserves in the world, with a reported mineral reserve of 168.30mnt grading 2.04% Li2O, containing 8.5mnt LCE as of December 31, 2021.

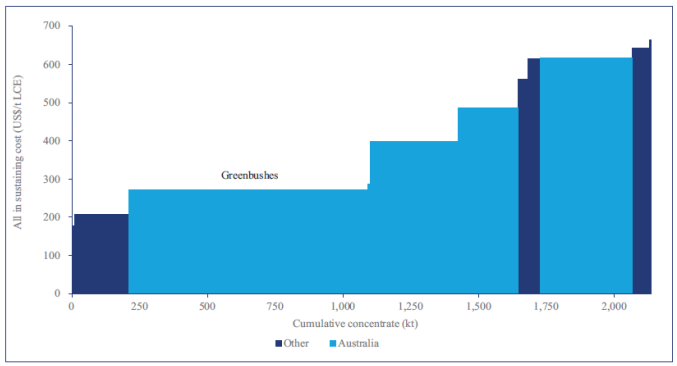
Compelling cost advantages over other mines in Australia: Apart from large-scale mineral resources and reserves, Greenbushes has also been competitive among all the spodumene producers globally in the aspect of production costs. Per Wood Mackenzie, Greenbushes had production costs of US$271/t on an all-in sustaining cost (CIF China) basis in 2021, while other mineral concentrate producers generally had production costs of US$386/t or above.

Exhibit 99: Mineral Reserve Estimates for Lithium Mines, 2021



Source: Wood Mackenzie.

Exhibit 100: Spodumene Concentrate Production Cost Curve in 2021



Source: Wood Mackenzie.

Current capacity and future capacity plans: At present, Greenbushes Mine has three processing plants under operation producing spodumene concentrate from lithium ores. They are one technical-grade plant (TGP), producing low iron technical-grade concentrates containing 5.0% to 7.2% Li2O, for glass, ceramics and porcelain industries, and No.1 and No.2 chemical-grade plants (CGP), producing chemical-grade concentrate containing 6.0% Li2O, for lithium batteries, among other uses.

Overall lithium concentrate capacity including TGP, CGP1, and CGP2 will reach 1.34mntpa upon completion of CGP2 ramp-up and yield improvements. Further volume increases will come from CGP3 and CGP4, whose construction is expected by Tianqi to be completed by 2025 and 2027, respectively, with the aggregated concentrate potentially exceeding 2.10mnt, according to the BDA report.

Shenghe Lithium – Yajiang Cuola (100% equity interest)

Located in Yajiang County, Ganzi Tibetan Autonomous Prefecture, Sichuan, Southwest China, Yajiang Cuola Project is a part of the larger Jiajika lithium mineralization district that is believed to be the largest hard rock lithium mineralization district in China and Asia. The project is located at the southeastern edge of the Qinghai-Tibet plateau at an altitude ranging from 4,100m to 4,900m. The primary spodumene pegmatite veins outcrop at elevations ranging from 4,200m to 4,550m.

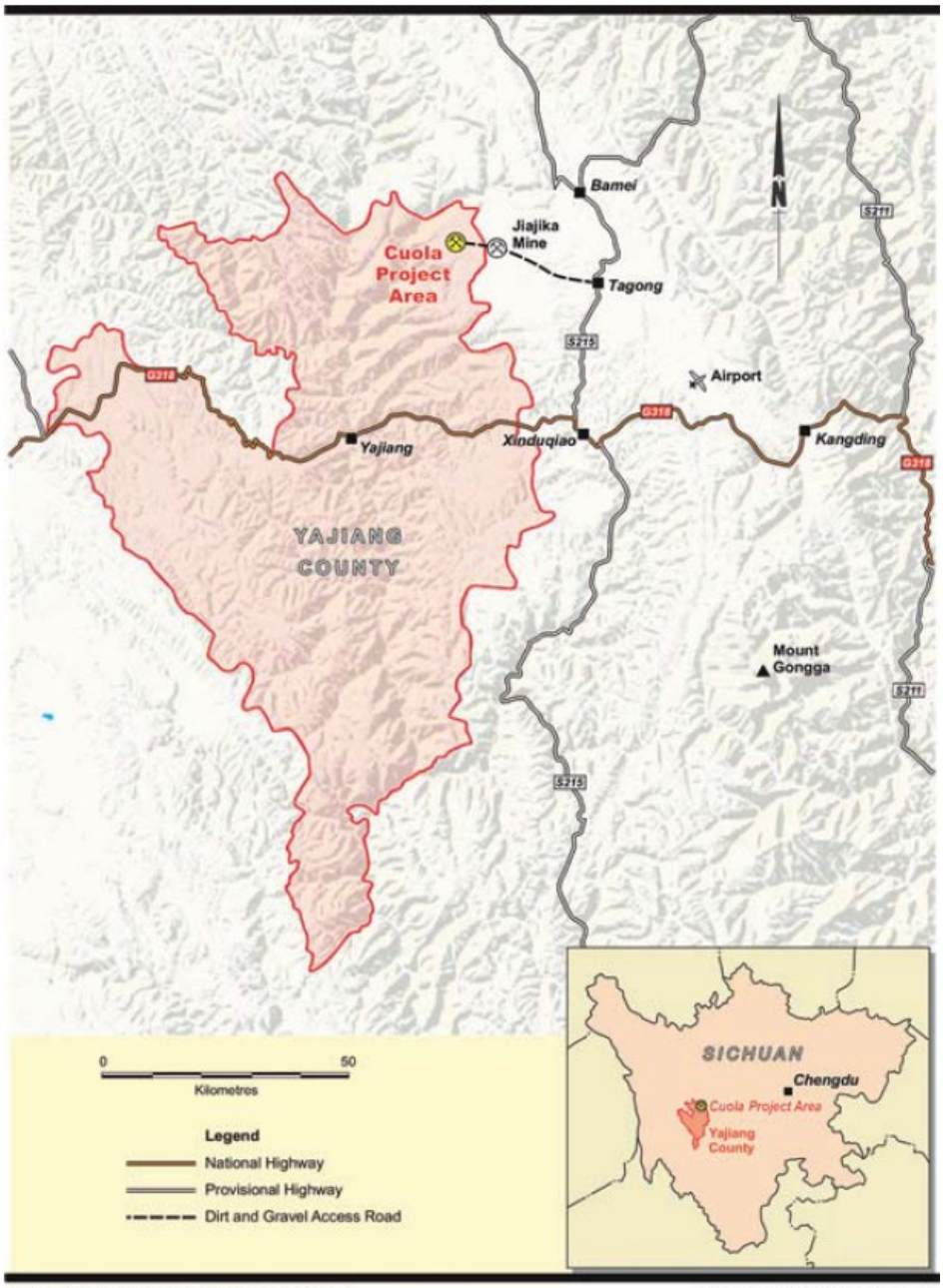
The mine has approximately 0.6mnt LCE of lithium resources (indicated and inferred) as of December 31, 2021, per the BDA report. As of February 2022, Tianqi Lithium held 100% equity interest in Yajiang Cuola Mine through its wholly owned subsidiary, Shenghe Lithium.

According to the environmental impact report released in late 2012 and Tianqi's 2012 annual report, the Cuola project was planned to build 600ktpa ore mining and processing capacity, with annual lithium concentrate output expected at 106.9kt. In addition, its mining permit is valid for 20 years from April 6, 2012, to April 6, 2032, with overall ore mining and processing capacity approved at 1.2mnt.

In August 2012, Stage I of the Yajiang Cuola Mine commenced construction, but later, in October 2013, all lithium operations at Jiajika District were suspended by the local government due to an environmental incident at a neighboring mine caused by a third party. At that time, 80% of the construction and related facilities had been completed.

In 2019, Tianqi received regulatory approval to recommence construction at Yajiang Cuola Mine. It is currently conducting a feasibility study on recommencing development and production of Yajiang Cuola Mine. It expects to resume construction in 2H22 and complete the construction of its Stage I project by 2025.

Exhibit 101: Map of Yajiang Cuola



Source: Tianqi Lithium.

SQM – Salar de Atacama (22.16% equity interest)

Salar de Atacama, located approximately 210km east of Antofagasta, is a salt-encrusted depression in the Atacama Desert. Brines are pumped from depths of 15 to 150 meters below the surface, which contain relatively high concentrations of potassium, lithium, sulfates and other minerals.

SQM's Salar de Atacama operation in the Atacama region of Chile, which has the largest brine reserves, at 45.51mnt LCE according to Wood Mackenzie, enjoys the advantages of high lithium grade, large reserves, and integrated low-cost processing capacity.

SQM holds exclusive rights to exploit the mineral resources in an area covering 140,000 hectares of land in the Atacama in northern Chile, of which SQM is entitled to exploit the mineral resources in 81,920 hectares. These rights are owned by CORFO and leased to SQM pursuant to a Lease Agreement that was first entered into in 1993 and will expire on December 31, 2030. Furthermore, several important amendments were made to the agreement in 2018.

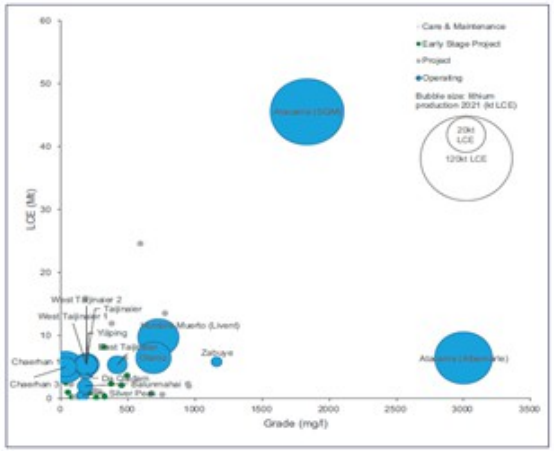
The amended lease agreement permits a total accumulated production and sales limit of up to 349,553 tons of lithium metallic equivalent (1,860,670 tons LCE), which is in addition to the approximately 64,816 tons of lithium metallic equivalent (345,015 tons LCE) remaining from the originally authorized amount. According to SQM's 2021 annual report, as of December 31, 2021, SQM extracted approximately 32% of the total permitted accumulated extraction and sales limit of lithium.

Post the acquisition of Series B shares in SQM in 2016, and the acquisition of Series A shares in SQM in 2018, as of December 31, 2021, Tianqi Lithium owned 43.8% of Series A shares and 3.7% of Series B shares of SQM, which in aggregate accounts for 23.7% of SQM's total shares.

Resources & Reserves: As reported by SQM in its 2020 annual report, the Salar de Atacama had an estimated total lithium reserve of 9.1mnt (in lithium metal content) as of December 31, 2020, with 6.0mnt proven reserves and 3.1mnt probable reserves, the largest in the world, and such reserves estimation is made without considering losses from evaporation processes and metallurgical treatment. Recoveries for lithium vary from 34% to 60%, depending on both brine composition and the process applied to produce the desired commercial products.

Meanwhile, as reported by SQM in its 2021 annual report, the Salar de Atacama has an estimated total lithium reserve of 0.36mnt (in lithium metal content) as of December 31, 2021, with 0.22mnt proven reserves and 0.14mnt probable reserves during the period of 2022-30, when a process recovery rate of 51% is applied for lithium.

Exhibit 102: Mineral Resource Estimates for Lithium Brine Deposits, 2021



Source: Wood Mackenzie. Note: SQM reports lithium reserves but not resources; however, as reserves are a subset of available resources, SQM's reserves have been represented as resources in the chart above.

Exhibit 103: Map of Atacama Salt Lake

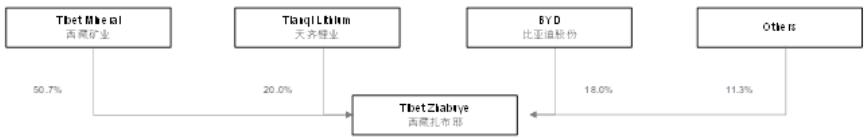
Source: SQM.

Current capacity and future capacity plans: As of the end of 2021, SQM's lithium carbonate and lithium hydroxide capacity increased to 120kt and 22kt, respectively, from 48kt and 6kt in 2016. Furthermore, the company has announced a capacity increase plan at the Carmen Lithium facility in Chile to further expand its lithium carbonate and lithium hydroxide capacity to a respective 210kt and 40kt. In addition, SQM's board of directors approved an investment in the Mt. Holland Project (50kt lithium hydroxide) at its (50%/50%) joint venture with Wesfarmers.

Shigatse Zhabuye – Zhabuye Salt Lake (20% equity interest)

The Zhabuye Salt Lake Project is located in the Tibet Autonomous Region, China. As of August 2022, Tianqi held a 20% equity interest in Shigatse Zhabuye, and Tibet Mineral was the largest shareholder. Shigatse Zhabuye mainly operates the Zhabuye Salt Lake Project that had 5.8 million tons LCE of lithium resources in 2020, according to Wood Mackenzie, and is already under production.

Exhibit 104: Shareholding structure of Shigatse Zabuye, as of August 2022



Source: Company data, Aiqicha.

According to Tibet Mineral, the project currently has 7-8kt lithium carbonate concentrate (55% lithium carbonate content within the concentrate) producing capacity, and targets to expand the existing capacity to 9-10ktpa by 2023. Furthermore, a separate project containing 9.6ktpa battery-grade lithium carbonate and 2.4ktpa industrial-grade lithium carbonate, is expected to be commissioning by September 2023.

Windfield – Salares 7 (13% equity interest)

As of August 2022, Tianqi indirectly held a 26.0% equity interest in Talison, which indirectly had a 50% equity interest in Chile SALA, owning the exploration rights of the Salares 7 Brine Exploration Project. As a result, Tianqi had an effective interest of 13% in the Salares 7 Project by then.

The Salares 7 Project is a lithium and potassium brine exploration project that consists of seven salars (brine lakes and surrounding concessions) in the Atacama province in Northern Chile.

Tianqi currently is not planning to undertake any development or exploration activities at the Salares 7 Project.

Midstream Lithium Conversion

Tianqi's lithium conversion capacity is located in Sichuan, Jiangsu and Chongqi, China, and in Australia, with the operating plants being Shehong Plant (various lithium products, with the majority being lithium carbonate), Zhangjiagang (lithium carbonate), and Tongliang (lithium metal), and the plants under trial production or planning being Kwinana (lithium hydroxide), Tongliang expansion (lithium metal), and Anju (lithium carbonate).

Zhangjiagang Plant, Jiangsu, China (100% equity interest)

Acquired in 2015 from Galaxy Resources, Zhangjiagang plant is the only fully automated battery-grade lithium carbonate production plant in operation in the world, according to Wood Mackenzie. Thanks to multiple technological upgrades, production efficiency has increased and energy consumption has declined as well.

Shehong Plant, Sichuan, China (100% equity interest)

Shehong Plant, located in Sichuan, has conversion capacity in producing a variety of lithium compounds, predominantly lithium carbonate, lithium hydroxide, lithium chloride, and lithium metal. Tianqi is continuously enhancing the automation technologies at the Shehong Plant to improve production quality and lower production costs.

Tongliang Plant, Chongqing, China (86.4% equity interest)

Acquired in 2017, Tongliang Plant engages in manufacturing of lithium metal products. The plant is undergoing comprehensive upgrades, aiming to be the world's first lithium metal automated production line. Moreover, Tongliang Plant is planning to expand 2ktpa lithium metal capacity to benefit from future development in solid-state lithium batteries. Tianqi expects it to commence operations starting from 4Q23. The expansion will be completed in two stages, with Stage I (800t) to be completed and commence operations starting from late 2023, and Stage II (1,200t) to be completed and commence operations starting from 2025.

Kwinana Plant, Australia (51% equity interest)

To capitalize on the particularly promising growth potential in the lithium hydroxide market, Tianqi commenced construction of the Kwinana Plant to solely manufacture battery-grade lithium hydroxide in Kwinana, Western Australia, in 2016. The Stage I project (24ktpa battery-grade lithium hydroxide capacity) is currently under trial production. Products are expected to be sold in 2H22.

While overall construction at the Stage II Project (24ktpa battery-grade lithium hydroxide capacity) is temporarily suspended, the company is currently conducting a feasibility study about the construction plan and estimating the capital expenditure of a second phase of the battery-grade lithium hydroxide capacity expansion of another 24ktpa, with overall construction already partially completed. Tianqi expects to resume project construction in 2H22.

Thanks to the proximity to major raw materials supply from Greenbushes Mine, Kwinana plants are expected to achieve relative cost savings on this end.

Exhibit 105: Map of Greenbushes Mine and Kwinana Plants

Source: Morgan Stanley Research.

Exhibit 106: Kwinana Lithium Hydroxide Plants

Source: IGO.

Anju Plant, Sichuan, China (100% equity interest)

The Anju Plant was initiated in 2017 for battery-grade lithium carbonate production. The project was planned in two stages, with Stage I having annual lithium carbonate capacity of 20ktpa. The construction of Stage I commenced in May 2019, but was suspended in July 2019 due to market conditions and financing considerations. Currently, Tianqi has been accelerating the development progress for the project, resuming construction in 1Q22 and targeting to bring Stage I online in 2023.

Company Background

Company History & Milestones

Shehong Lithium, the predecessor of Tianqi Lithium, was established as a state-owned enterprise in 1995, and it completed conversion into a joint stock company and was renamed Sichuan Tianqi Lithium Industries (Tianqi Lithium / Tianqi) in 2007.

In 2010, Tianqi Lithium went public on the Shenzhen Stock Exchange (A-share). In 2014, the company acquired a 51% equity interest in Windfield, which owns the Greenbushes Mine, the world's largest hard rock lithium mine in terms of production and reserves in 2021. Respectively, in 2015 and 2017, Tianqi Lithium acquired Zhangjiagang Plant (lithium carbonate) and Tongliang Plant (lithium metal). In 2018, Tianqi Lithium completed the acquisition of certain equity interests in SQM, gaining exposure to overseas lithium brine resources. Furthermore, it introduced IGO as a strategic investor in TLEA, where Tianqi and IGO currently own 51% and 49% equity interests, respectively. In July 2022, Tianqi Lithium completed its IPO on the Hong Kong Stock Exchange (H-share), and is now a dual-listed lithium name in both the A- and H-share markets.

After years of development, Tianqi is now a leading new energy material company, both domestically and globally, specializing in lithium ore mining and lithium concentrate compounds and derivatives manufacturing. Thanks to sufficient supply and low cost of raw materials and efficient manufacturing of high-quality lithium compounds, Tianqi Lithium is well positioned in the lithium industry, supported by strong lithium consumption growth, mainly from the EV and energy storage system markets.

According to Wood Mackenzie, Tianqi Lithium was the largest producer of mined lithium (954kt) and the world's fourth-largest and Asia's second-largest lithium compounds producer in terms of production volume (44kt) in 2021, with total production capacity of lithium compounds and derivatives reaching 44.8kt.

Exhibit 107: Milestones of Tianqi Lithium

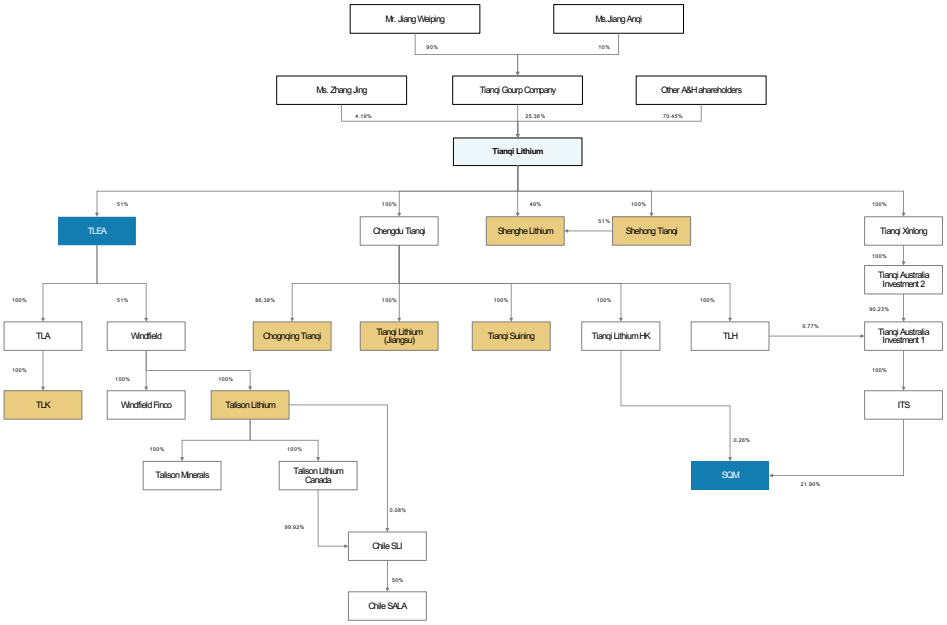
Source: Tianqi Lithium.

Shareholding Structure

Tianqi Group is the largest shareholder of Tianqi Lithium, owning a 28.18% equity interest in Tianqi Lithium's A-shares. The controlling shareholder, Mr. Jiang Weiping, and his daughter, Ms. Jiang Anqi, hold respective 90% and 10% stakes in the Tianqi Group. In addition, Mr. Jiang Weiping's spouse, Ms. Zhang Jing, directly holds a 4.65% equity interest in Tianqi Lithium. Tianqi Group, Mr. Jiang Weiping, Ms. Zhang Jing, and Ms. Jiang Anqi are considered as the single largest investor group in Tianqi Lithium.

In terms of Tianqi Lithium's major business segments, and the relevant entities – (1) lithium mining and processing business is currently mainly conducted under Talison Lithium, via Tianqi's holding in TLEA, and, in the future, will also be under Shenghe Lithium owning a 100% equity interest in Yajiang Cuola Mine; (2) lithium chemicals production business is currently conducted under Tianqi Lithium (Jiangsu), Shehong Tianqi and Chongqi Tianqi, and in the future will be under TLK (Kwinana plants) and Tianqi Suining (Anju plant); and (3) Tianqi also currently indirectly holds a 22.16% equity interest in SQM via its holdings in Chengdu Tianqi and Tianqi Xinlong and their subsidiaries (Exhibit 108).

Exhibit 108: Shareholding Structure of Tianqi Lithium (Major Shareholders & Major Holding Companies), as of August 2022



Source: Tianqi Lithium. Note: The entities constituting Tianqi Lithium's major lithium mining and processing, and lithium producing business are highlighted in brown, and TLEA and SQM are highlighted in blue.

Management Team

Exhibit 109: Brief Introduction to Tianqi Lithium's Management Team

Name	Position	Work Experience
JIANG Weiping	Executive Director, Chairman of the Board	20 years of experience in the lithium industry Set up Tianqi Group Company in 2003, and has acted as the chairman of Tianqi Group Company since its incorporation
HA Chun Shing	Executive Director, Chief Executive Officer	24+ years of experience in the consumer and manufacturing industry Used to work in OLIP, Swarovski as well as Steyr Motors GmbH and joined the Company in 2021
ZOU Jun	Executive Director, Executive Vice President, CFO	20 years of experience in finance and accounting industry and joined the Company in 2007 Served for Chongqing Tianjian Auditing Firm prior to Tianqi
GUO Wei	Senior Vice President	17+ years of experience in the lithium industry and joined the Company in 2004 Mainly responsible for supply chain and procurement, project management and operations
YAN Dong	Senior Vice President	Rich experience in the manufacturing industry and joined the Company in 2013 Mainly responsible for planning and coordinating the sales and marketing activities of the Company
XIONG Wanyu	Vice President	Rich experience in administration and joined the Company in 2014 Mainly Responsible for the management of government affairs, corporate administration, social responsibility and group work affairs of the Company
LIU Ying	Vice President	17+ years of experience in the human resources industry and joined the Company in 2017 Mainly responsible for the human resources management and enterprise universities preparation and daily operational management of the Company
ZHANG Wenyu	Board Secretary, Vice President	20 years of experience in areas of legal, investment, accounting and taxation and joined the Company in 2021 Mainly responsible for supervision of the daily affairs of the Board corporate governance and equity financing etc.

Source: Tianqi Lithium.

Direct Financing History

Since 2010, Tianqi Lithium has undertaken six rounds of major financing activities, including A-share IPO, private placement, right issuances, bond issuance, loan borrowings and H-share IPO, raising, in aggregate, approximately Rmb44bn from the capital markets.

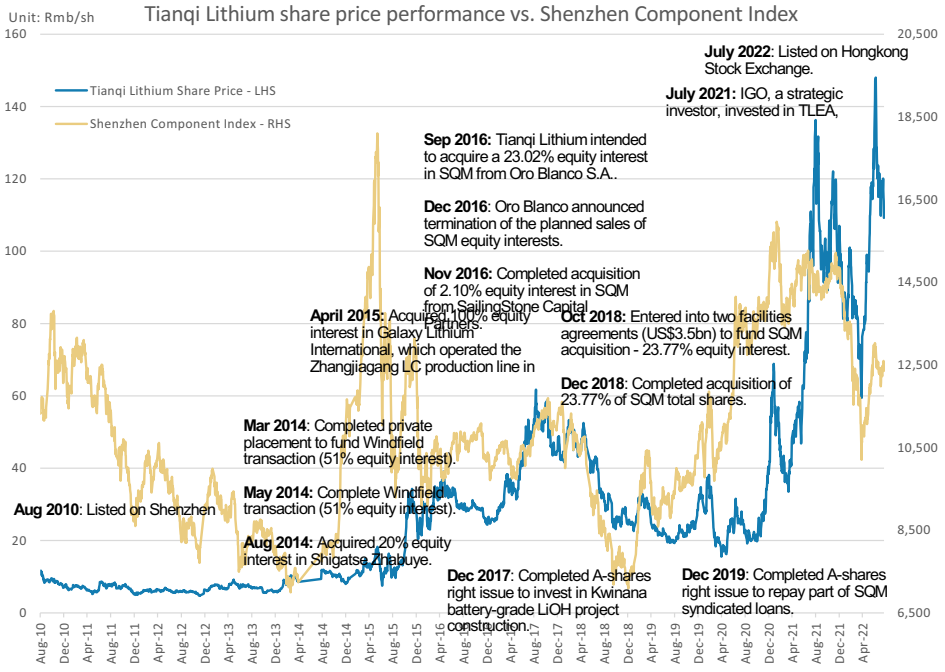
Exhibit 110: Major Financings for Tianqi Lithium since 2010

Year	Type of Financing	Fund Raised (Gross Amount) (Rmb mn)	Purpose of Financing
2010	A-share IPO	735	Capacity expansion and technical upgrade
2014	Private Placement	3,129	Acquisition of 51% equity interests in Windfield
2017	Rights Issuance	1,634	Kwinana Stage I battery-grade LiOH project
2018	Syndicated Loan	23,762	Acquisition of 23.77% equity interests in SQM
2018	Corporate Bond	300	Repayment of syndicated loan
2019	Rights Issuance	2,932	Repayment of syndicated loan
2022	H-share IPO	11,535	Capacity expansion and technical upgrade

Source: Tianqi Lithium, Morgan Stanley Research. Note: H-share IPO proceeds are calculated based on number of offer shares under the global offering (without exercising the over-allotment option) and HKDCNY exchange rate @ 0.86.

Exhibit 111summarizes key events for Tianqi Lithium since its 2010 A-share listing, its A-share price movements (including major M&A activity, financing activity, including strategic investors, etc.), and movements in the Shenzhen Component Index.

Exhibit 111: Tianqi Lithium Share Price Performance and Major Corporate Events



Source: Tianqi Lithium, Refinitiv, Morgan Stanley Research.

Industry Overview

Summary & Conclusions

At the current stage, lithium chemicals are primarily produced from such raw materials as spodumene concentrate (mainly in Australia and Brazil), lithium brine (primarily in Chile, Argentina, and China), and lepidolite (in China). Looking ahead, with further exploration and development efforts, upstream lithium resources will be mined in more types, and a wider range of the world, and recycling volume will increase, as well.

The popular business models for lithium producing globally include (1) integrated producers (mainly lithium brine and lepidolite based), and (2) a combination of Australian spodumene concentrate miners and Chinese lithium converters.

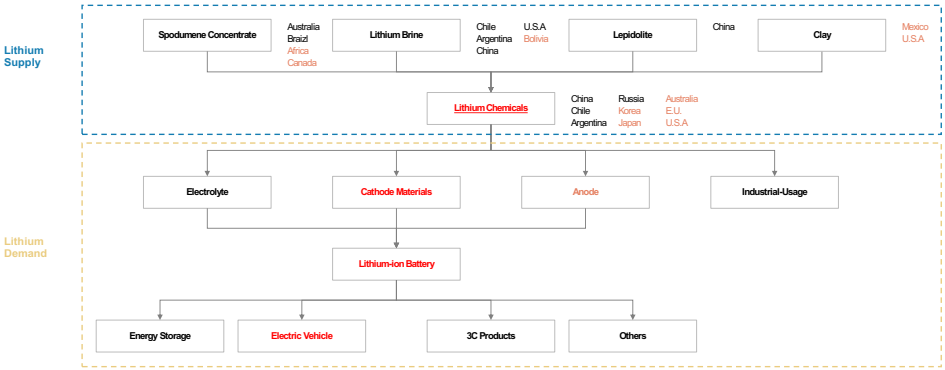
Lithium demand can be divided broadly into two categories – battery and non-battery (or industrial usage). The lithium-ion battery segment has a wide range of downstream usage, which includes well-known electric vehicle, energy storage, and consumer electronics manufacturers. Lithium demand from electric vehicles has been rising rapidly, thanks to improving electric vehicle penetration rates in the global market, and this is expected to sustain, against the backdrop of reducing carbon emissions, and achieving sustainable economic growth across the globe.

In addition, demand related with industrial usage has been growing relatively steadily over the past few years, and we expect it to continue to increase at a similar pace in the future.

Taking a step further, within lithium usage in the battery field, lithium chemicals are used predominantly in cathode materials, as well as electrolyte, and are on track to be used in anodes when the next frontier of lithium-ion batteries (solid-state-battery) is introduced into the market.

As a result, cathode output tends to be a reliable gauge of lithium consumption within the battery field, and should be monitored as an industry indicator. Lithium demand estimates made from cathode output are more likely to capture any demand front-loading within the value chain, no matter in cathode materials, battery or electric vehicles, as compared with actual consumption from electric vehicles.

Exhibit 112: Overview of Lithium Value Chain

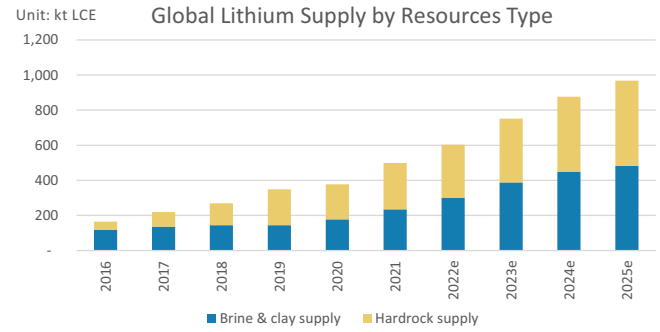


Source: Morgan Stanley Research. Note: Countries highlighted in brown represent that they will be involved in lithium mining (any of the resources) or lithium producing in the future, while currently there's no commercial operations. Content highlighted in red will be further discussed in the following sections, and are believed to be under key focus for lithium supply and demand dynamics. Lithium metal is on track to be used in anode producing in the next frontier of lithium-ion battery (i.e., solid-state-batteries).

Global Lithium Supply

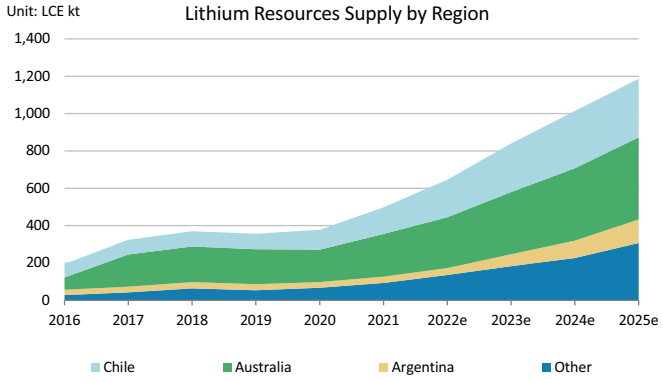
By upstream lithium resource type, lithium brine and hardrock (primarily spodumene concentrate) each have been accounting for a similar share in global lithium supply. Looking ahead, we expect the overall proportions to remain largely stable, considering new supply additions in Australia (hardrock), Chile (lithium brine), Argentina (lithium brine), China (hardrock and lithium brine), Africa (hardrock), etc.

Exhibit 113: Global Lithium Supply, by Resource Type



Source: CRU, Roskill, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Exhibit 114: Lithium Resources Supply, by Region – without Assigning Any Probability to New Capacity



Source: CRU, Roskill, Morgan Stanley Research. E = Morgan Stanley Research estimates.

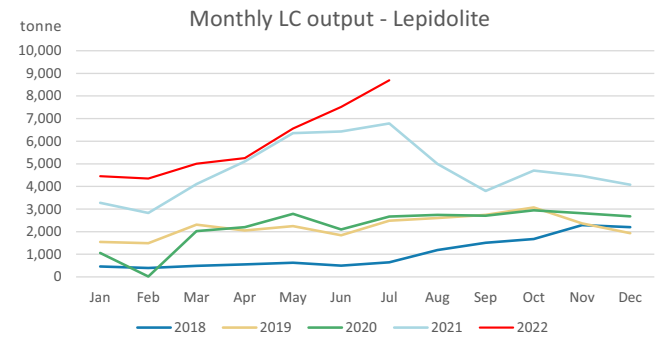
Australia (hardrock): Australia hosts the most operating and suspended lithium mines today in the world, which mainly include Greenbushes, Mt Marion, Mt Catllin, Pilgan, Ngungaju (under resumption), Wodgina (under resumption) and Bald Hill (under suspension). Capacity expansion and operations resumption is ongoing, to meet rising consumption for spodumene concentrates, especially that from the Asian market.

Chile (lithium brine): SQM and Albemarle are the only two operators in Chile, jointly operating at the Atacama Salt Lake, and both have future capacity expansion plans there.

Argentina (lithium brine): At present, Livent and Allkem operate at Salar de Olaroz and Salar de Hombre Muerto, being the only two operators. Future capacity growth will come from both capacity expansion at the brownfield projects, and operations commencement at the greenfield projects, with a rising presence of Chinese companies, per our tracking.

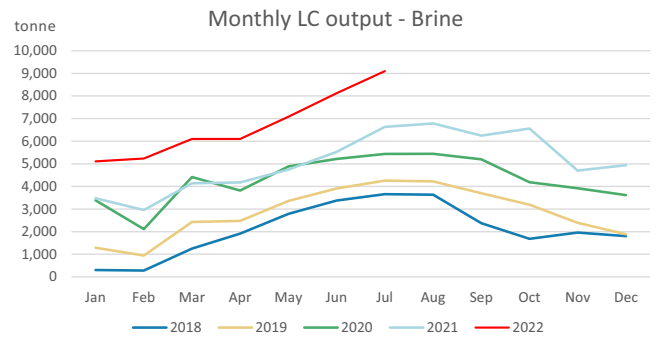
China: In China, lithium upstream resources currently are predominantly lithium brine in Qinghai, and lepidolite in Jiangxi, with future development potential lying in spodumene concentrate in Sichuan and lithium brine in Tibet, apart from Qinghai and Jiangxi.

Exhibit 115: Monthly Lithium Carbonate (LC) Output in China (Lepidolite-Based)



Source: Baiinfo, Morgan Stanley Research.

Exhibit 116: Monthly Lithium Carbonate (LC) Output in China (Brine-Based)



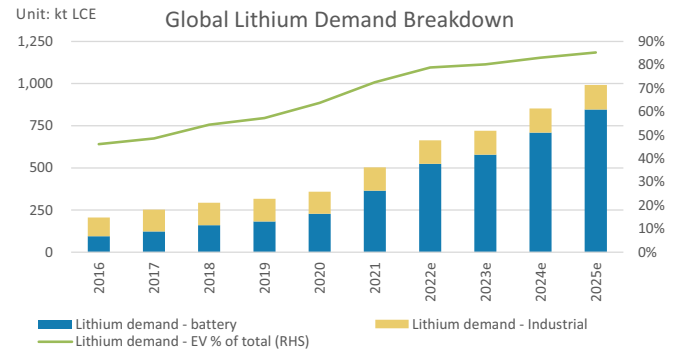
Source: Baiinfo, Morgan Stanley Research.

Global Lithium Demand

As discussed, lithium demand can be divided broadly into two categories – battery and non-battery (or industrial usage), with more rapid growth expected in battery demand. Furthermore, within the battery space, the majority of lithium demand correlates with electric vehicle production. Rising electric vehicle output and larger battery sizes in EVs, indicated by lithium usage per unit of electric vehicle, all point to further lithium demand growth.

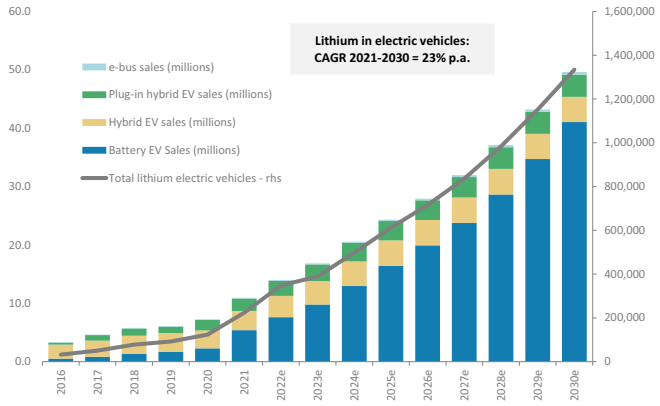
Electric vehicles: Our Morgan Stanley global autos team expects shipments for pure battery electric vehicles (passenger) to reach 15.9mn units (31% CAGR, 2021-25), and that of plug-in electric vehicles (passenger) to reach 8.4mn units (23% CAGR, 2021-25) in 2025, representing a blended global EV penetration rate of 27.4% in passenger vehicles, compared with 11.8% in 2021. This provides solid support for future lithium demand growth.

Exhibit 117: Global Lithium Demand Breakdown (Battery and Industrial Usage)



Source: Morgan Stanley Research. E = Morgan Stanley Research estimates.

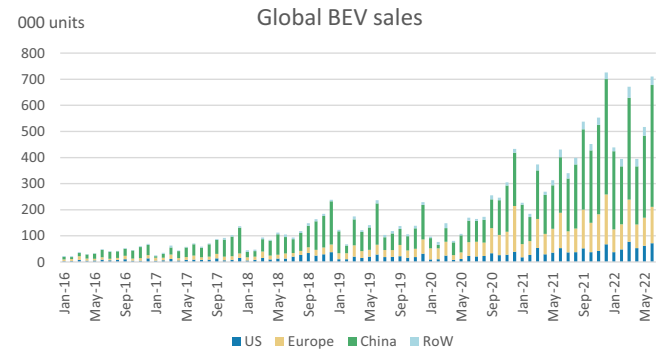
Exhibit 118: Lithium Demand (LCE tonne) in Electric Vehicles



Source: Morgan Stanley Research. E = Morgan Stanley Research estimates.

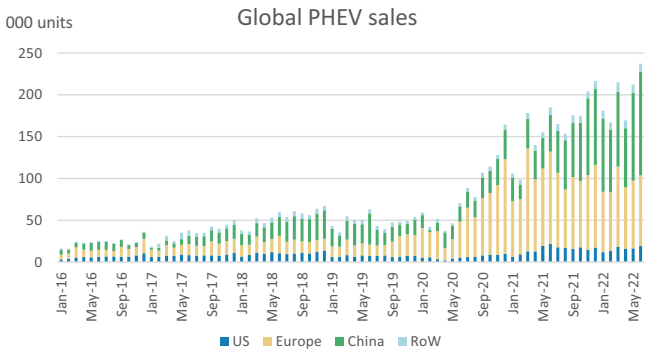
Total electric vehicle sales (including both passenger vehicle and commercial vehicle), globally, have been rising rapidly, reaching 6.76mn units in 2021, from 0.79mn units in 2016. Within this, the portion attributable to battery electric vehicles (BEV) increased from 64% in 2016 to 71% in 2021, mainly led by strong growth in both China (with BEV at ~80% of total sales) and Europe (BEV at ~55% of total sales).

Exhibit 119: Global Monthly Battery Electric Vehicle (BEV) Sales



Source: EV Volumes, Morgan Stanley Research.

Exhibit 120: Global Monthly Plug-in Electric Vehicle (PHEV) Sales

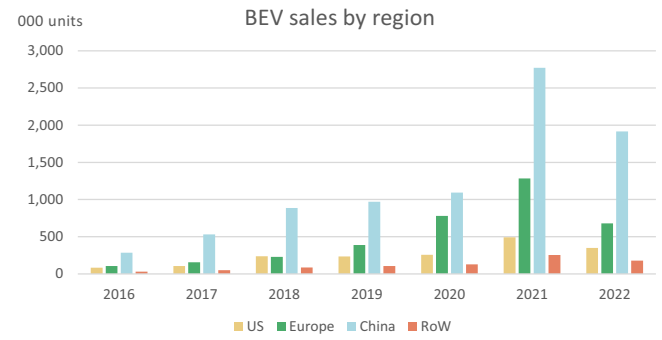


Source: EV Volumes, Morgan Stanley Research.

Sales volume for battery electric vehicles registered a 45% CAGR, 2016-21, with Europe and China experiencing respective CAGRs of 51% and 46%, and global total shipments reaching 4.8mn units in 2021.

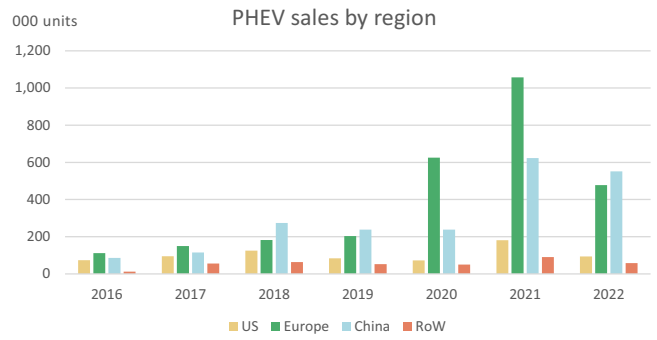
Sales volume for plug-in hybrid electric vehicles registered a 38% CAGR, 2016-21, with Europe and China realizing respective CAGRs of 46% and 39%.

Exhibit 121: Battery Electric Vehicle (BEV) Sales, by Region



Source: EV Volumes, Morgan Stanley Research. Note: Sales volume for 2022 represents data as of 6M22.

Exhibit 122: Plug-in Hybrid Electric Vehicle (PHEV) Sales, by Region



Source: EV Volumes, Morgan Stanley Research. Note: Sales volume for 2022 represents data as of 6M22.

Lithium-ion Battery: Within the lithium-ion battery segment, lithium chemicals predominantly are used in cathode materials, while a small portion are used in electrolytes. Lithium consumption within battery cells containing different chemical compositions varies, and this is mainly a consequence of the difference in specific capacity and average voltage of the battery cells, and chemical composition of the cathode materials.

The majority of lithium-ion batteries are used in electric vehicles, among which ternary batteries and lithium iron phosphate (LFP) batteries are the two most popular types used globally. On a comparable basis, lithium consumption in battery cell KWh units is normally higher in ternary batteries, compared with that in lithium iron phosphate (LFP) batteries. In addition, we note that actual lithium consumption in cathode materials would be higher than the theoretical numbers, considering some conversion losses during the manufacturing process. As a result, it is also necessary to track changes in battery mix.

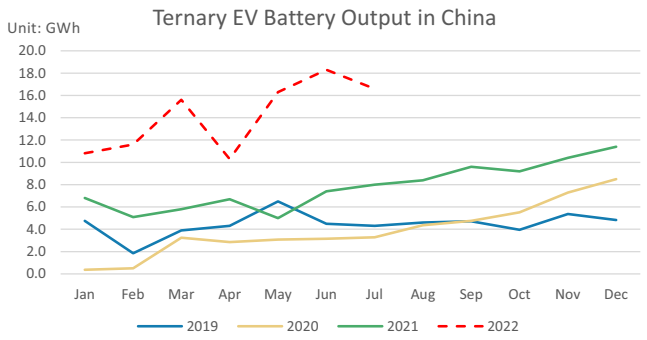
Exhibit 123: Lithium Consumption within Different Types of Cathode Materials and Lithium-ion Battery Cells

Cathode Materials	LFP	NCM111	NCM523	NCM622	NCM811	NCA	LCO	LMO
Chemical Formula	LiFePO4	LiNi(1/3)Co(1/3)Mn(1/3)O2	LiNi(0.5)Co(0.2)Mn(0.3)O2	LiNi(0.6)Co(0.2)Mn(0.2)O2	LiNi(0.8)Co(0.1)Mn(0.1)O2	LiNi(0.8)Co(0.15)Al(0.05)O2	LiCoO2	LiMn2O4
Specific Capacity (mAh/g)	145	155	165	180	200	205	165	105
Average Voltage (V)	3.20	3.60	3.60	3.60	3.60	3.60	3.85	3.70
Cathode Weight in Battery Cell (kg/KWh)	**2.16**	**1.79**	**1.68**	**1.54**	**1.39**	**1.36**	**1.57**	**2.57**
Cathode Weight - Molecular Weight	157.8	96.5	96.6	96.9	97.3	96.1	97.9	180.8
Lithium								
Lithium Content in Cathode (%)	4.4%	7.2%	7.2%	7.2%	7.1%	7.2%	7.1%	3.8%
Lithium Weight in Cathode	44.0	71.9	71.9	71.6	71.3	72.2	70.9	38.4
Lithium Carbonate Weight in Cathode	234.2	383.0	382.6	381.1	379.8	384.5	377.5	204.3
Lithium Carbonate Weight in Cathode - Adjusted	253.2	425.6	425.1	423.5	422.0	427.2	419.4	227.0
Lithium Hydroxide Weight in Cathode	266.0	435.0	434.6	432.9	431.4	436.7	428.7	232.1
Lithium Hydroxide Weight in Cathode - Adjusted	295.5	483.4	482.9	481.0	479.3	485.3	476.4	257.9
Lithium Chemicals Used (LC / LiOH)	LC	LC	LC	LC	LiOH	LiOH	LC	LC
Lithium Weight in Cathode Weight (kg LCE/tonne)	**253**	**426**	**425**	**423**	**422**	**427**	**419**	**227**
Lithium Weight in Battery Cell - Cathode (g LCE/KWh)	**546**	**763**	**716**	**654**	**586**	**579**	**660**	**584**
Lithium Weight in Battery Cell (g LCE/KWh)	**586**	**803**	**756**	**694**	**626**	**619**	**700**	**624**

Source: Morgan Stanley Research.

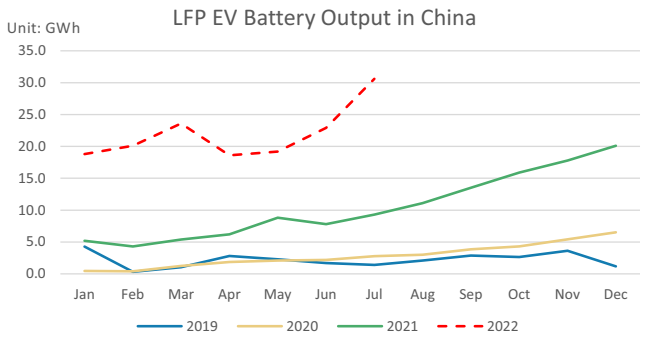
Improving adoption of LFP batteries in the Chinese electric vehicle market has led to strong growth in LFP power battery output in 2021. We note that the difference in battery output in China and battery installment in China could stem from: (1) inventory pile-up at battery manufacturers and auto OEMs, and (2) export volume to overseas downstream customers.

Exhibit 124: Ternary Electric Vehicle Battery Output in China



Source: China Automotive Battery Innovation Alliance, Morgan Stanley Research.

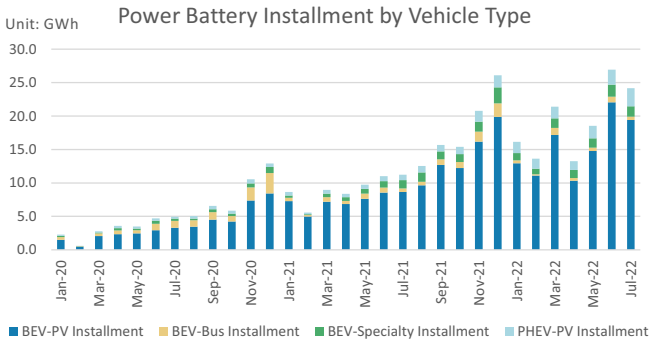
Exhibit 125: LFP Electric Vehicle Battery Output in China



Source: China Automotive Battery Innovation Alliance, Morgan Stanley Research.

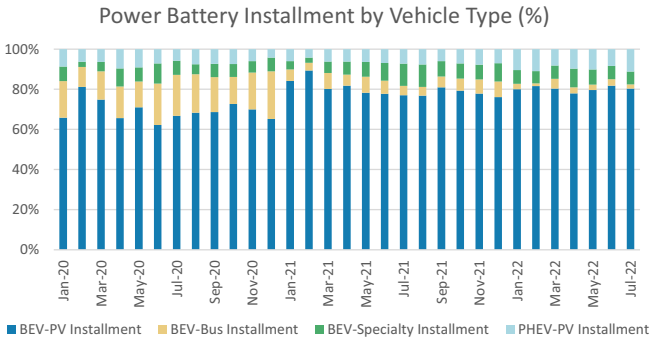
Apart from the upward trend in power battery installments in China, the major driver is still passenger vehicle sales (especially pure battery electric vehicles), and seasonality adjustments are normally witnessed around the Chinese New Year period.

Exhibit 126: Power Battery Installment, by Vehicle Type, in China



Source: China Automotive Battery Innovation Alliance, Morgan Stanley Research.

Exhibit 127: Power Battery Installment, by Vehicle Type (%), in China

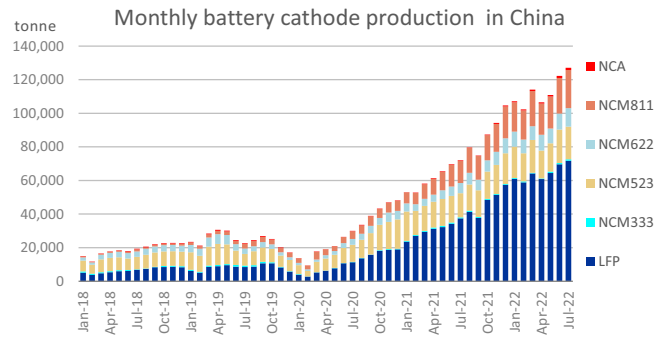


Source: China Automotive Battery Innovation Alliance, Morgan Stanley Research.

Besides electric vehicle output / shipment volume, battery size is another factor to monitor, as total lithium demand will also increase if battery size increases, even when overall volume stays the same. That said, this at least was not the case in the past two years, for the China market, where pure battery electric vehicles, containing smaller battery content and having shorter ranges continued to prevail.

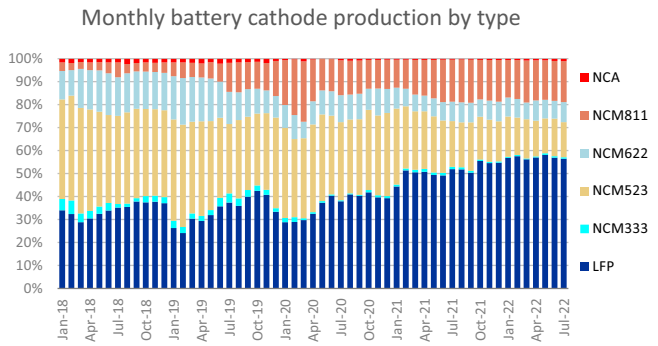
Cathode materials: Considering most lithium chemicals are directly used in cathode materials, the changes in cathode material output are likely to better describe the lithium demand during any specific period. Echoing the aforementioned higher LFP power battery output, this has also been reflected in much higher output growth in LFP cathode materials in China versus ternary ones.

Exhibit 128: Monthly Cathode Materials Output in China



Source: SMM, Morgan Stanley Research.

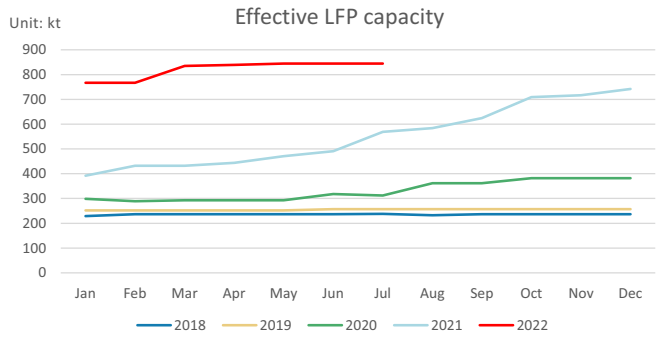
Exhibit 129: Monthly Cathode Materials Output in China



Source: SMM, Morgan Stanley Research.

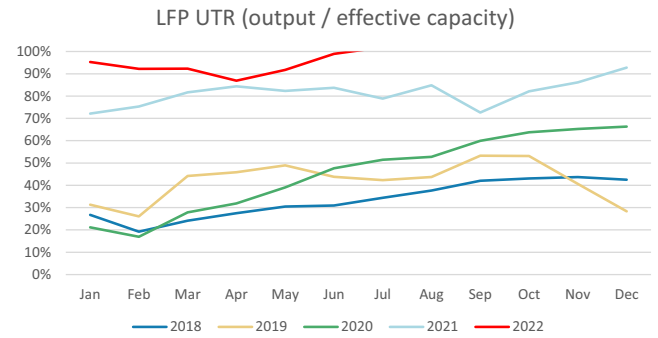
According to Baiinfo, effective LFP cathode materials capacity in China reached 845ktpa at the end of July 2022 and overall utilization rates stayed over 90%.

Exhibit 130: Effective LFP Cathode Materials Capacity in China



Source: Baiinfo, Morgan Stanley Research.

Exhibit 131: Utilization Rates at LFP Cathode Materials Producers in China



Source: Baiinfo, Morgan Stanley Research.

Furthermore, Baiinfo expects another 120kt, 330kt, 620kt, and 150kt new LFP cathode materials capacity to be completed in 2022-25, respectively, which will provide direct supports for lithium demand upon their operations commencement.

Exhibit 132: LFP Capacity Plans for 2022-25 in China

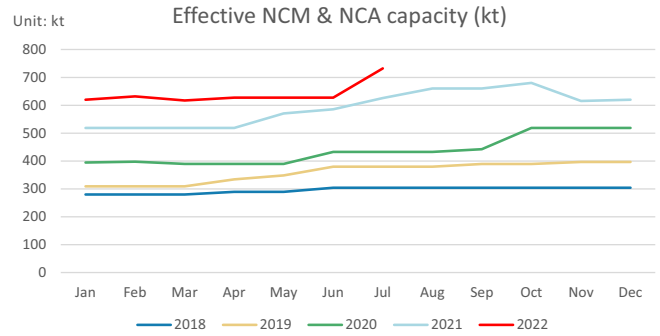
Commission Date	Province	Company Name	Capacity (tonne)	Note
Dec-25	Anhui	Gpro Titanium	150,000	
Dec-24	Fujian	Xiamen Tungsten New Energy Materials	100,000	
Dec-24	Anhui	Anhui Sierte	20,000	
Dec-24	Hunan	Hunan Bangsheng	200,000	
Dec-24	Inner Mongolia	Shengfan S&T	300,000	
Dec-23	Anhui	Gpro Titanium	50,000	
Dec-23	Henan	Longbai	150,000	
Dec-23	Anhui	Anhui Sierte	20,000	
Jan-23	Hunan	Hunan Changyuan LICO	60,000	
Jan-23	Sichuan	Wanhua Chemcial	50,000	
Dec-22	Anhui	Anhui Sierte	10,000	
Dec-22	Shandong	Shandong Fengyuan	50,000	Two stages in total, with each being 25ktpa
Jun-22	Hunan	Hunan Shenghua	60,000	Part of the total plan of 250ktpa

	Capacity (tonne)	Requirement for lithium chemicals (LCE tonne)
2022	120,000	30,381
2023	330,000	83,547
2024	620,000	156,968
2025	150,000	37,976

Source: Baiinfo, Morgan Stanley Research.

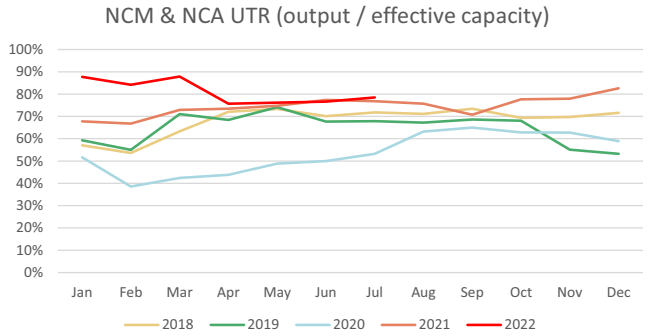
According to Baiinfo, effective NCM and NCA cathode materials capacity in China was slightly higher than 730ktpa at end-July 2022 and overall utilization rates were around 78%. Comparatively low utilization rates also reflect the near-term popularity in LFP products in China, as such products are mainly consumed in the China market, while ternary products have a certain portion in overseas countries, especially for high-nickel ternary cathode materials.

Exhibit 133: Effective NCM and NCA Cathode Materials Capacity in China



Source: Baiinfo, Morgan Stanley Research.

Exhibit 134: Utilization Rates at NCM and NCA Cathode Materials Producers in China



Source: Baiinfo, Morgan Stanley Research.

Furthermore, Baiinfo expects there will be another 90kt, 220kt, and 210kt new NCM and NCA cathode materials capacity to be completed in 2022-24, respectively, smaller than the number mentioned earlier for LFP products.

Exhibit 135: NCM and NCA Capacity Plans in 2022-24 in China

Commission Date	Province	Company Name	Capacity (tonne)	Note
Dec-24	Zhejiang	Zhejiang Huayou Cobalt	150,000	
Dec-24	Fujian	Xiamen Tungsten New Energy Materials	60,000	
Dec-23	Tianjin	Tianjin B&M Science and Technology	50,000	
Dec-23	Zhejiang	Ningbo Ronbay New Energy Technology	130,000	
Jan-23	Hunan	Hunan Changyuan LICO	40,000	
Dec-22	Shandong	Shandong Fengyuan Chemical	10,000	
Dec-22	Tianjin	Tianjin B&M Science and Technology	50,000	
Sep-22	Hunan	Hunan Shanshan Energy	30,000	

	Capacity (tonne)	Requirement for lithium chemicals (LCE tonne)
2022	90,000	38,046
2023	220,000	93,001
2024	210,000	88,774

Source: Baiinfo, Morgan Stanley Research.

Global Lithium Supply & Demand Summary

In terms of the lithium market balance outlook, our Morgan Stanley global commodity team sees the current market tightness continuing through most of 2022, but projects a return to a surplus market in 2023 and forecasts the lithium price to trend lower in 2023 as supply increasingly comes through. Upside risk to the base case would stem from significant delays in supply growth.

Exhibit 136: Morgan Stanley Research Lithium Global Supply-Demand Model

	unit	2016	2017	2018	2019	2020	2021	2022e	2023e	2024e	2025e
Supply											
Brine/DLE/Clay operations	kt	117	136	144	145	178	235	305	356	388	406
Brine/DLE/Clay expansions/projects (uncommitte	kt							13	52	87	103
Growth in brine supply	%	*26%*	*16%*	*6%*	*0%*	*23%*	*32%*	*36%*	*26%*	*16%*	*7%*
Hardrock operations	kt	78	188	297	209	200	264	314	380	435	460
Hardrock expansion/projects (uncommitted)	kt							0	3	13	51
Total converted hardrock supply (LCE)	kt	**48**	**83**	**125**	**204**	**200**	**264**	**301**	**364**	**426**	**485**
Growth in mineral supply	%	*3%*	*140%*	*58%*	*-29%*	*-5%*	*32%*	*19%*	*22%*	*17%*	*14%*
Total World Supply	**kt**	**165**	**219**	**269**	**349**	**378**	**498**	**603**	**752**	**876**	**969**
Growth in lithium supply	%	*-2%*	*33%*	*23%*	*30%*	*8%*	*32%*	*21%*	*25%*	*17%*	*11%*
Consumption by end-use											
Rechargeable Battery	kt	95	123	160	182	229	365	524	578	709	846
of which Electric Vehicle demand	kt	32	51	78	92	123	224	348	389	498	612
Growth in battery demand	%	*21%*	*30%*	*30%*	*14%*	*26%*	*60%*	*43%*	*10%*	*23%*	*19%*
Industrial Demand	kt	111	130	134	135	130	138	141	143	144	146
Total World Demand	**kt**	**206**	**253**	**294**	**317**	**358**	**504**	**664**	**721**	**853**	**992**
Growth in lithium demand	%	*15.4%*	*23.1%*	*16.1%*	*7.9%*	*13.0%*	*40.6%*	*31.8%*	*8.5%*	*18.3%*	*16.3%*
Market balance	**kt**	**-41**	**-34**	**-25**	**31**	**19**	**-6**	**-61**	**31**	**23**	**-23**
Implied global inventory	**kt**			**0**	**31**	**51**	**45**	**0**	**31**	**54**	**31**
Weeks' consumption				0	5	7	5	0	2	3	2
Lithium carbonate (fob Latin America)	**US$/t fob**	**$6,995**	**$12,325**	**$14,947**	**$11,312**	**$6,859**	**$10,761**	**$44,698**	**$28,750**	**$13,500**	**$10,250**
China spot 99.5% battery-grade	**US$/t**	**$18,955**	**$18,157**	**$15,447**	**$8,830**	**$5,683**	**$16,670**	**$65,365**	**$43,750**	**$18,750**	**$10,625**
Spodumene price (cif China)	**US/t**	**$600**	**$899**	**$906**	**$610**	**$453**	**$1,026**	**$4,627**	**$2,875**	**$1,258**	**$848**
China spot 56.5% hydroxide	**US/t**	**$20,869**	**$18,157**	**$15,447**	**$8,830**	**$6,490**	**$15,424**	**$63,436**	**$42,250**	**$18,750**	**$10,625**

Source: CRU, Roskill, Morgan Stanley Research. E = Morgan Stanley Research estimates.

Global Trade Flow

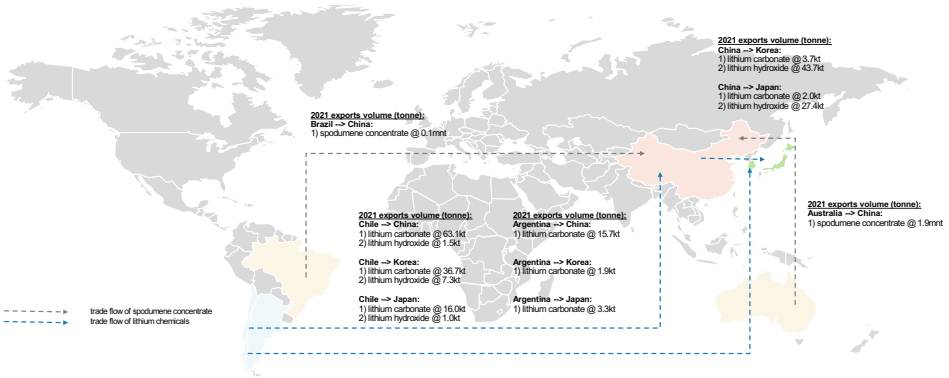
Exhibit 137 summarizes the major global lithium trade flows related to spodumene concentrate and lithium chemicals.

Today, lithium spodumene is predominantly mined and processed into spodumene concentrate in Australia and a small amount is produced and processed in Brazil. These raw materials are subsequently shipped to China for further processing in producing lithium chemicals.

Meanwhile, lithium chemicals (including lithium carbonate, and lithium hydroxide processed from domestically produced lithium carbonate) produced from lithium brine in South America are mostly sold to China, Korea and Japan, where cathode manufacturers are primarily located. In addition, China exports a certain portion of lithium hydroxide to cathode producers (mainly high-nickel ternary producers) in Korea and Japan each year.

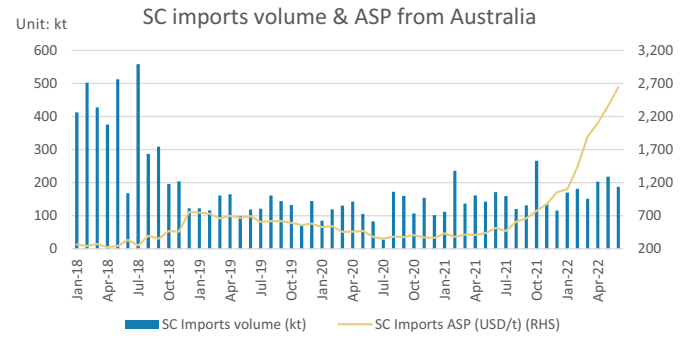
The landscape is set to change gradually, with lithium converters relying on spodumene concentrate to be built outside China, for example in Australia, Korea, Japan, European countries, etc.

Exhibit 137: Global Lithium (Spodumene Concentrate and Lithium Chemicals) Trade Flow among Major Players



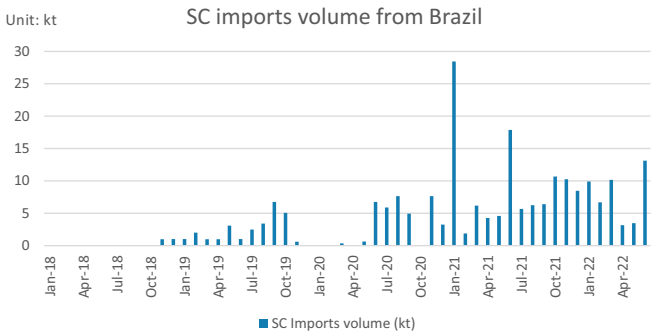
Source: China Customs, Chile Customs, Korea Customs, Japan Customs, Morgan Stanley Research.

Exhibit 138: China Monthly Spodumene Concentrate (SC) Imports from Australia



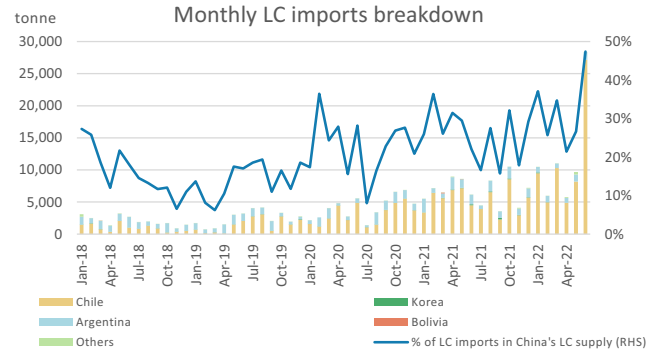
Source: China Customs, Morgan Stanley Research.

Exhibit 139: China Monthly Spodumene Concentrate (SC) Imports from Brazil



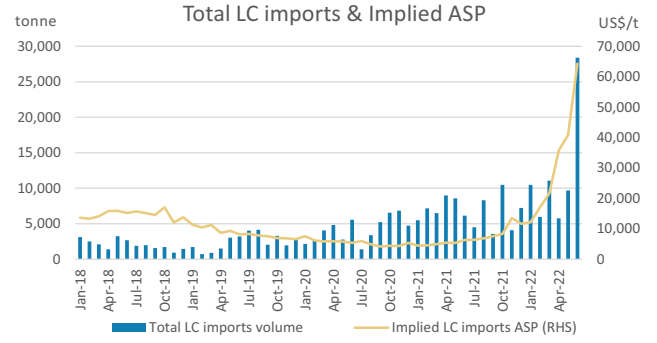
Source: China Customs, Morgan Stanley Research.

Exhibit 140: China Monthly Lithium Carbonate (LC) Imports Breakdown



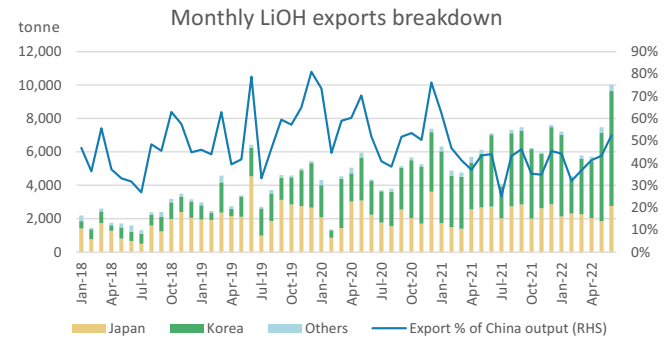
Source: China Customs, Morgan Stanley Research.

Exhibit 141: China Monthly Lithium Carbonate (LC) Imports Volume and ASP



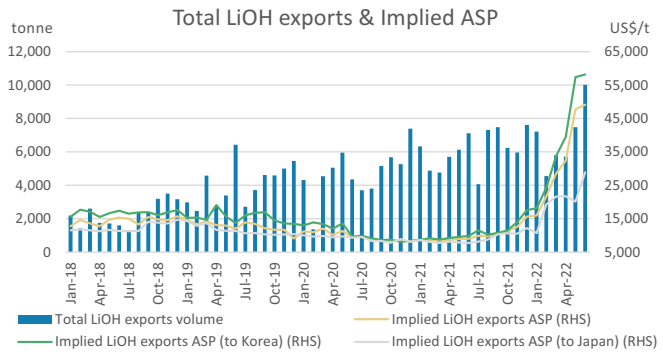
Source: China Customs, Morgan Stanley Research.

Exhibit 142: China Monthly Lithium Hydroxide (LiOH) Exports Breakdown



Source: China Customs, Morgan Stanley Research.

Exhibit 143: China Monthly Lithium Hydroxide (LiOH) Exports Volume and ASP



Source: China Customs, Morgan Stanley Research.

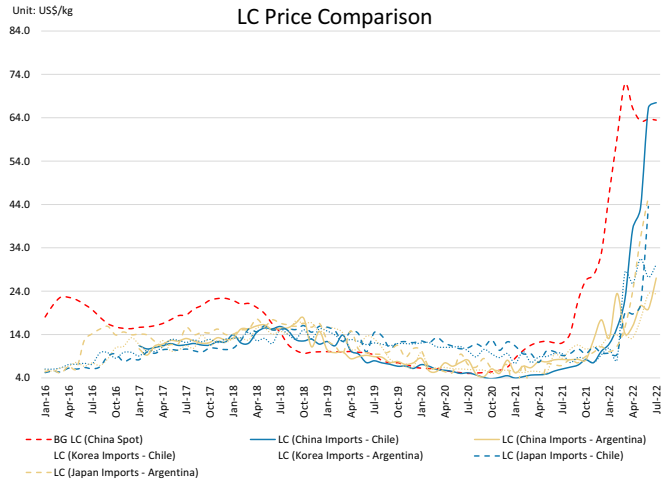
Global Lithium Pricing

Since late 2020, spot prices for China's lithium chemicals have been rebounding and are now notably higher than the regional trading prices, as measured by trade data published by each country's customs department. We attribute the disconnection to different pricing strategies introduced by China's and overseas lithium producers, with the latter tending to be relatively more reliant on long-term contract sales, or even having some fixed price sales. Under a scenario of acute market tightness, rapid price hikes in the spot sales are inevitable.

That said, we note that some overseas producers start to shift more sales into spot sales or variable price sales, providing more price upside potential when the market remains tight. This can also be identified in the price trends shown in Exhibit 144 and Exhibit 145.

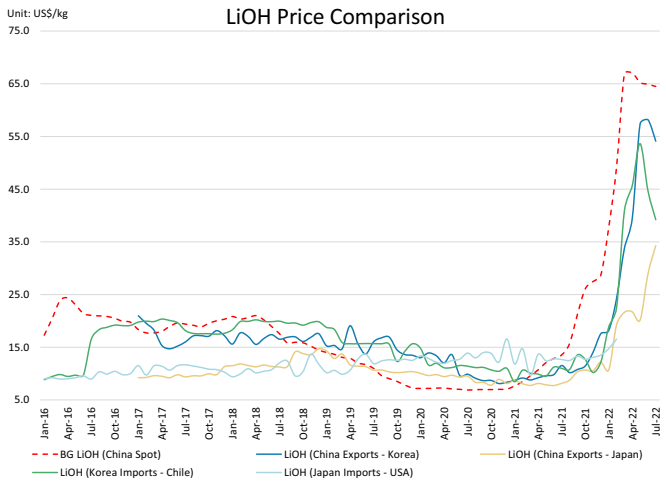
Also, Chinese producers' lithium hydroxide sales to their overseas customers are adjusted on a quarterly basis, and are now becoming more correlated with the spot price changes in China, as we note that China's lithium hydroxide export prices have been rising relatively substantially since 4Q21.

Exhibit 144: Global Lithium Carbonate (LC) Price Comparison



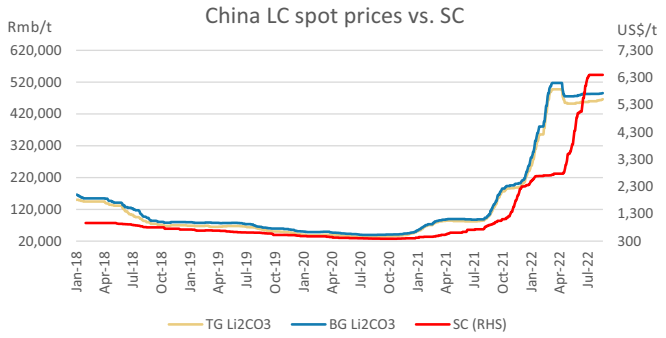
Source: Baiinfo, China Customs, Chile Customs, Korea Customs, Japan Customs, Morgan Stanley Research.

Exhibit 145: Global Lithium Hydroxide (LiOH) Price Comparison



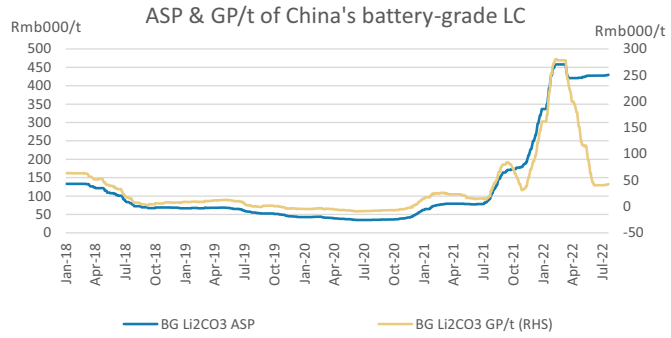
Source: Baiinfo, China Customs, Chile Customs, Korea Customs, Japan Customs, Morgan Stanley Research.

Exhibit 146: Spot Lithium Carbonate (LC) and Spodumene Concentrate (SC) Prices in China



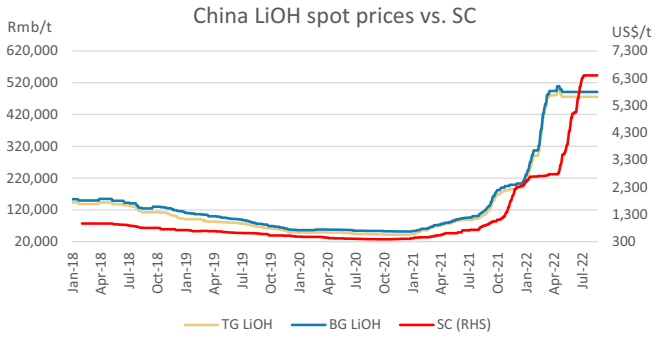
Source: Baiinfo, Morgan Stanley Research.

Exhibit 147: Spot ASP & GP/t Estimates for China's Battery-Grade Lithium Carbonate (LC)



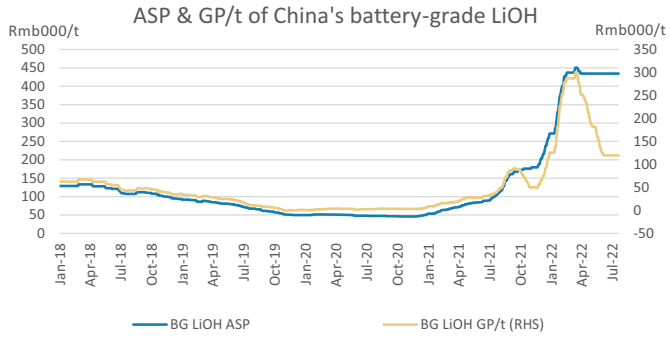
Source: Baiinfo, Morgan Stanley Research. Note: GP/t estimates are made for independent converters that procure spodumene concentrates from third parties to produce lithium chemicals.

Exhibit 148: Spot Lithium Hydroxide (LiOH) and Spodumene Concentrate (SC) Prices in China



Source: Baiinfo, Morgan Stanley Research.

Exhibit 149: Spot ASP & GP/t Estimates for China's Battery-Grade Lithium Hydroxide (LiOH)



Source: Baiinfo, Morgan Stanley Research. Note: GP/t estimates are made for independent converters that procure spodumene concentrates from third parties to produce lithium chemicals.

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(as of July 31, 2022)

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To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

	COVERAGE UNIVERSE		INVESTMENT BANKING CLIENTS (IBC)			OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC)	
STOCK RATING CATEGORY	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MISC
Overweight/Buy	**1366**	**39%**	**318**	**42%**	**23%**	**593**	**39%**
Equal-weight/Hold	**1559**	**44%**	**357**	**47%**	**23%**	**708**	**46%**
Not-Rated/Hold	**0**	**0%**	**0**	**0%**	**0%**	**0**	**0%**
Underweight/Sell	**613**	**17%**	**91**	**12%**	**15%**	**226**	**15%**
TOTAL	**3,538**		**766**			**1527**	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

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Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
Not-Rated (NR). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.
Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

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Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.
In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.
Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.
Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Stock Price, Price Target and Rating History (See Rating Definitions)

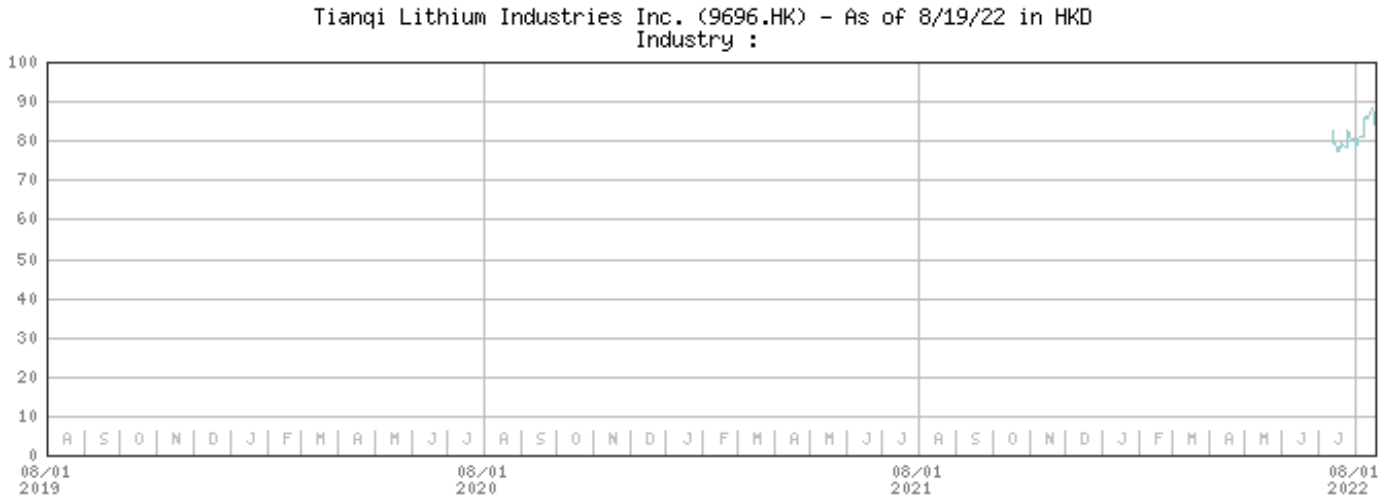
Stock Rating History: 8/1/17 : E/A; 3/8/18 : NA/A

Price Target History: 7/28/17 : 40.85; 9/28/17 : 52.49; 2/26/18 : 45.88; 3/8/18 : NA

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -•- No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) ▬
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.



Stock Rating History: No Stock Rating History Available

Price Target History: No Price Target Assigned (NA)

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -•- No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) ▬
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INDUSTRY COVERAGE: Greater China Materials

COMPANY (TICKER)	RATING (AS OF)	PRICE* (08/19/2022)
Hannah Yang, CFA		
CSG Holding Co., Ltd. (000012.SZ)	U (07/04/2022)	Rmb6.81
Flat Glass Group Co Ltd (6865.HK)	O (07/30/2020)	HK$24.80
Flat Glass Group Co Ltd (601865.SS)	O (07/30/2020)	Rmb40.42
Luoyang Glass Co Ltd (1108.HK)	O (07/14/2021)	HK$13.36
Luoyang Glass Co Ltd (600876.SS)	O (07/14/2021)	Rmb28.18
MMG Ltd (1208.HK)	U (07/13/2022)	HK$2.21
Shandong Pharmaceutical Glass Co. Ltd. (600529.SS)	O (01/04/2021)	Rmb28.15
Xinyi Glass Holding Limited (0868.HK)	E (09/30/2021)	HK$15.84
Zhuzhou Kibing Group Co Ltd (601636.SS)	U (07/04/2022)	Rmb12.45
Rachel L Zhang		
Aluminum Corp. of China Ltd. (601600.SS)	O (11/30/2020)	Rmb4.49
Aluminum Corp. of China Ltd. (2600.HK)	O (11/30/2020)	HK$2.81
Angang Steel Company Limited (0347.HK)	O (11/28/2013)	HK$2.61
Angang Steel Company Limited (000898.SZ)	O (01/09/2018)	Rmb2.98
Baoshan Iron & Steel (600019.SS)	O (01/16/2016)	Rmb5.35
China Jushi (600176.SS)	O (12/22/2020)	Rmb14.80
China Molybdenum (3993.HK)	O (09/24/2019)	HK$3.63
China Molybdenum (603993.SS)	E (09/24/2019)	Rmb5.24
Ganfeng Lithium Co. Ltd. (002460.SZ)	E (06/16/2020)	Rmb89.09
Ganfeng Lithium Co. Ltd. (1772.HK)	O (06/16/2020)	HK$70.10
Guangdong Jia Yuan Technology Co., Ltd. (688388.SS)	O (01/18/2022)	Rmb66.87
Henan Liliang Diamond Co. Ltd (301071.SZ)	O (06/14/2022)	Rmb213.00
Jiangxi Copper (0358.HK)	O (09/24/2019)	HK$9.73
Jiangxi Copper (600362.SS)	E (09/24/2019)	Rmb16.85
JL Mag Rare-Earth Co. Ltd (6680.HK)	O (05/26/2022)	HK$32.35
JL Mag Rare-Earth Co. Ltd (300748.SZ)	E (05/26/2022)	Rmb39.70
Lee & Man Paper Manufacturing (2314.HK)	U (07/13/2022)	HK$3.07
Maanshan Iron & Steel (0323.HK)	E (03/24/2021)	HK$2.11
Maanshan Iron & Steel (600808.SS)	E (03/24/2021)	Rmb3.04
Nine Dragons Paper (2689.HK)	U (07/13/2022)	HK$6.88
Nuode Investment Co., Ltd. (600110.SS)	O (01/18/2022)	Rmb10.95
Shandong Nanshan Aluminium Co. (600219.SS)	O (11/30/2020)	Rmb3.66
Tianqi Lithium Industries Inc. (002466.SZ)	O (08/22/2022)	Rmb109.20
Tianqi Lithium Industries Inc. (9696.HK)	O (08/22/2022)	HK$81.00
Tongling Jingda Special Magnet Wire Co (600577.SS)	O (10/18/2021)	Rmb6.16
Sara Chan		
FangDa Carbon New Material Co. Ltd. (600516.SS)	O (01/05/2021)	Rmb7.12
Shandong Gold Mining Co. Ltd (600547.SS)	U (11/06/2018)	Rmb17.92
Shandong Gold Mining Co. Ltd (1787.HK)	E (11/06/2018)	HK$13.26
Zhaojin Mining Industry (1818.HK)	E (03/25/2021)	HK$7.19
Zhongjin Gold Corp. Ltd. (600489.SS)	E (04/13/2022)	Rmb7.21
Zijin Mining Group (2899.HK)	O (07/09/2019)	HK$9.04
Zijin Mining Group (601899.SS)	O (07/13/2022)	Rmb8.84
Yujie Wang		
China Steel Corp. (2002.TW)	E (07/13/2022)	NT$29.00
GEM Co Ltd (002340.SZ)	E (07/13/2022)	Rmb9.08
Zhejiang Huayou Cobalt Co Ltd (603799.SS)	O (02/23/2021)	Rmb79.27

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* Historical prices are not split adjusted.