

Lithium, can't have an EV (electrical vehicle) evolution without it!



What is Lithium? It's a very light weight metal with high energy density. Raw lithium is processed into a chemical compound (carbonate or hydroxide) that then forms part of the battery pack with a wide variety of formulations. For battery purposes, the industry classifies this as Lithium Carbonate Equivalent or LCE.

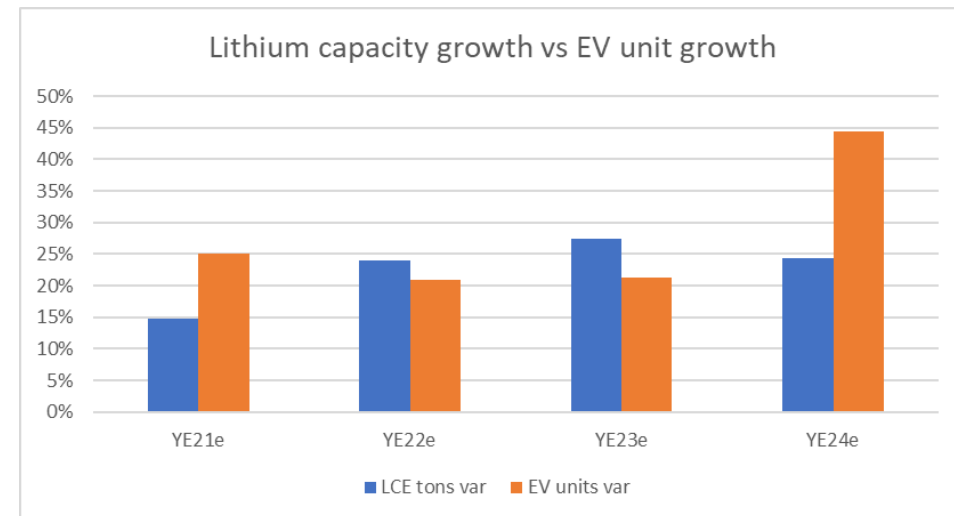
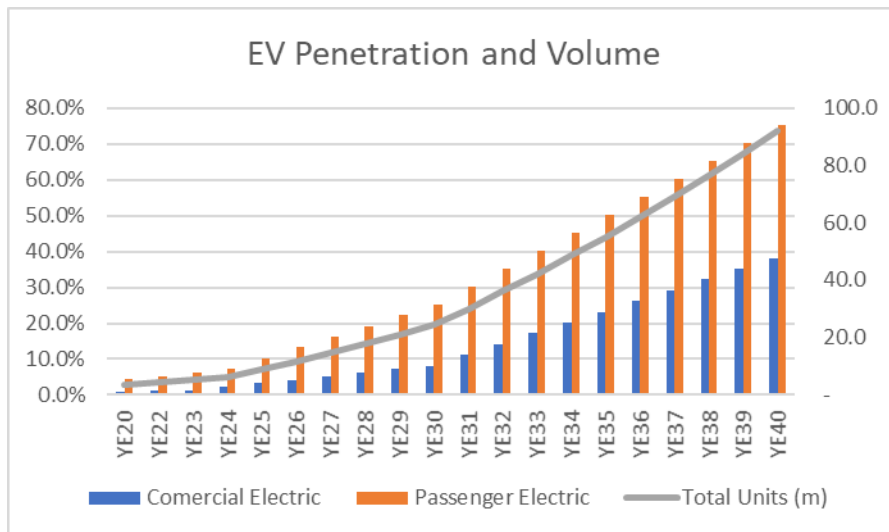
Where is raw lithium mined? There are two main economical sources, from **salt brines** found in places like the Atacama desert in Chile and from **Spodumene** ore/rock found in Western Australia. The extraction process in the salt brines has less steps into carbonate while the hydroxide process has a cost advantage from spodumene.

How much LCE is needed in an EV battery? This depends on battery size; the Tesla S uses about 51kg of LCE. The average in YE20 was around 63kg and should increase to gain range and power, especially in commercial use. Recharge anxiety or running out of charge, is a very real deterrent to EV adoption.

Can capacity keep up with demand? Barely and not necessarily in sync with EV demand. The main players are ramping up capacity from 375kMT of LCE to over 900mMT by YE24. However, total LCE demand to meet auto/government regulations into YE40 will likely require a sustained annual 15%+ capacity growth or to over 4mMT. This will require US\$100bn+ in capex.

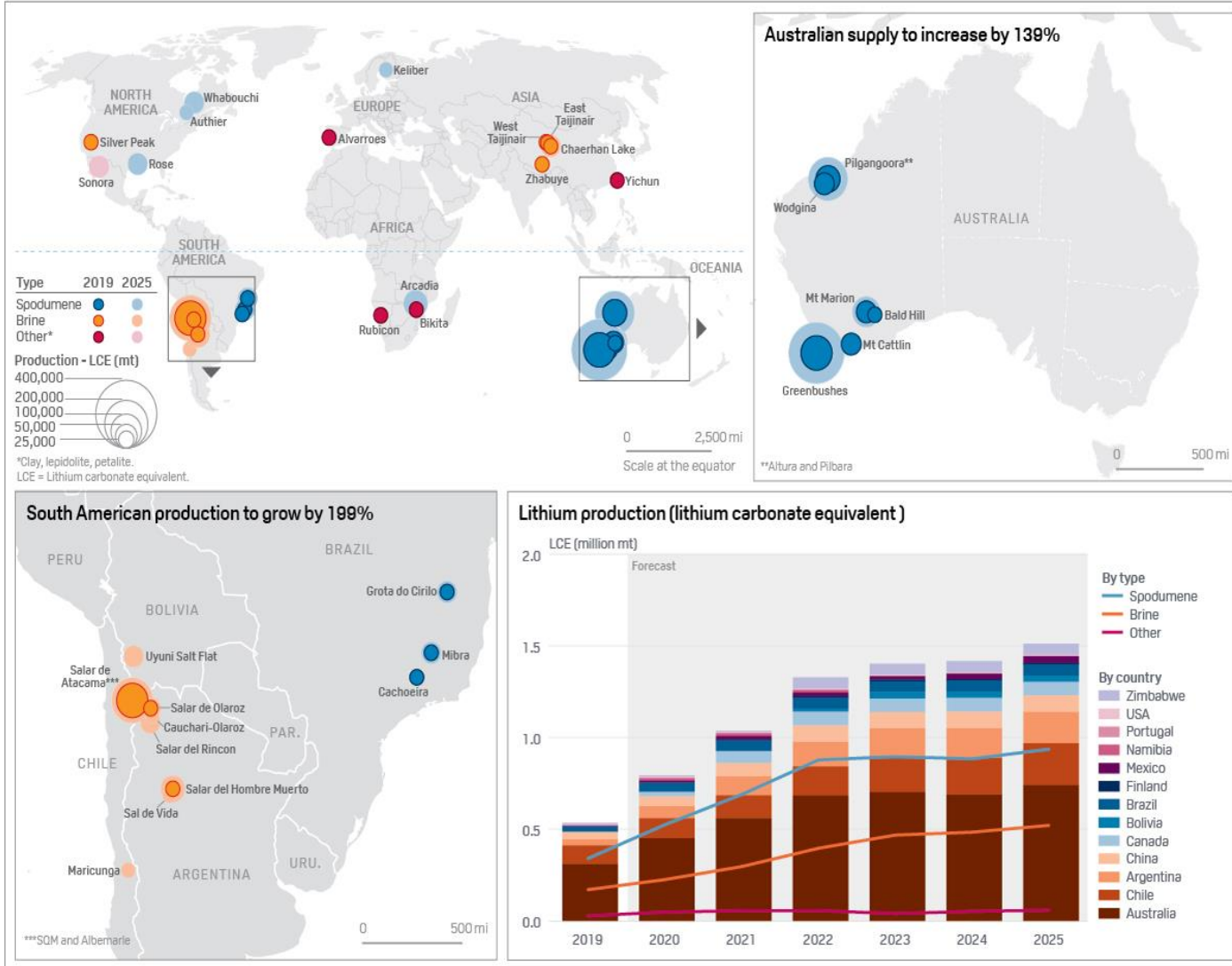
Can prices stay high? Yes, as battery and EV makers plan their capacity expansion, they will look to lock in raw material sourcing, this may lead to a medium-term spike in contracted and spot prices.

Downside risk: The transition from combustion engine to electric is fraught with hurdles, raw material build out (copper, cobalt, magnesium) may delay/derail auto and government best wishes.



LITHIUM SUPPLY SET TO NEAR TRIPLE BY 2025

Lithium is an integral component of batteries for electric vehicles. Over the past few years EV purchases have rocketed, with over 2 million sold in 2018 alone. With the anticipation of increased demand from the battery sector, lithium projects, exploration and investments have all increased. New and expanding projects have seen the bulk of lithium output shift from the much-hyped brine production in South America to hard rock mining in Australia. Despite expectations of further strong demand growth to come, a supply-demand imbalance in the market has caused lithium prices to drop during 2019, in turn stalling investment in the industry.



Source: S&P Global Market Intelligence, S&P Global Platts

S&P's Global Market Intelligence report (and others) seems optimistic with respect to capacity growth.

In YE19 they called for a 100% increase in LCE to YE22. This is not going to happen.

Our bottom up, per company review, suggests far lower capacity expansion and a near duopoly between SQM and Albemarle.

YE20 did not see a big capacity increase. The pandemic hindered construction and at the same time drove prices substantially lower, to the point of break even, which did not foster aggressive capex.

Tianqi sold half its 51% stake in the Greenbush mine to IGO while Albemarle retained the other 49%.

Ganfeng has acquired controlling and minority stakes in smallish operations (and preoperational) mines based in Argentina, Mexico and recently Mali.

While the sector should add capacity at a high pace, it may not provide much of cushion for battery and EV makers seeking to ramp up production faster.

This supports pricing, at least in the medium term.

Lithium prices



Prices for lithium concentrate (from Spodumene), LCE and in hydroxide form have moved in tandem, spiking as EV production began to hit overall battery demand in YE18 and then dropped to near cash cost as capacity came online and the pandemic shutdown occurred.

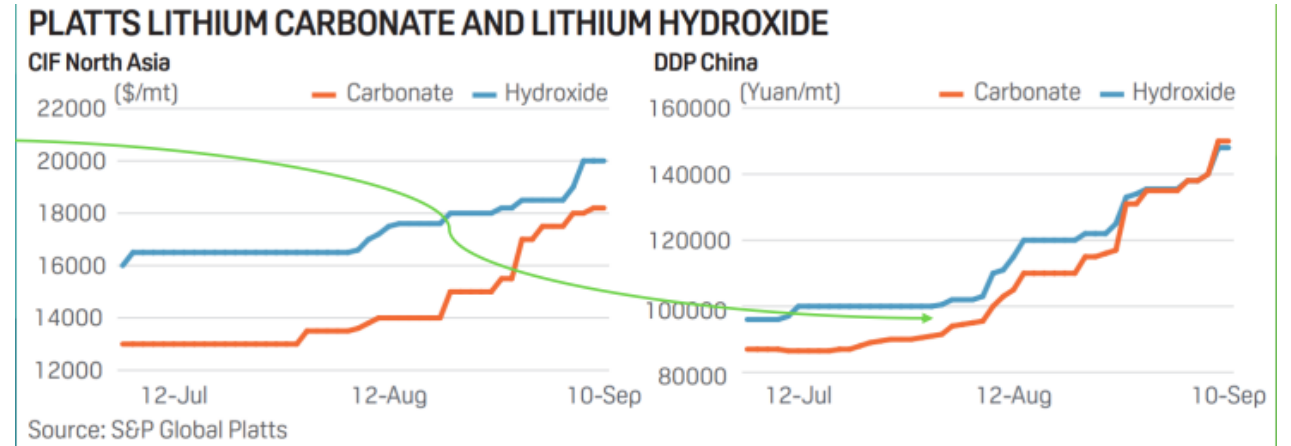
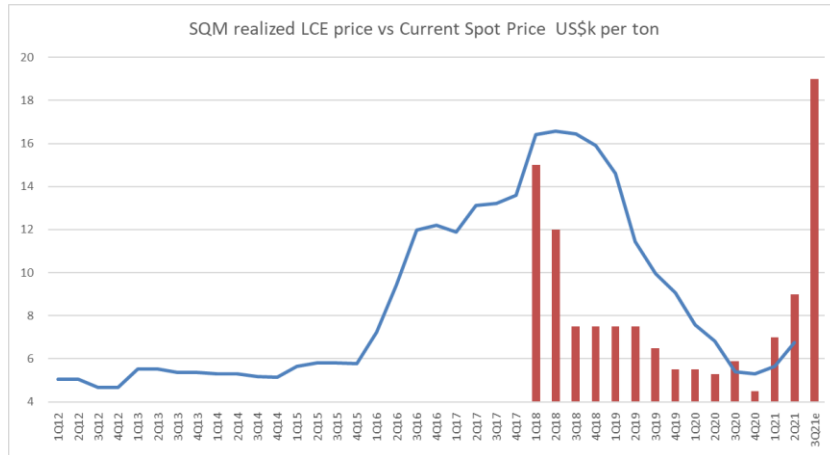
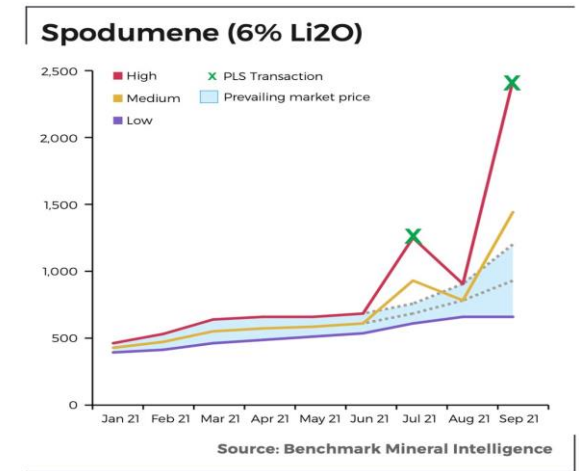
Today, spot prices are above the 2018 peak, but many companies are not realizing these prices as they entered long term contracts in mid YE20, which should mature by YE21. Thus, it is likely LCE prices may be reflected in EBITDA in YE22 fwd.

While there is enough new capacity coming online, it is not always in sync with EV and more importantly the ramp up of new battery production and thus we may see volatile spot prices, but most companies are seeking long term supply contracts that may have some price escalation formula.

On the Spodumene price front, Pilbara has initiated an auction platform called BMX (Battery Material Exchange), where it saw a spectacular jump in prices (see fig at right)

Its our understanding that SQM, the main supplier, is not seeking to maximize pricing but instead a balance that allows it to generate the cash to continue to add capacity but dissuade over building and new entrants.

Pilbara auction is the red line



Primary Lithium Companies



We selected the top lithium source producers, the companies that have access to raw lithium in the form of brine or spodumene i.e. upstream. This can be sold as a concentrate or refined into Lithium carbonate or hydroxide (1 part Lithium equals 5 LCE) that are the chemical components in EV batteries. The Chinese players are more focused on integration and securing sourcing of raw material vs mining and production.

SQM or Soquimich operates in Chile’s Atacama dessert (same as Albemarle). Its Lithium production and processing are integrated with Potassium and thus offers some cost advantage. SQM is investing heavily in lithium capacity and will expand to Australia (Mt Holland mine). About 30% of revenue comes from LCE, the remaining from fertilizers and iodine.

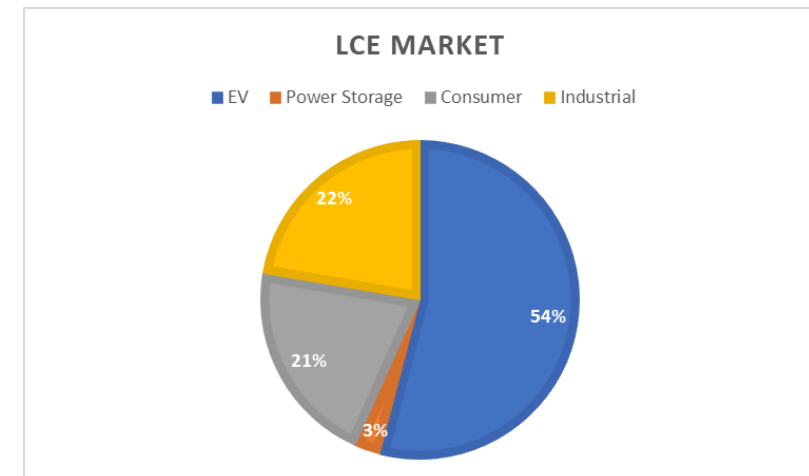
Albemarle (US) operates in Chile (Atacama), Australia (Greenbush) and Nevada via both brine and ore mining. About 40% of revenue comes from LCE, the rest various other industrial and specialty chemicals.

Tianqi (China) is a pure LCE producer with a 24% stake in SQM and JVs in Australia with IGO (sold to) and Albemarle in the Greenbush mine complex.

Ganfeng (China) primarily a lithium chemical producer that sources a sizable chunk of its lithium from JVs in Argentina and Australia. Our analysis indicates its equity stake in LCE capacity could grow to 179k MT by YE24. In a press release it stated it would be increasing LCE capacity to 600k MT. However, its not clear if this is processing capacity and includes raw lithium mining.

Pilbara (Australia) started up operations this year, **IGO** (Australia) acquired a stake in Greenbush from Tianqi and **Livant** operates in Argentina.

LCE MT000s	YE20	YE21e	YE22e	YE23e	YE24e	% Global	% LCE Rev
SQM	84	142	125	210	260	29%	30%
Albermarle	83	85	115	155	200	18%	40%
Ganfeng	50	74	124	169	179	15%	73%
Tianqi	70	70	80	90	100	14%	100%
Pilbara	10	20	34	34	40	4%	100%
IGOL	-	17	22	27	32	4%	20%
Livant	18	18	20	33	40	4%	100%
Others	60	60	60	60	60	12%	
Total	375	486	580	778	911		
% for EV	54%	50%	50%	44%	53%		



Which Lithium stock to own



Given current valuations and growth prospects we favor **SQM** and **Pilbara** (PILBF on OTC and PLS on ASX).

The rest of the sector appears rather expensive, not that the shares can't continue to perform given the market view on most thinks EV related.

We used consensus estimates to build the comparison table. It should be noted that Tianqi's 24% stake in SQM is not reflected in EBITDA and thus we adjusted EBITDA by the SQM stake. Ganfeng holds 6.8% of Pilbara for which we adjusted EBITDA.

The pure or 100% lithium raw material companies are few, Pilbara and Livant.

Livant may be a far better known name in the US market and hence its high valuation despite, in my view, weaker fundamentals. Operating in Argentina is no easy feat given that countries unfavorable mining regulation and restrictions. Australia, is most likely, the best direction for mining in general.

Chile is facing a long bout of regulatory uncertainty during the creation of a new constitution, which at best, will lead to greater taxes at worst nationalization. Both Albemarle and SQM have mining regulations and a tax frame that should protect them to end of concession, but one never knows.

There are a host of Canadian and Australian listed pre-operational lithium stocks that we did not look at.

	EV/EBITDA				LCE Vol YE21	EBITDA var				Rev var				EBITDA margin	ND/EBITDA
	YE21e	YE22e	YE23e	YE24e		YE21e	YE22e	YE23e	YE24e	YE21e	YE22e	YE23e	YE24e		
SQM	17.4	12.2	11.4	9.7	142	59%	45%	7%	18%	32%	30%	9%	17%	36%	0.73
Albermarle	35.3	25.7	19.3	14.8	85	-2%	38%	31%	29%	4%	18%	17%	16%	41%	1.99
Ganfeng	69.1	44.3	34.9	29.3	74	151%	53%	26%	20%	80%	52%	22%	20%	52%	1.21
Tianqi	48.0	26.7	27.8	25.9	70	na	90%	-7%	3%	86%	67%	2%	3%	40%	5.03
Pilbara	266.5	11.4	7.5	8.3	20	na	2086%	45%	-9%	109%	314%	34%	3%	64%	3.15
IGO	11.5	11.3	9.6	8.6	17	3%	3%	15%	12%	3%	-15%	8%	9%	35%	(1.11)
Livant	64.6	32.6	25.7	15.3	18	195%	101%	29%	64%	34%	20%	25%	29%	28%	1.86

Lithium Company Data



SQM and ALB conducted capital raises this year, but SQM looks to have a better balance between capex, EBITDA growth and leverage.

Pilbara is a slower growing pure lithium player with a big target on it, in my view.

Individual company reports will come out shortly.

US\$m	Ticker	Mkt Cap		Revenue					EBITDA				
		Price	US\$m	YE20	YE21e	YE22e	YE23e	YE24e	YE20	YE21e	YE22e	YE23e	YE24e
SQM	SQM	54	15,410	1,817	2,405	3,128	3,410	3,984	580	919	1,337	1,432	1,690
Albermarle	ALB	246	28,794	3,129	3,239	3,836	4,487	5,216	819	803	1,112	1,456	1,873
Ganfeng	2460	165	35,170	864	1,555	2,358	2,888	3,466	218	554	868	1,097	1,306
Tianqi*	2466	92	21,222	507	941	1,572	1,597	1,645	33	707	1,243	1,203	1,291
Pilbara	PLS	2.1	4,753	63	132	547	733	752	(25)	16	351	509	464
IGO	IGO	10	5,594	670	690	587	632	690	345	357	369	423	475
Livant	LTHM	27	4,358	288	386	465	579	745	22	66	132	171	281

