

Lithium 2021 Recap & What I Expect in 2022

Today is 12/29/2021 which happens to be my 37th wedding anniversary. As has been my habit over the past few years, in late December I take 90 minutes max to give my thoughts on the year in the review mirror and expectations for the coming year. My bride has given me permission to spend a limited time writing this typo laden post before we toast our years together with a bottle of Caymus.

Before writing this, I listened to Elon Musk on the Lex Friedman podcast. Elon said something everyone should consider “prototypes are easy but production is hard”. Whether you are talking about the Space-X Starship program, Tesla, or lithium – what you can do in a lab or a pilot plant doesn’t always scale. The “lithium oversupply” camp should listen to Elon. Unfortunately, Elon didn’t provide an update on scaling his Morton Salt and clay lithium idea. I think he is more focused on Starship and getting to Mars.

Last year, I called 2020 the “Year of the Lithium Enema” where the supply chain got “cleaned out” of excess inventory. Clearly that happened as the “spot” price rise to over \$30,000/MT now began in late 2020. Like many I thought Covid would slow EV growth but that was my error. The spike came about the time I originally predicted it in a December 2019 Linked In post.

Yet certain banks and analysts persist in their denial of a long term shortage by calling for price to drop in the second half of 2022. Of course, the poster child for bad lithium calls is Morgan Stanley. On 11/8/21 they said:

“We see the current tight market returning to an oversupplied one through next year. Therefore, we see China’s carbonate spot price gradually normalizing from 2Q22 onward to \$13K/MT by year end”

Morgan has a well-established track record of predicting lithium volumes that never materialize. Even abandoned projects seem to make their way into the Morgan supply numbers. If you can find the supply that will end a tight market in 2022, let me know. I don’t see it.

Why do I persist in what seems like gratuitous Morgan bashing?

Unfortunately, despite the obvious lack of competence of their lithium team, the strong overall Morgan Stanley franchise provides a halo effect for a lithium group that, at this point, seems to enjoy getting the story wrong.

Every time I watch a Morgan Stanley TV add with likable pro golfer Justin Rose; I want to be a believer but then I remember the MS lithium predictions.....

Yes, lithium price is getting harder to predict but I believe that a China spot price > \$50K/MT is more likely in 2022 than the return to \$13K that Morgan calls for by 12/31/2022. Of course, in January 2019 Morgan predicted carbonate prices below \$10K/MT from 2021-2030. Perhaps they are learning, albeit slowly.

In 2021, we saw the greatest year of demand growth in lithium history. When all the numbers are in early next year, the final demand number for 2021 could be as high as 450K MT or almost 150K MT of growth. Any idea what supply growth was? Let's just say it was nice SQM began to finally show the expanded volumes they have been promising for several years but the ~100K MT they expect to sell this year while a nice (~30K/MT) increase over 2020 hardly fills the supply gap that the Australia/China axis of spodumene production and conversion has been unable to keep up with.

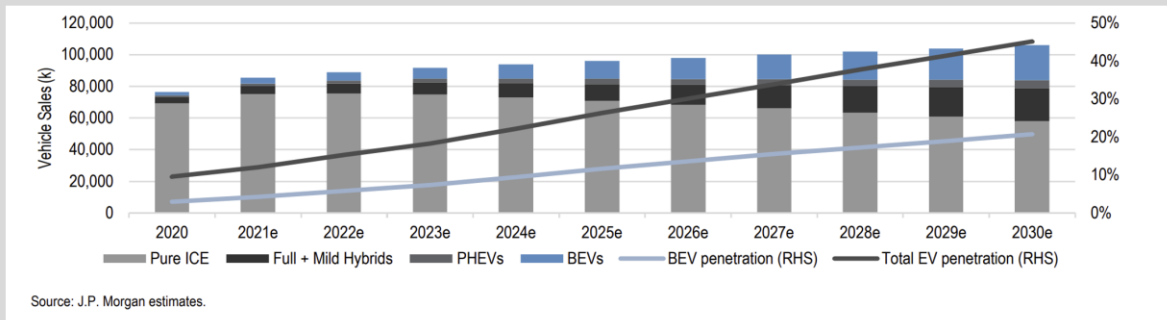
The cynics about the current lithium shortage continually refer to the transition from undersupply in 2016/17 to oversupply in 2018/19 and smugly expect the same to happen this time. They ask: "How is this time different"?

The short answer is **EV demand** but that is only one factor.

In the last cycle, multiple WA spodumene mines came online in a world with <1% EV penetration which caused an oversupply of spodumene concentrate and lowered the costs of independent chemical converters ultimately driving China spot prices below \$4,000/MT. In 2018, demand growth was less than one-fourth of what 2021 demand growth will be. Yes, Greenbushes is expanding, Wodgina will restart and Pilbara will produce more in 2022 but with battery demand growth at record levels, the tight market persists.

Look no further than the Pilbara spodumene auction prices to understand what is happening. If you believe projects like AVZ in hard rock and Bolivia in brine or geothermal in the Salton Sea are coming online soon enough to cause oversupply then you probably also believe in the tooth fairy and I can't help you.

JP Morgan's EV Forecast – July 2021



Canaccord's Supply and Demand Forecast – August 2021

		2019a	2020a	2021e	2022e	2023e	2024e	2025e	2026e	2027e
Supply										
Brines	kt LCE	150	150	193	234	310	367	452	500	520
Hard rock mine prod'n	kt LCE	240	225	280	347	464	606	779	849	893
Effective converter capacity	kt LCE	156	195	252	312	421	547	638	739	832
Total market supply	kt LCE	306	346	445	546	731	914	1090	1239	1352
YoY change	%	16%	13%	29%	23%	34%	25%	19%	14%	9%
Demand										
Industrial use	kt LCE	108	104	107	109	111	113	115	118	120
Market share	%	41%	34%	22%	19%	15%	13%	11%	9%	8%
Batteries - EV's	kt LCE	104	137	233	286	378	488	622	789	1066
Batteries - other (inc WIP)	kt LCE	16	28	105	138	206	245	266	331	359
Total batteries	kt LCE	156	199	374	460	621	772	929	1160	1467
Market share	%	59%	66%	78%	81%	85%	87%	89%	91%	92%
Total demand	kt LCE	264	304	480	569	732	885	1044	1278	1587
YOY change	%	6%	15%	58%	19%	29%	21%	18%	22%	24%
Market surplus/(deficit)	kt LCE	43	42	-35	-23	-2	29	46	-38	-236
%	%	15%	14%	-7%	-4%	0%	3%	4%	-3%	-15%

Canaccord's demand numbers are marginally higher than mine but they are reasonably close over this period. I could show JP Morgan's supply& demand numbers (the only "Morgan" that I pay attention to) which shows a much greater deficit in 2022 – 2024 before returning to relative balance.

One point I want to make that is generally misunderstood: due to the length and complexity of the lithium supply chain, "shortages" begin at capacity utilization > 90%. This was the case in 2005-2008 and again from late 2015 to 2018. Only the inexperienced believe an exact match of supply and demand results in balanced market without supply bottlenecks.

Another salient point to consider is that now that lithium purchasers are in panic mode, any opportunity to build inventory will be taken which further exacerbates upward price pressure.

To repeat the point – EV demand and to a lesser extent ESS demand has hit the hockey stick inflection point in demand. So, yes, it **IS DIFFERENT** this time.

The bottom line is that the existing integrated producers all have cost positions that will enable them to have attractive margins for the remainder of the decade. SQM is already quoting prices approaching spot level for non-contract business. I expect as their contracts reset their price will no longer be the embarrassment it has been recently. Albemarle talks a good game of raising price but still has a legacy of low price long term contracts signed at a time when they should have been able to see where the market is going. Ganfeng and Tianqi should be able to ride the price wave for their China business. Export business done under formula pricing will reset more slowly yet both will achieve better prices Albemarle's over the next few years.

Lithium demand in 2022 will grow 180K MT or more (including inventory build) but supply in the proper grade be inadequate so the global average price will be substantially higher.

The Lithium Americas – Ganfeng JV (Minera Exar) will start up Cauchari in 2022 but allowing for ramp up time don't expect significant supply of BQ into the market until 2023. That said, Ganfeng will be desperate for lithium values to feed the home market and will happily take everything Cauchari can supply.

Ganfeng's growth ambitions are likely to be raw material limited in the short to mid-term. Mineral Resources has indicated they want to start taking their pro-rata share of Mt. Marion relatively soon. Of course, that could be a negotiating ploy by Chris Ellison but if Ganfeng does continue to get 100% of Mt Marion volume expect it to be at a much higher price point demanded by Min Res for their share.

In the short term, Ganfeng's other hard rock interests will have trouble filling the gap left if they lose half of Mt Marion's production. I consider Mineral Resources CEO Chris Ellison one of the best negotiators in the lithium world. I recommend you watch Mr. Ellison's moves carefully. His statements that show he is "all in" on lithium chemical production are worth noting.

LITHIUM STRATEGY

Convert spodumene to high quality lithium hydroxide

Next 2-5 years

Mt Marion¹ – spodumene concentrate

- Take possession of MRL share of offtake – 240ktpa
- Convert to hydroxide – 32ktpa

MARBL JV²

- Wodgina spodumene concentrate
 - Bring back to full production in line with market demand – 750ktpa
 - JV partner will convert all product to lithium hydroxide
 - MRL share – 42ktpa hydroxide
- Kemerton Hydroxide Plant
 - 50ktpa capacity – MRL share 20ktpa
 - Commission plant through CY22



1. Mt Marion is a joint venture between Jiangxi Ganfeng Lithium (50%) and Mineral Resources Limited (50%)

2. MARBL JV is a joint venture between Albemarle Corporation Inc. (60%) and Mineral Resources Limited (40%)

Of course, I remain a fan and a friend of Ganfeng but their transition to global lithium powerhouse is not without challenges.

Next year will be pivotal for many projects from Argentina to the US to Africa. A failure of development projects to get to the next stage in the coming year will have huge ramifications on supply in the middle of the decade.

While I applaud Rio Tinto for entering the brine world with the Rincon acquisition – getting into production is far from a fait accompli. The same can be said for Neolithium. These projects need to move forward given the demand spike. The new owners certainly have the financial resources to bring them into production but the lithium learning curve may delay them. Expansions by Allkem at Olaroz and Livent at Hombre Muerto should be monitored but I expect more delays.

I believe Thacker Pass is too compelling as a US resource not to move forward. I also hope there is an announcement in 2022 that Standard Lithium and Lanxess are constructing a commercial plant in El Dorado. Validating their DLE technology may open up more US resources. Despite the anti-mining sentiment of many in the US, I expect common sense to prevail as it becomes obvious to all that there will be no energy transition without responsible extraction of battery raw materials.

The EU will have greater challenges than North America producing a meaningful volume of their own lithium needs locally. The combination of lack of high quality resources and anti-mining protests will force Europe to look elsewhere for most of their lithium raw materials and focus on local conversion. Recycling isn't going to make a meaningful difference in this decade.

In the past, I have referenced "deep pockets" (such as Rio Tinto) and the energy transition plays of Oil & Gas companies at some point benefiting lithium. In 2021, I had serious discussions with four energy companies about lithium investments. Of course, I can't tell you who they are but one of them has already made a lithium investment announcement.

At some point in the future lithium will again move into significant oversupply but "spoiler alert" that won't be in this decade. The battery producers and OEMs have only themselves (and maybe Morgan Stanley) to blame for believing "market forces" would keep them awash in cheap lithium. Delayed investment in lithium projects has put the industry too far behind to catch up quickly. Someday lithium prices will be back under \$12,000 but by then my wife and I will have had 50 anniversaries or more.

The lithium decade is just getting started. The industry needs more strong players. LAC will certainly be one of them. Jon Evans, with the help of a great team is lithium executive of the year as far as I am concerned for positioning LAC to benefit from partnerships without being dependent on them. It was also a brilliant stroke to become a three asset company. Of course, the challenge of getting assets into production remains. The last three asset junior (Galaxy) never realized their potential. I am confident this fate will not befall Lithium Americas. I also want to give kudos to Ken Brinsden at Pilbara for surviving the hard times and engineering a great turnaround.

It is a popular myth that China "dominates" lithium. That has never really been the case. In my opinion, China's position in lithium will be weaker in 2022 than it was previously. More WA spodumene will stay in Australia as hydroxide plants come online. In the future, European converters will compete with the Chinese to acquire raw material from Australia, Africa, Brazil, etc.

I fully agree that China has a very strong position in battery metals overall, but they have an extremely weak position in domestic lithium resources. Given both Ganfeng and Tianqi depend on raw materials from other countries, I don't believe "Team China" is in any position to dictate the future of lithium. Lithium prices are highest in China not because China has a strong position but because they are dependent. Investment by Chinese companies in South America lithium resources shows China is quick to act – a fact I admire but take a hard look at the top six lithium companies and then tell me how China is dominant.

I don't give investing advice on the podcast or in writing but once a year I disclose my top personal investments. The price rise of LAC in 2021 made it my largest holding eclipsing Apple and Alphabet (Google) to become #1 in my portfolio. Netflix is next at #4. The rest of my top ten are various lithium stocks I disclosed last year, Tesla and Amazon. If you think my holdings taint my commentary, my advice to you is to look elsewhere. No human is without bias. I try to keep my bias at bay but you should always be skeptical.

There were 37 new episodes of the Global Lithium Podcast in 2021. I will be cutting back on that number in 2022 as I spend more time writing a book. The podcast has a loyal and predictable audience with downloads in 140 countries. The breadth of interest never ceases to amaze me especially given the niche subject matter. Hopefully, future episodes will continue to attract listeners.

Happy New Year and "Lithium Decade".