



Myth - an unfounded or false notion

Five years ago, I wrote an article about the top lithium myths. Since 2016, the industry has evolved and the most popular myths along with it.

In the first article, I led with a myth about the power of the “Big 3” lithium companies. In 2021, many reading this don’t know who the “Big 3” were. Two of them, Albemarle and SQM, are still leading lithium companies while the third, Livent, is sliding toward irrelevance.

Ganfeng and Tianqi round out the current top 4 majors. In 2016 no one, including me, could have foreseen Ganfeng’s 2021 market cap exceeding Albemarle and SQM combined. In my defense I did predict in 2016 that Ganfeng would ultimately become the world’s number #1 lithium company. As of today, Ganfeng as #1 seems a forgone conclusion if not yet a fait accompli.

So, what is my top myth for 2021? A difficult question given there are so many options and it may seem a bit of a contradiction given my statement about Ganfeng.

Myth #1: China dominates the lithium industry

Like many popular myths there are grains of truth built into the fabric of this incorrect narrative. Yes, China based companies like Ganfeng have grown rapidly. Yet, the reality is all the top Chinese producers including Ganfeng and Tianqi are currently dependent on Australian assets for their spodumene feedstock. Due to the low quality resources within the “Middle Kingdom” the massive conversion capacity China has built requires imported feedstock and that situation will only get worse in the future. The Chinese companies should be complimented for having more foresight than western producers in securing resources but let’s look at another aspect. Much of the world class hydroxide produced in China is done so by two American companies – Albemarle and Livent. Are these companies dependent on China? Not really. Albemarle’s feedstock for hard

rock hydroxide comes from Australia and their next large capacity additions will be in WA not China. Even Tianqi's next plant will be in Oz.

The coming five years will see more hard rock chemical plants built in Australia (Wesfarmers) and maybe even Quebec and the EU – time will tell. Brine supply in South America will start to catch up with hard rock capacity as SQM & Albemarle continue their slow build up in the Atacama, Cauchari starts up in Argentina, and delayed expansions by Orocobre and Livent hopefully proceed. Lithium Americas will make sedimentary production a reality as it moves Thacker Pass forward and finally a major league miner will enter the lithium fray with Rio Tinto moving Jadar forward late in the decade.

Yes, China is a major lithium player but dominant? Not now and even less in the future. My apologies to all the lazy journalists out there that love to complain about China's lithium dominance with "click baity" headlines. And "no" I am not sure "baity" is a word but you know what I mean.

Myth 2: "Market forces" will ensure adequate lithium supply

My take: unfortunately, lithium supply is not a spreadsheet exercise. Supply numbers from both majors and juniors don't add up. The gap between supply and demand grows from 2026 to 2030.

Bloomberg NEF believes that EV battery demand will grow almost 15 fold by 2030 to 2,576 GWH requiring over 2,000K MT of LCE or over 6 fold total lithium supply growth vs 2020 just for EVs.

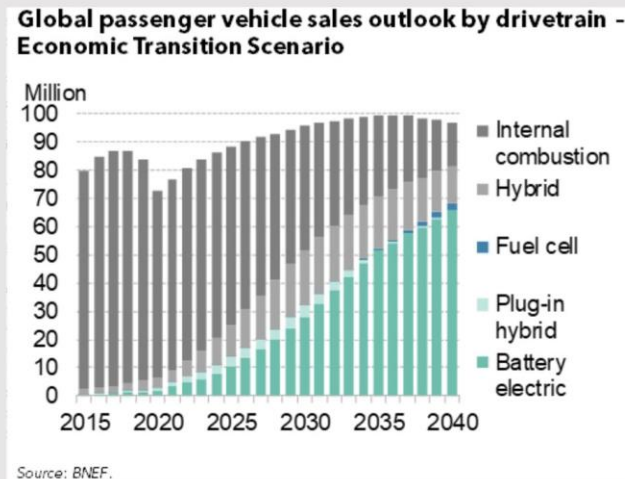
They further state (see figure 1) that they do not foresee a problem with the supply of key battery metals including lithium. Who would have the temerity to challenge the thinking of such an august organization as Bloomberg NEF? Sorry, but common sense and experience forced my hand here.

And it's not just Bloomberg NEF that reckons that global EV penetration will push 20% in 2025 and continue the hockey stick move from there. UBS and many others are making similar prognostications. Of course, with all the OEMs making new electric model announcements and battery producers announcing new megafactories on an almost weekly basis, it is easy to see how this belief grows. Later today, Joe Biden will officially announce his aspirational goal of 50% EV sales in the United States by 2030. Spoiler alert: it is not going to happen but it is good to see our aging President channel his inner Elon Musk by announcing a goal he knows won't happen but energizes the troops.

The problem big banks and others continue to ignore – in the near and mid-term, the lithium industry is ill prepared to deal with exponential growth. Lack of investment will make lithium "the limiting factor" to EV growth and the speed of the energy transition. It seems the likes of Bloomberg have not learned how to properly handicap lithium project announcements

My contention is that the lithium industry is in no position to supply enough battery quality product to enable anything more than 10 to 12% EV penetration of pure EVs in 2025. The final outcome, of course, will be determined by average battery size.

Bloomberg NEF Sees No Issue with Lithium Supply to 2030



- We expect the supply of lithium, cobalt, manganese and nickel to be sufficient to meet lithium-ion battery demand out until 2030 under our Economic Transition Scenario. New refining facilities and investment will be required, but we are confident the market will respond to this need. Under our Net Zero Scenario the rapid increase in demand for lithium-ion batteries will require huge volumes of raw materials.

Figure 1

Most of my readers are well aware of how even the major players have struggled to expand (think ALB and SQM in Chile and Livent in Argentina) and juniors have struggled with project financing (Neo Lithium and several others come to mind). Look at the recent announcement by Rio Tinto – the mining major won't be able to fully ramp up a project that has been on the docket for years until 2029 – eight years after they finally decided to move forward. I will save commentary on other projects for the next myth.....

Myth 3: OEMs are “locking in” supply for all those new EV models

I have been involved in supply discussions with OEMs and battery producers for many years. Normally the likes of Tesla, Panasonic, BYD, Nissan, GM, VW, etc. have treated their suppliers as “supplicants” generally assuming the suppliers had no power or would cave to threats of losing volume. Over a decade ago Nissan brought me into a conference room and insisted I give them a fixed price for 8 years. Needless to say, that didn't happen.

Wiser OEMs and battery producers are beginning to realize they may have a lithium issue soon but find it culturally difficult to accept that the tables are turning and, in the case of the lightest metal, they will become the supplicants and may remain so for several years.

If you are a Tesla fan – not to worry. Once he started paying attention, Elon Musk’s star power has enabled the Tesla supply chain to sign favorable deals with multiple majors that love to tell Wall Street that they supply Tesla.

For every “dogecoin” like deal Tesla has signed with the Piedmonts of the world they also count Albemarle, Ganfeng and Livent as real suppliers with actual contracts that result in product delivery. Unfortunately, the rest of the EV/battery world doesn’t have a social media superstar / genius as CEO. Elon can get away with playing some games that his peers can’t seem to pull off. The problem is investors buy into Elon’s virtual supply rhetoric as we saw last year around “Battery Day”.

The number of potentially meaningless supply agreements is growing rapidly. In addition to the Tesla /Piedmont “deal”, LG’s recent agreement with a prospective geothermal producer comes to mind. At the risk of getting more letters with groundless accusations from lawyers on multiple continents, let’s just say I am not a fan of any project or of any company that is so thin skinned that their first response to valid questions about their plans is to try to bully the questioner rather than answer basic questions.

OEM’s depending on currently non producing juniors for anything more than a minority of their future supply needs are playing a dangerous game especially if the junior doesn’t have a strong partner or a team with prior project execution experience.

Supply agreements with other than the top six producers are not likely to happen on time or for the agreed volumes if they happen at all.

Myth 4: Lithium supply from recycling matters before 2030

The anti – mining camp around the world has a “circular economy” dream. The mantra is that urban mining will replace the need for extracting battery metals from the earth in the near term. Dream on.

The EU definition of the circular economy is below. Who can argue with trying to “repair, reuse, or recycle”? The “inconvenient truth” is that it will be decades not years before recycling contributes even half of the global supply of battery metals.

European Parliament

What is the circular economy?

The circular economy is a [model of production and consumption](#), which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

In practice, it implies **reducing waste** to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby **creating further value**.

The math isn’t complicated.

Many companies (Redwood Materials, Neometals, Li Cycle, Ganfeng, Umicore, etc.) are in the process of building recycling infrastructure across the globe; however, the fact of the matter is it will take at least a decade, perhaps longer, to have a volume of spent batteries ready to be recycled that will yield sufficient lithium to account for 10 to 15% of total lithium demand.

What's my point? It will have taken approximately 7 decades for lithium chemical demand to reach 1 million MTs of LCE, it will take less than 5 years to reach the 2nd million MTs of demand. Global supply of lithium chemicals is currently slightly more than 400K MT LCE. Supply has to grow at least 6X by 2030. That is a hard rock, brine, and sedimentary lithium production exercise not "urban mining".

Much of the recycling effort in this decade will be focused on reprocessing battery megafactory offspec cell output as dozens of battery plants ramp up around the world. The unappreciated fact is that inefficient battery start-ups will cause another bottleneck in the EV supply chain. Initial battery cell reject rates can run as high as 50% in the first several months of a new operation. Lithium that is in an unusable battery cell has to be recycled. Clearly this phenomena slows lithium's trip to a useful life storing energy. Stated another way, the time it takes to recycle lithium in an unusable cell is an added link in the supply chain meaning more not less LCEs need to be produced (from the earth) in the next decade to compensate for battery plant growing pains.

No question that urban mining is important and that recycling will ultimately be a major source of lithium but it is abject nonsense to assume we won't need responsible mining for decades to come.

Don't believe me? I accept that but perhaps you will accept the word of Mr. Chris Reed, CEO of Neometals who has forgotten more than I know about recycling. Take it away Mr. Reed:

Chris Reed @CJReedNMT · Aug 3

Replying to @globallithium @FT and 2 others

Thanks Joe, as usual spot on. Even if we recycled every EOL Li-battery in the world in 2030 it would only supply 10% of feedstock required for that years new battery production. But hey you have to start somewhere. Cheers Chris

I realize it is hard for many to accept but most of us that grew up in the lithium industry understand that continuous process and environmental performance improvement is a requirement but we also understand that we live in an imperfect world that will never be able to satisfy those that don't create but only criticize. If you want an "energy transition", mining is here to stay.

Myth #5: The future of lithium is DLE and Hydroxide

Let's just say that both are important in the future of lithium but neither will dominate. DLE (direct lithium extraction) is probably the most misunderstood concept in lithium. DLE is not a "drop in" technology. It is a concept that must be customized based on the resource involved. I firmly believe DLE will work in certain resources and will fail in others. DLE can be considered green in certain cases but requires excess resources (water and energy) in other cases. Most people hyping DLE have never been involved in commercial lithium production. I am hopeful that Standard Lithium will be the first to commercialize a true DLE process with Lanxess in Arkansas but that doesn't mean it will work for others in the Salton Sea, the Rhine Valley, Argentina or anywhere else. Each case must be judged on the merits. When people tell you Bill Gates or Warren Buffet is behind a DLE project you should probably grab your wallet. If you are in Germany you may want to check your local "geothermally induced earthquake" protocols. This is a NYT headline from a few years back.

German Geothermal Project Leads to Second Thoughts After the Earth Rumbles

As for hydroxide becoming the dominant lithium chemical used for cathode. As I said from the beginning “I believe in balance not promotional ‘bull’ of the lithium ion variety”.

My belief was documented long before Elon Musk validated the concept by using LFP in Tesla batteries. Hydroxide will grow at a faster rate than lithium carbonate in the coming years based on use in high nickel cathode but in 2025 carbonate will still be the most used lithium chemical in lithium ion batteries. There is no scenario where lithium hydroxide is 70% of cathode demand as many have postulated.

There you have it – new myths for a new decade. I realize I have only scratched the surface here. Lithium remains misunderstood and oversimplified by many that want to write on the topic but don't have the background or insight to do so.