An update on the graphite sector and what to expect in 2024 and beyond

written by Matt Bohlsen | December 20, 2023

2023 has been a rough year for all the EV metals and graphite was no exception. EV battery anodes contain a combination of spherical graphite (sourced from natural flake graphite) and synthetic graphite. Today we take a look at the key trends of 2023 and what we can expect in 2024 and beyond.

Can the Western graphite and anode industry rise to meet China's challenge?

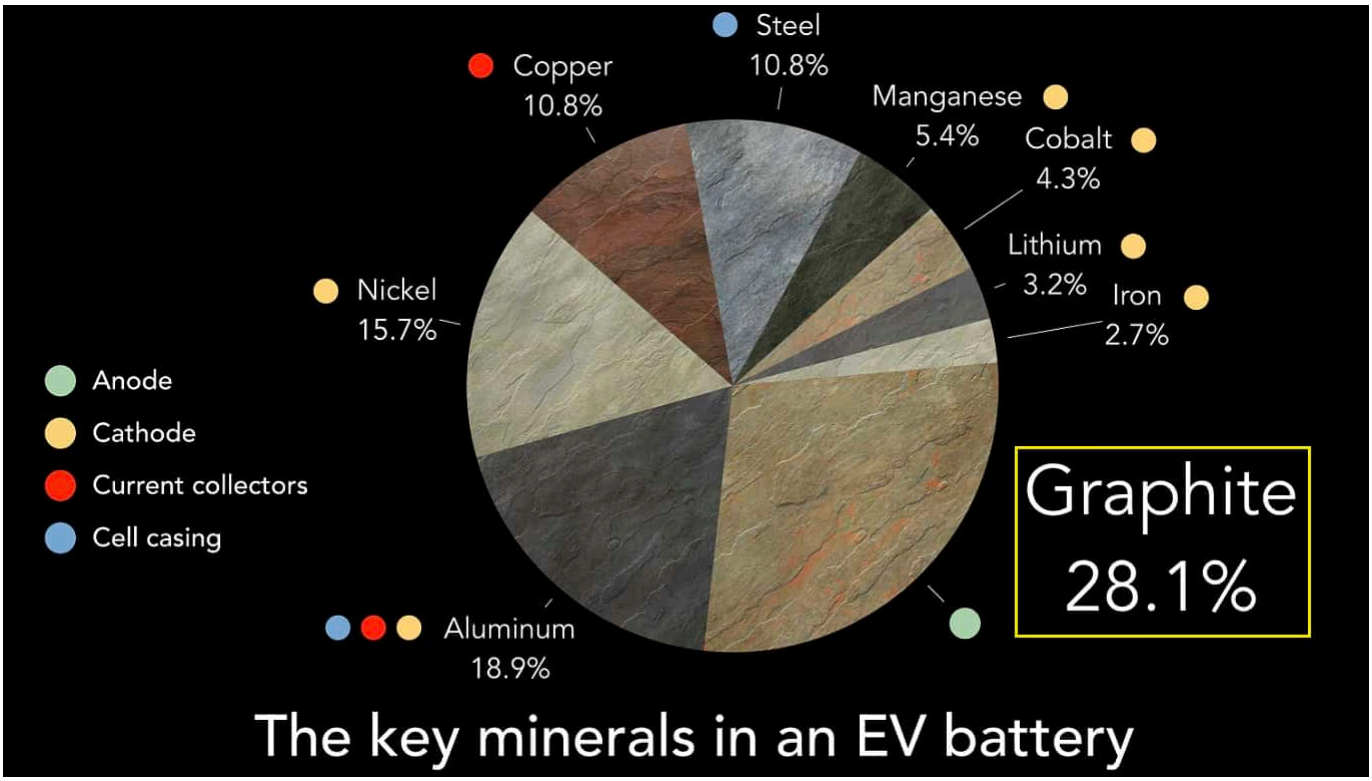
written by Matt Bohlsen | December 20, 2023

China to impose some graphite and processed graphite materials 'export permits' from December 1, 2023

Last week it was reported that China, the world's top graphite producer plans to curb exports of key battery material by implementing export permits for some graphite products from December 1 to protect national security. Another report stated:

“China graphite export restrictions could hinder ex-China anode development….if it lasts into the longer term, it is likely to accelerate the build-out of a localized graphite and battery anode supply chain outside China.”

Graphite is the number one metal required for lithium-ion batteries making up about a 28% share. It is used in the anode.



The key metals and minerals in a battery of an electric vehicle

The world is very dependent upon China to supply processed graphite material and anodes for Li-ion batteries

The reason why this is huge news in the graphite world is that China produces 67% of global natural flake graphite supply and refines more than 90% of the world’s graphite into active anode material (typically spherical graphite). If China were to deny

or delay permits for spherical graphite it will cause major problems for anode manufacturers outside China, such as those in South Korea, Japan, or North America.

China currently produces ~77% of global lithium-ion batteries and 75-80% of global electric cars, thereby completely dominating the industry. If the West is shut out from sourcing processed EV battery materials from China then they will have a major problem producing their own EVs. China plans to prioritize EV battery materials for their own needs. This is why President Biden introduced the Inflation Reduction Act (IRA) and the EU introduced the EU Critical Raw Materials Act. Both are designed to address the shortages in the EV supply chain and the forecast shortages of future supply of critical raw materials. The problem is the IRA has done little to address the supply of raw materials and the EU Critical Raw Materials Act is woefully inadequate and targets fall way short of what will be needed.

Which western graphite companies can rise to meet the challenge to establish an ex-China graphite supply chain

The leading western graphite companies that are working to establish an ex-China supply chain for flake graphite, synthetic graphite, and spherical graphite include:

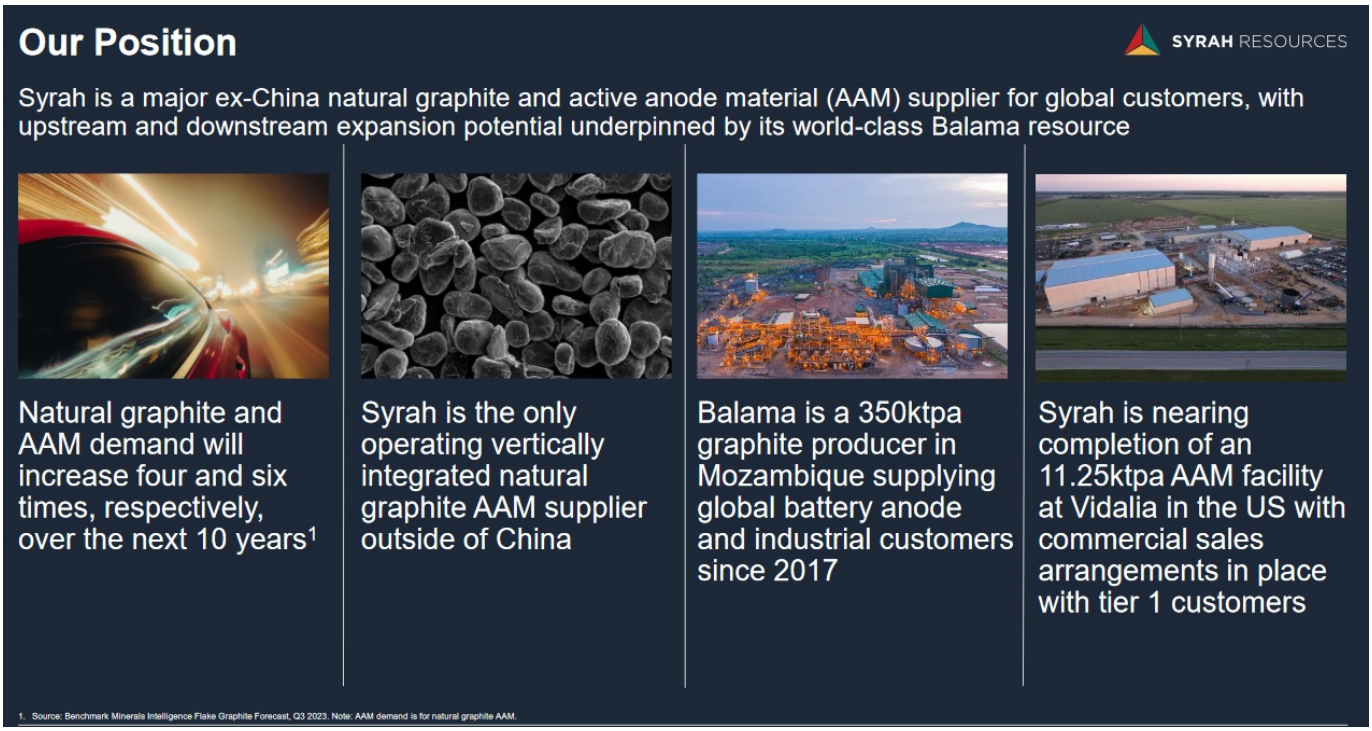
- **Syrah Resources Limited (ASX: SYR)** – Largest western flake graphite producer with their 350,000tpa flake graphite capacity Balama Mine in Mozambique. Currently constructing the Vidalia spherical graphite facility in Louisiana, USA with Stage 1 production plans to produce 11,250tpa of spherical graphite. Longer term they plan to expand to

45,000tpa in 2026 and then to >100,000tpa by 2030 with an Europe/Middle East facility. Syrah already has an off-take agreement with Tesla (NASDAQ: TSLA). Syrah's stock price has surged ~80% higher the past week following the release of the China export permits news.

- **Nouveau Monde Graphite Inc. (NYSE: NMG | TSXV: NOU)** – Is rapidly progressing their plans for their Matawinie Graphite Mine and Bécancour Battery Anode Material Plant in Quebec, Canada. The company is working with Panasonic to qualify their graphite anode material. Panasonic supplies Tesla with batteries.
- **Northern Graphite Corporation (TSXV: NGC | OTCQB: NGPHF)** – Owns graphite producing and past producing mines in Quebec, Canada and Namibia. They also own the Bissett Creek graphite Project in Ontario, Canada. The Company state that they are "North America's Only Significant Natural Graphite Producer". The Company plans to develop one of the world's largest battery anode materials facilities in Baie-Comeau Québec with 200,000tpa of capacity.
- **NextSource Materials Inc. (TSX: NEXT | OTCQB: NSRCF)** – A new graphite producer from their Molo Graphite Mine in Madagascar with Phase 1 capacity of 17,000tpa of flake graphite production and plans to expand to 150,000tpa. The Company's short term plan is for a Battery Anode Facility in Mauritius and longer term for similar facilities in USA/Canada, UK, EU.
- **Magnis Energy Technologies Ltd.** (ASX: MNS | OTCQX: MNSEF) – Magnis aims to produce high performance anode materials utilising ultra-high purity natural flake graphite from their Nachu Graphite Project in Tanzania. Magnis' partially owned U.S.-based subsidiary Imperium3 New York, Inc ("iM3NY") operates a gigawatt scale lithium-ion battery manufacturing project in Endicott, New York.

- **Talga Group Ltd. (ASX: TLG)** – Own the integrated mine to anode Vittangi Graphite Project in Sweden. In September 2023 Talga broke ground on their 19,500tpa anode facility, stating "the refinery is projected to be the first commercial anode production in Europe for electric vehicle Li-ion batteries".
- **Novonix Limited (NASDAQ: NVX | ASX: NVX)** – Has a production capacity target of up to 20,000 tpa of synthetic graphite anode material from their Tennessee facility in the USA.
- **Anovion Technologies (private)** – The USA anode producer plans to invest US$800 million to produce a 40,000tpa synthetic graphite anode material facility in Georgia, USA with plans to expand to 150,000tpa by 2030.

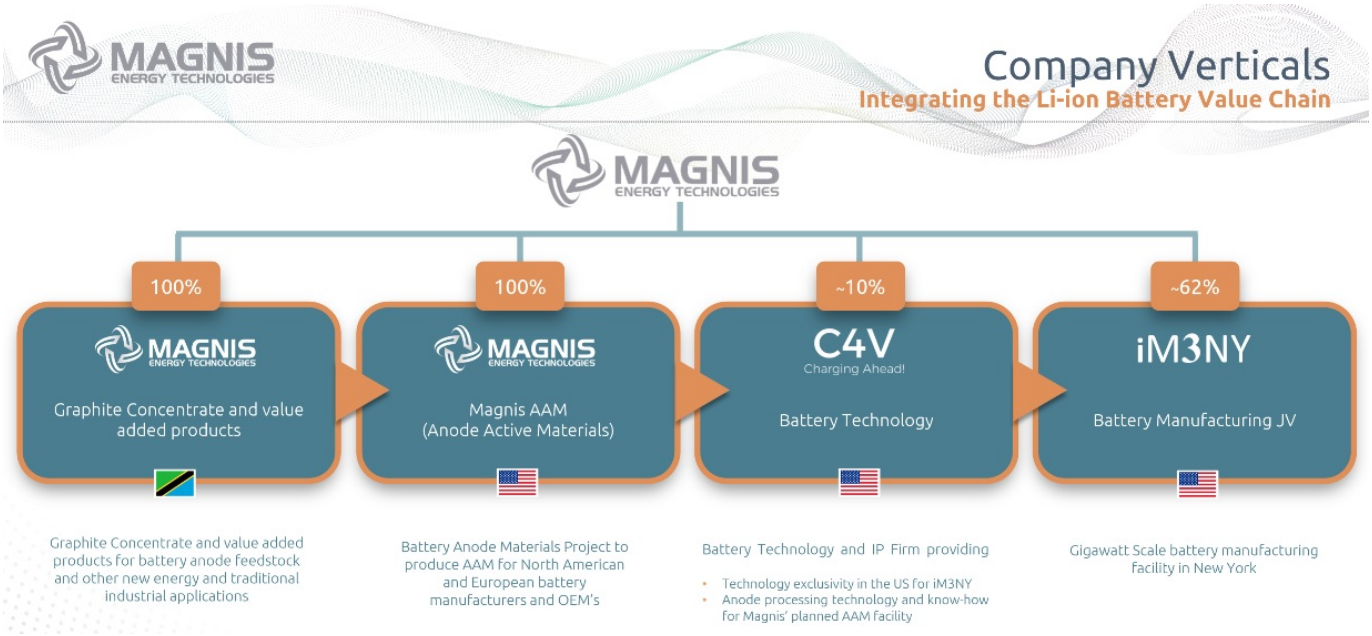
Syrah Resources leads the West's attempt to build an ex-China flake graphite and anode material supply chain



Source: Syrah Resources September 2023 Quarterly Activities presentation

Magnis Energy Technologies is working towards becoming a

graphite producer, anode materials producer and is already a small scale JV battery producer in the USA



Source: [Magnis Energy Technologies company presentation]

Closing remarks

The Western world received a loud wake-up call the past week. The China graphite products 'export permits' may only serve to restrict or slow down some anode material supply from China, but it puts the West on notice of how dependent they are upon China.

Given the world is rapidly moving to electric vehicles, the West must urgently build up its EV materials supply chains or risk being left behind in the global EV race.

The USA is making some bold moves and the companies discussed in this article are moving in the right direction. Let's just hope that the western EV supply chain build out accelerates rather than stalls like [GM's latest electric pickup truck plans]. I think Americans will want U.S.-branded electric cars and I know Europeans will want European branded electric cars. If we are not careful our only choice one day might be Tesla and Chinese

electric cars. Stay tuned.

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5 Stocks on the Radar Amid China’s Graphite Export Ban

written by Tracy Weslosky | December 20, 2023

Recent developments from China’s Ministry of Commerce concerning export permits on critical graphite products have sent ripples through the financial markets. Graphite, indispensable for electric vehicle (EV) batteries, is now under tighter control by China, a country that dominates its global production.

China’s Tightening Control over the Global Graphite Market

written by Tracy Weslosky | December 20, 2023

China’s Ministry of Commerce has announced that, effective December 1, export permits will be mandated for specific graphite products, citing national security reasons. Graphite, a pivotal component for electric vehicle (EV) batteries, finds China at its epicenter, producing 67% of the global supply of natural graphite. Additionally, China refines over 90% of the world’s graphite, which is integral to almost all EV battery

anodes.

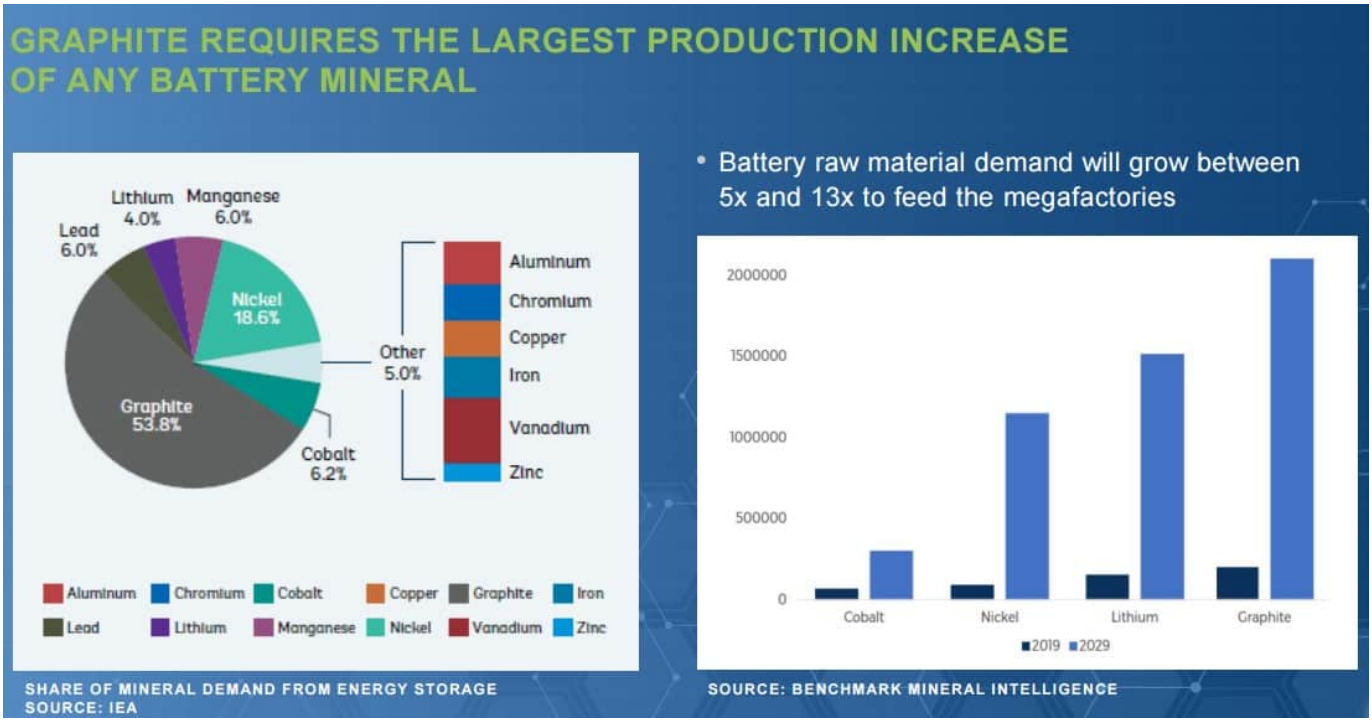
Why Graphite Could be the Next Critical Mineral to Rise Steeply in Price

written by InvestorNews | December 20, 2023

Last July and August, I did a 6-part series called the "Dean's List" which looked at North American explorers and miners that could benefit from government commitments to critical minerals, like the Inflation Reduction Act. This is especially important given how many of those materials are controlled, either through mining, ownership, or processing by China, which isn't exactly "singing from the same hymn book" as the United States and many of its allies these days. Despite the current global tensions, it also comes down to math. There just isn't enough of many of these commodities at present to meet the explosive growth being projected in the various segments of the "green" revolution.

One of the articles from last year's series focused on graphite. I consider graphite to be one of the least publicized critical minerals, especially given this anode material is the single largest component (by weight) of lithium-ion batteries used in EVs (up to 48%) and energy storage technologies. On top of that, almost 80% of graphite mine production in 2021 came from China, while China makes almost 100% of the graphite anode material. Lastly, graphite also requires the largest production increase of any battery mineral in order to meet forecast demand.

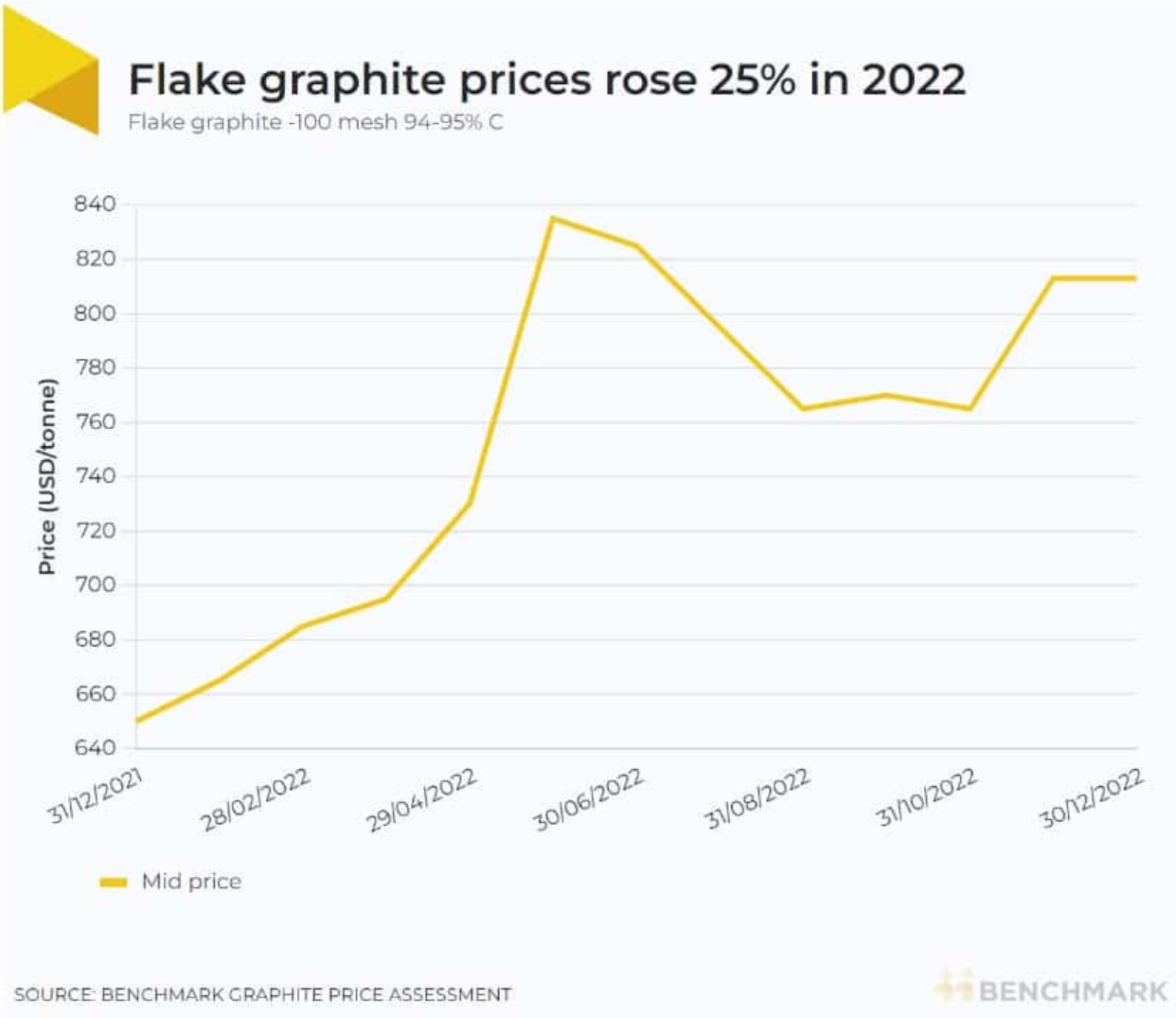
Graphite Growth Requirements for Battery Demand Forecasts



Source: Northern Graphite Corporate Presentation

Naturally one would expect that the price of graphite would be following a similar path as lithium, which was the second best-performing commodity in 2022, and despite coming off its recent highs, lithium is still triple its three-year average. However, it appears graphite is not following suit, despite all the table pounding about the growing supply/demand imbalance, at least not yet. Although there is a slight caveat to this comment as there are no standardized prices for natural graphite and there are no fungible spot or futures markets.

Flake Graphite Price – 2022



Source: benchmarkminerals.com [article]

Graphite Prices

There are a couple of reasons that graphite prices haven't taken off like lithium prices and I'll try to provide some clarity on that. But as we go through this it will begin to appear that it's only a matter of time before graphite sees its time to shine. Unless of course, you are a consumer of graphite, then you might want to start working on how you will explain to Elon Musk why dropping all the prices of his Tesla models might not be a great idea.

Historically, industrial uses of graphite have always been the main driver of demand. Currently, steelmaking is still the

largest source of demand for graphite, but another interesting use, at least in the U.S., is over 7% of annual demand in 2021 came from brake linings. Graphite production for these well-established industrial uses has helped keep the market well supplied, reducing price volatility. In fact, weakness in steelmaking demand, along with a return to more normal graphite production post-COVID (remember that China didn't open up their economy until well after the rest of the world) is the primary reason for graphite prices to have come off the boil.

Synthetic Graphite

The second reason graphite prices haven't taken off (yet) has to do with the fact that anode manufacturers have an alternative, a synthetic graphite derived from petroleum coke (a carbon-rich, solid material that comes from oil refining). I could talk for hours about petcoke from my previous career but I think that would only be interesting to me and maybe one other person I know. As noted earlier, there are a lot of opaque corners in the world of graphite, but I was able to find the following comment: "*Today, synthetic graphite anodes dominate in terms of market share, accounting for approximately 57 percent of the anode market*" which is attributed to Benchmark Mineral Intelligence but it might be behind their paywall. I also found this quote in an article on the Benchmark Mineral website: "*Synthetic graphite anode supply grew by more than 30% during 2022, and is anticipated to even surpass that in 2023, given a supply deficit developing for natural graphite feedstock.*" It appears a lot of the growing anode demand for graphite is being supplied by fossil fuels and not natural graphite.

The Time for Natural Graphite

My interpretation of all this information is that it is simply a matter of when, not if, graphite prices start to rise as we have

seen with lithium. The reasons are multi-faceted and thus it could make for a slow and steady rally or if all factors coalesce at one time it could become a parabolic rise.

1. As anode demand becomes a more material component of overall graphite demand it removes any previous flexibility from the supply side. If steel making or any other industrial use for graphite returns to historic levels it will quickly put pressure on the rapidly growing anode component of the demand equation. The first graph above shows how just anode growth alone will impact the overall demand outlook, let alone any other industrial uses. In the grand scheme of things, I don't see steel consumption going to zero anytime soon freeing up that graphite supply.
2. The synthetic graphite derived from petroleum coke is going to be influenced by oil prices. If oil prices go back over $100/bbl that is going to have a material impact on synthetic graphite prices. Granted, oil prices could just as easily go back to the $50-$60/bbl range and partially offset the overall graphite price rise due to general demand growth, but my personal opinion is that we'll see $100/bbl before we see $50/bbl (perhaps an article for another day).
3. But the biggest impact could come from the ESG side. "*The production of synthetic graphite can be four times more carbon intensive than that of natural graphite*", another interesting fact attributable to Benchmark Mineral Intelligence that I could only find in this article. Kinda makes you think we can't see the forest for the trees when you are making decisions like this in an effort to reduce carbon emissions. If battery makers demand low carbon anode material we could see a step change in prices, literally overnight, as natural graphite becomes the only

option.

It would appear now might be a very good time to be developing a natural graphite deposit outside of China.