

Prices Beginning to Rise?

In this issue we discuss:

- **Prices for Carbonate and Spodumene Edging Up** It isn't with a bang and prices aren't probing anything like all-time highs, but up is better than down. Specifically, lithium carbonate and spodumene are suggesting that they have seen the bottom. Lithium hydroxide usually lags and is more or less flat right now. For lithium, this is probably the best real news in a long while.
- **Battery Production Up Everywhere** While lithium prices have been stuck in the mud due to overcapacity, the number of batteries being manufactured has risen steadily. It doesn't take mathematical genius to note that demand for lithium, nickel and cobalt in batteries will rise if more batteries are being made.
- **Critical Materials and How You Back a Non-Chinese Supply Chain** The rare earths seem to be getting all the press, but the real problem children in the critical materials space are likely the ones that get imported as fairly simple chemicals that a lot of downstream industries depend on. The right way to develop non-Chinese suppliers for those materials isn't the way we are going about it right now.

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As a Matter of Introduction...

This is our fourteenth (semi)monthly newsletter! Plus or minus one or two. Time flies when you are having fun, and critical materials and the connected industries are, at least to us, fun. While we never produced a newsletter filled with cautions about the “best cure for high prices being high prices “ during the lithium heyday that extended through the middle of 2017, those who sat in on Stormcrow talks at conferences know that we were out there saying it. However, we feel even more strongly that the old maxim about the “best cure for low prices being low prices” is every bit as true, and given some pessimism around the battery materials market now, we believe that some realism (along with a little hope that is finally being sprinkled with some evidence) is required.

First, for those who don’t know, Stormcrow deals with the markets for critical materials. Generally speaking, what amounts to a critical material is in the eye of the beholder, but we think of them as materials that are essential to making a product with the properties intended by its designers, even if those materials are not anything like the highest-cost item on a bill of materials. As an example, think about lithium in the battery of your cell phone. That lithium costs pennies as a raw material, but if your cell phone manufacturer was forced to do without it then the resulting cell phone would bring with it a very, very different operating experience than it currently does.

Over the coming months, we are going to deal with our views of the market prospects for some critical materials, and interesting facts about others. We will talk a little about technology and the impact, both good and bad, that it can have on demand for critical materials. We hope you find this interesting and worthwhile! Note that when not writing newsletters like this one, Stormcrow Capital functions as a corporate adviser (capital markets / financing / M&A) in the critical materials sector. We are registered as an Exempt Market Dealer in Canada (*additional disclosures included at the end of this note, for those who need help getting to sleep*).



Little Green Shoots

We might be coming into winter in North America, but at least lithium chemicals within the broader battery materials space are finally showing some signs of life. Between the beginning and end of October, the chemicals looked like this:

Battery-grade LiOH • H₂O down 1.1%

Battery-grade Li₂CO₃ UP 2.1%

Battery-grade CoSO₄ • 7 H₂O down 1.3%

Battery-grade NiSO₄ • 6 H₂O down 1.8%

So three down and one up, and Stormcrow says things are looking good. Hmm. Except that since the end of October, hydroxide prices have flattened out, carbonate prices are continuing up, spodumene prices finally look to be up and both cobalt sulfate and nickel sulfate are up.

Note that we expect lithium hydroxide price improvements to lag lithium carbonate price improvements, because in China a substantial amount of battery-grade lithium hydroxide is converted from technical-grade lithium carbonate. A rising carbonate price should eventually push hydroxide prices higher, all else equal.

Also, battery demand continues to grow (more below) and new capacity in any of the battery chemical spaces has been, to say the least, constrained. It would appear that the old rule that the best cure for low prices being low prices is going to prove itself correct, once again.

All of this couldn't be true without continued demand for all these chemicals in lithium batteries. Fortunately, factories demanding chemicals to make more batteries doesn't seem to be a problem.

Battery Demand Just Keeps on Growing

So, the good news from the Chinese Association for Automobile Manufacturers is that battery production for new energy vehicle purposes reached 9.9 GWh in October, up by almost 48% from the level in October 2019. We are seeing penetration rates of new energy vehicles in select European countries reaching levels of 10% or more on a regular basis, with a very few countries reaching levels higher than 30% (looking at you, Norway).



This is all very good for lithium, nickel and cobalt demand for batteries, and it begs the question why prices for lithium and other battery chemicals have remained flat. The answer to that appears to have been large stockpiles of raw materials that were in place early in 2020.

Regardless of the current state of the industry, which is undeniably good, our best guess for 2019 is that the automotive industry in China used about 70 GWh of lithium cells in the manufacture of all new energy vehicles sold in China. For this year, our best guess is that this figure will be 41-55 GWh, probably toward the higher end of that range. But if the industry had a six month stockpile of some key feedstocks in China, based on projections that were looking toward 100 GWh of automotive battery demand in 2020, then that coupled with higher demand for batteries in consumer electronics means that we are just now emerging into a world where consumers need to restock.

From what we see in battery chemical pricing, we may finally be at that point.

How to Build a China-Independent Critical Materials Supply Chain

We are still not feeling a lot of attraction to the rare earths. Over the last while, prices for some of the magnet materials have shown positive movement, and if we refer to the above argument for lots of demand from new energy vehicles and waning stockpiles, then we are probably at a point when magnet material demand will ramp and some suppliers will get back into the game as prices improve. But we don't see any surprises, no secular shortages in material availability, either natural or man-made.

Indeed, we have written in the past that there are some materials the western world should worry about. If the topic of discussion is a trade war between China and the US, then China could conceivably hit the US by limiting sales of chemicals like antimony. Most of the antimony used in the US comes from China. China is the largest processor and supplier of antimony in the world, and there just isn't enough processed elsewhere to replace what China sends to the US. Most of that antimony enters the US as chemicals, and these are used for a bunch of different purposes, ranging from the hardening of lead electrodes in 12 volt automotive lead-acid batteries and making the alloys in bullets, to the manufacturing of wood preservatives and treatment of construction materials, to the production of flame-retardant chemicals that are used to treat large quantities of textiles used in the manufacturing of furniture. Cutting off the supply of antimony would not only hamper the production of battery electrodes, bullets, wood preservatives and flame-retardant chemicals, but would have significant knock-on effects when it comes to downstream use in automobile manufacturing, defense, construction and retail sales.



If China needed an even bigger hammer, one that would have global impact rather than limiting damage to the US, it has those weapons as well. One such would be to impose restrictions on the export from China of gallium and related chemicals. The market for gallium is a small one, but gallium is a necessary component in gallium arsenide and gallium nitride semiconductor wafers. Without those semiconductor substrates, it becomes hard to see how microwave power amplifiers, a critical component in the manufacturing of cellular communication devices and networks, can be made. Without microwave power amplifiers, forget a 5G rollout; we'd be lucky to maintain the 4G networks we have.

But the point here isn't to prophesize doom, it's to discuss how we, and more specifically how western governments, should incent critical material production that is independent of China. There has been a lot of talk in the US of government support for projects in the forms of loans and grants. Junior mining companies love free money, so they won't protest if that is the way these things go, but to us that initiative is ripe for disaster.

We know from reading way too many NI 43-101- and JORC-compliant studies that all junior companies are always in the process of building the least expensive source in history of whatever it is they are planning on making. Very few of them come close. But they need the juice that conjectured low costs provide to be able to justify to private investors that wild success is at least possible. In turn, they need investors to satisfy the banks that loans might be safe. And all this must be advanced to some point in order to satisfy potential customers that negotiating and signing an off-take agreement is not a complete waste of time.

Maybe the correct role for government, and it doesn't need to be an especially gigantic government when we are discussing critical materials because the markets for a lot of critical materials are not earth-shakingly huge, is to turn this usual order of business on its head. Maybe the right thing to do is to establish a National Critical Materials Stockpile. At first, this Stockpile can buy materials in the open, global market. But it can also sign off-take agreements with new suppliers. The only things we would emphasize would be that these agreements be fairly heavily tilted toward paying no more than market price for materials and that the agreements look to diversify sources of supply.

The rationale for all this is fairly simple. By keeping the size of the off-take agreements to new suppliers small, it encourages junior developers to keep things reasonable. We can think back to Molycorp's development in the rare earth space in 2010. When the rare earth market was of a size that the entire ex-China demand for rare earths was about 40,000 tonnes per year and was already being supplied by Chinese companies, building a 40,000 tonne per year capacity was, perhaps, optimistic. And so it proved to be.



And the real purpose of a Stockpile should be to moderate price swings in what are predominantly small and volatile markets. The Stockpile should not simply buy materials in drums that get stuck in warehouses. The appropriate analysis should be done to determine what the near-term and mid-term prospects are for a material, and the Stockpile should be selling when the prices are too high and buying when the prices are too low. The usual way such Stockpiles have been maintained is to buy a bunch of stuff then sit on it until some power declares an “emergency”. Well, the market for critical materials declares its own emergencies, a la when lithium chemicals jumped to prices of more than USD\$20,000 a tonne in 2017 or when magnet materials such as neodymium oxide jumped to nearly USD\$500 a kilogram in 2010-2011. Having a Stockpile that could be selling into such a hot market and then buying back when the prices retreat would do a lot for making the life of suppliers much simpler.

Ensuring that consistent market rates (or at least near market rates) will be paid for these materials helps to ensure that the new suppliers are likely to weather the storms in these volatile markets and to guarantee that western companies drawing their materials from these new suppliers won't be penalized (or subsidized, for that matter) by doing so.

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