

Recharging a battery in 5 minutes is the starting block for NEO Battery Materials interest

It seems like it was only last week that I was writing about nanomaterials and how they were going to save the world by making everything better. Oh wait, it was just last week. I guess the difference here is that this company has an actual resource (targeting silica in quartzites) that would supply their proprietary nanocoating technology. Nope, that's almost the same as well. So to quote baseball's philosopher, Yogi Berra, it's déjà vu all over again. Today is another story about nanomaterials that look like they have the potential to improve the technology required to lower our carbon footprint and make the air we breathe a little cleaner.

The company being discussed this time around is NEO Battery Materials Ltd. (TSXV: NBM | OTC: NBMFF). A six-month chart of this stock will tell you that there is plenty of buzz around what is happening, given it has traded in a range of \$0.14/share to as high as \$1.31, closing yesterday at \$0.89. Most of this activity is being driven by the steady stream of exciting news that comes out on an almost weekly basis. Two of the biggest surges in the stock price came first in early June when the Company made the remarkable announcement that its nanocoated silicon anode allows for a safe full charge on small battery cells within 5 minutes leading to a two-day rally of 62%. Then this past Friday NEO reported the first prototype of silicon anode active materials has been successfully produced, and samples have been sent to partners for full cell evaluation and electrochemical characterization. The latest news causing the stock to surge 30% on the day with further follow through on Monday adding another 14% to the

share price.

These are some pretty stunning moves so let's look a little closer at what this all means in the grand scheme of things and why the stock may be responding like it is to this news. The first news seems pretty obvious to me, recharging a battery in 5 minutes is impressive no matter how you look at it. If we could all recharge our smartphone, wearable device, tablet, laptop, cordless yard equipment, etc. in 5 minutes, life would be a whole lot more convenient. But convenience isn't going to save the earth. Where this becomes a game changer is if they can evolve this technology for use in the Li-Ion batteries used in EVs. Imagine the change in adoption of EVs over internal combustion engines if you can recharge your battery in almost the same amount of time it takes to fill a vehicle with gas. It almost wouldn't matter what the range of the battery is as long as there was adequate charging capability. Going to Starbucks for a coffee? Plugged in the car before I went in and it was charged when I came out. Stopping by the grocery store on the way home from work to pick up something for dinner? No problem, also charged the car while I was in the store.

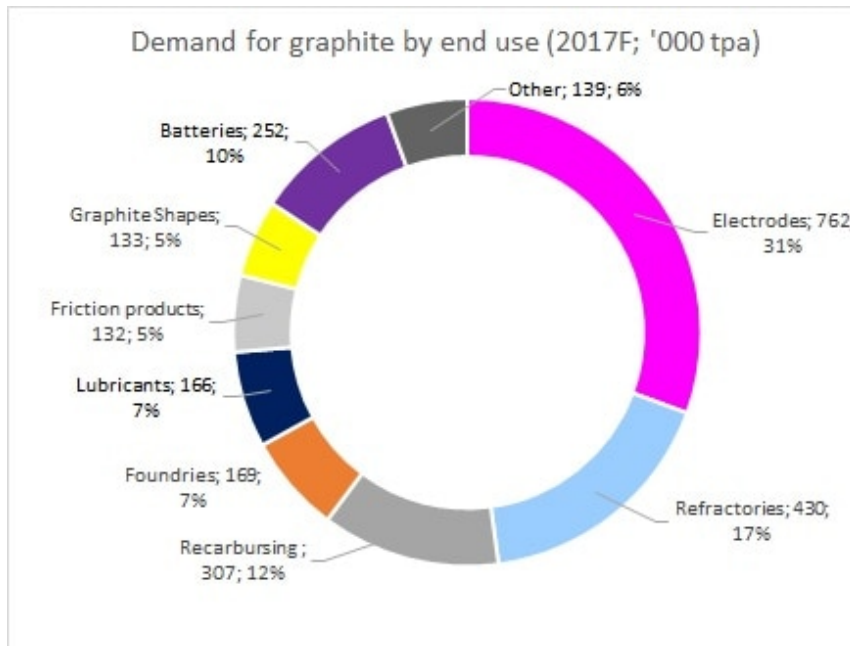
Perhaps I'm getting a little bit utopian but it's hard to argue that an EV that could charge in 5 minutes wouldn't be revolutionary. This leads us to the latest news from the Company, the first working set of NEO's proprietary silicon anode materials has been manufactured through their unique process. This prototype will be utilized by NEO's third-party partners for evaluating the performance and efficacy of NEO's silicon anodes in each respective party's cell system and environment. The Company expects this development to act as a catalyst to accelerate the commercialization of its silicon anode active materials. Another critical piece of information in the latest press release was the signing of two new Non-Disclosure Agreements (NDAs) with global top-tier battery material producers in China and South Korea for NEO's

innovations with silicon. They are getting the word out and in front of the right people to make something happen.

The Company raised \$2 million in early May and had a cash balance of \$872,171 as of their May 31st financials. NEO has likely raised another \$1.4 million from the exercise of in-the-money (\$0.30 strike) warrants that were set to expire on August 21st. There are still 17 million warrants outstanding but with an expiry date of May 2024, who knows if/when those might get exercised. In the meantime, there should be enough cash to continue operations for a couple of more months at which point in time we will see what's next for NEO Battery Materials. They may have to go back to the market to raise some capital, or perhaps a JV with one of their NDA partners will provide some financial support. Regardless, there are some exciting things happening that will keep investors on the edge of their seats for the foreseeable future.

2017: An Opportune Year For Graphite Producers

China may still be responsible for the vast majority of the world's graphite supply, but as demand steadily climbs, the country's ongoing crackdown on polluting industries continues to reshape global markets, creating opportunities for others to enter the supply chain anew. Whereas, steel trends would normally be the main force in graphite, the market stands to be considerably altered by the explosive demand for lithium ion batteries expected over the next decade.



Graphite demand Core Consultants estimate

Even the most conservative forecasts have graphite demand going strong over the next 5 years. The anode market alone, which is almost exclusively served by naturally sourced spherical graphite and synthetically produced graphite, looks set to increase from 80,000 tpa, as it was in 2015, to at least 250,000 tpa by the end of 2020, but in the most optimistic cases, the market could be as large as 400,000 tpa.

In the 90s, China dumped large quantities of graphite product on the market as a means to earn foreign exchange. Much like with rare earths, this deflated the industry in the west, resulting in very few new graphite plays and leaving us highly dependent on Chinese supply. However, now that China has enough dollars, a booming domestic steel industry and skies thick with smog, it is unlikely the country can repeat the affair, and as such, it seems that it's someone else's turn.

President Xi's serious attitude to environmentally motivated industrial reforms have reduced China's output of graphite electrodes for the manufacture of steel by 30%. One company which survived the closures is now the highest performing stock on the Shanghai Stock Exchange with a 263 percent year-to-date gain, and its first-half net profit surged to 412

million yuan (\$63 million) from just 15 million yuan a year ago. Analysts expect the company's July figures to trump the first half of the year as graphite electrode prices explode.

The recent spate of severe weather, particularly Hurricane Harvey closing refineries up and down the Texas gulf coast, has extended the shortage of needle coke, a necessary ingredient in the production of graphite electrodes. Normally, we would expect China to fill this gap, but, as mentioned above, factory closures and additional export duties designed to keep product at home mean they can no longer meet this requirement.

At the end of last year, China announced they plan to stockpile graphite as one of their critical elements since production is likely to continue falling, and this year, Chinese spot graphite electrode prices recently reached \$30,000 per MT, a 300% increase since January, demonstrating the serious nature of the looming supply deficit and leaving the door wide open for new projects.

The growth in the markets for electric vehicles and grid storage systems should be enough to drive graphite prices even further, which, in the absence of new projects coming online, may ultimately close some smaller steel refineries as costs begin to spiral. Construction will still play a major role in graphite demand, but China's construction sector will largely just continue to restrict their export of graphite products since the stockpiles will be consumed domestically.

Graphite is about to explode in popularity, and the world's largest supplier of the material is unable to scale as quickly as it once could. This puts junior explorers and burgeoning producers in an enviable position since very few new graphite projects have been listed over the last couple of decades, and any investor looking for exposure should consider getting in sooner rather than later.

The Tesla Beauty Contest

✘ Tesla has confirmed that it will proceed with plans to build the battery 'gigafactory', choosing Nevada as the location. Now, it will have to secure the critical raw materials to launch production and keep the plant running. There has been much focus on the lithium supply requirement, but for the initial period, Tesla does not need to secure a lithium offtake agreement as there are two or three major suppliers in the western United States (such as Western Lithium – TSX: WLC – in Nevada), which have expansion capabilities. Three new lithium mines have also opened in the last couple of years and at least another is ready to proceed subject to financing. However, it is unlikely Tesla could go ahead without a secure source of graphite which is needed to make the anode material in the battery.

Batteries contain some 10 to 12 times more graphite, by weight, than lithium. Losses in the manufacturing process end up consuming 30 to 40 times more graphite than lithium. China produces 70 to 80 per cent of the world's graphite and its industry has serious environmental and resource management challenges. The associated resource nationalism and the preference for selling value added products rather than cheap natural resources suggests that the supply chain could be compromised and unreliable. Tesla's domestic sourcing ambitions are not a secret and the Gigafactory will source such materials as cobalt, graphite and any other critical material it needs in North America in order to establish as tight a supply chain as possible with an aim to keeping low costs and low environmental impact.

Who will win the Tesla graphite beauty contest? There is only one company that can meet Tesla's volume and timeline

requirements some contend. It is also located in North America and has the best location/infrastructure and the lowest capital cost of any new graphite project – that company is Northern Graphite (''NGC', TSXV: NGC | OTCQX: NGPHF).

NGC is planning on producing about 44,000 tons of graphite concentrate per year. 90% is battery grade and the yield of anode material (called "spherical graphite" or "SPG") is 50%, both the highest in the industry. This would put its annual SPG production at 20,000 tons and the company has already defined the resources to expand beyond this. Tesla's initial requirement is 27,500 tons in 2017/2018. Other companies with similar sized projects have 40-70% battery grade material and a yield of 33% or less which make their potential annual SPG production less than 10,000 tons. What will they do with the high percentage of non-battery grade material that must be sold to maximize projects economics?

NGC has completed a bankable Feasibility Study and has also secured its most important environmental permit. The company is ready to start construction next year and reach the production phase before the end of 2016. The competition is well behind in the engineering/permitting process. NGC also has one other huge advantage over its peers...

It is not enough to just be able to produce graphite. It must be purified to 99.95%C for use in lithium ion batteries. The Chinese wet chemical approach, a veritable environmental nightmare, and the thermal method, too expensive and inefficient, are not options. The only company that already has a proven, proprietary purification technology also happens to be NGC. In part, this is due to the pristine nature of its flake graphite which makes it easier to remove impurities. Even if its peers knew the process, it is unlikely it would work on their concentrates due to different mineralogy. Initial testing also indicates that this high quality flake results in greater battery capacity but further testing and validation is required.

We don't know when or what Tesla will decide to do about its graphite supply, but those who would venture a gamble in the graphite beauty contest would clearly have to place NGC at the top of this list.

Of course, there are also questions as to whether the Gigafactory will actually be built; indeed, even Tesla's sales targets of 500,000 EVs by 2017/2018 are rather ambitious. However, few would venture to bet against Elon Musk. Alternatively, it seems highly probable that the production of EV's from all car companies will exceed 500,000 units per year by 2017, considering that every major manufacturer already has an electric or hybrid vehicle on offer in 2014. This is less than 1% of the annual new car market. Regardless of the outcome, Tesla will need more graphite than lithium and NGC is in the best position to supply it.