NEO Battery Materials’ next generation EV battery is the focus of its new Korean R&D hub

written by InvestorNews | May 31, 2022

I’m going to make a bold prediction. The electric vehicles we see on the road today will be virtually obsolete in 5 years. The amount of capital and brain power being applied to battery technology coupled with the desire/need for fewer and lower carbon footprint resources that go into those batteries is going to result in material step changes in vehicle range, speed of charging and hopefully the corresponding cost. Whether the electrical grid can keep up with this rapid transition to EVs remains to be seen but we can save that discussion for another day.

Imagine you want to go on a road trip in your EV, but every 300-400 miles you have to spend a few hours charging. What if the next generation of EVs could add 50+% to that range and fully re-charge in 15-30 minutes. How much would you be willing to pay for the old generation of EV versus the convenience of a new one? For sure there will still be a market for used EVs as some people only need it for their daily commute or trips to the grocery store and otherwise the vehicle sits idle for hours, at which point in time there is little to no inconvenience to charge it. But for me, as someone who likes to fish and hike in the great outdoors of the Rocky Mountains, I can assure you there is no chance I’m buying a current generation EV with its theoretical range that potentially leaves me stranded in the middle of nowhere when the actual range ends up being 25% lower

than optimal operating conditions.

One company leading the charge into the next generation of batteries is NEO Battery Materials Ltd. (TSXV: NBM | OTCQB: NBMFF), a Vancouver-based company focused on lithium-ion battery materials for electric vehicle and energy storage applications. NEO has a focus on producing silicon anode materials through its proprietary single-step nanocoating process, which provides improvements in capacity and efficiency over lithium-ion batteries using graphite in their anode materials. The Company intends to become a silicon anode active materials supplier to the electric vehicle industry with their all-star management and technical advisory team cherry picked from LG Chem, Samsung and various renowned universities.

The numbers are impressive both from a capacity/capability perspective and relative cost to their competition. In mid-2021 the Company announced that in a half-cell coin test that its nanocoated silicon anode allowed for a safe full charge within 5 minutes, which demonstrates the potential for scaling and implementation in larger cells such as those used in high power EV batteries. Through a mix of treatments and nanocoating materials, NEO utilizes pure metallurgical-grade silicon (Si) particles, which provide a 40-70% higher initial capacity compared to current competitors that employ SiOx, SiC, or other composite silicon materials. Due to NEO's advantage of retaining a higher initial capacity, on average, a 5% silicon weight loading of NBMSiDE™ can have the equivalent impact of a 10% loading of a competitor's materials. Initial coulombic efficiencies (ICE) – the ratio of the discharge capacity after the full charge and the charging capacity of the same cycle and is usually a fraction of less than 1 – for NEO's 100% micron-size level Si anode have exceeded the 86% level, and cycling performance presents excellent capacity retention after 300 charging/discharging cycles.

And all this technology is advancing beyond research lab theoretical work. The latest press release from the Company confirms an MOU with the Province of Gyeonggi (basically Seoul, South Korea, and the surrounding area) to establish grounds for investments and cooperation between NEO and the Province to advance the mass production of silicon anode materials for EV batteries. NEO Battery Materials will initially invest, over the next 5 years, 24 billion KRW or approximately C$25 million to support the construction and expansion of the silicon anode commercial plant located on a 107,000 sq. ft. site in Oseong Foreign Investment Complex, Pyeongtaek City, Gyeonggi-do. The Company aims to transform the Province into an essential manufacturing and R&D hub of silicon anode materials. The first phase of the commercial plant will possess an initial annual production capacity of 240 tons of NBMSiDE, and the facility will be built as a 4-story office building with additional space that can accommodate production expansion to 1,800 tons annually of the Company's anode material.

I have no idea if NEO Battery Materials will be one of the success stories to advance the next generation of battery technology for EVs and energy storage. I do know that they have generated some interesting results and have NDAs signed with over 20 globally established industry players in the battery cell manufacturing, materials manufacturing, and automotive industries. With a market cap of roughly C$30 million, you can decide if this is one of the companies you'd like to hold if you are investing in the future of EVs.

Jack Lifton on the Real X-Factor in the Critical Materials Supply Chain

written by Jack Lifton | May 31, 2022

America's permanent civil servants, otherwise known as the employees of Federal agencies and the staffers of the elected officials of both local and national governments, are required to believe in the efficient market hypothesis as promulgated by the credentialed clerisy, in this case the Chicago (Milton Friedman and his disciples) School of Economics. This school holds that it is a law of nature that the demand for and the supply of any commodity will always trend towards an equilibrium in which the one equals the other, so that, for example, if the demand for copper wire exceeds the supply then capital will pour into the copper production industry until the supply equals the demand, or prices for copper will increase so as to deflate the demand increase, or some combination of both will occur.

Since there is no infinite reservoir of copper just waiting to be mined, refined, and fabricated by the driver of increased prices, the efficient market hypothesis fails to be reliable when the real world is involved.

This would, of course, be common sense if not only the correct (Ivy League) education, but also first-hand knowledge, experience, and skill in the particular subject matter were valued in Washington, DC. They are not.

What the Chinese refer to and define as "New Energy" is the production of electricity by means other than using fossil fuels for heating water to a boil and using the steam to spin turbines. This definition includes solar, wind, fuel-cell,

nuclear, and recently commercialized chemically based rechargeable storage devices and systems such as batteries. Thus, all, or in-part (hybrids) battery powered, fuel cell powered, and even hydrogen powered (internal combustion engine) motor vehicles in China are called “new energy vehicles” (NEVs) and I am going to adopt that terminology here.

The contemporary market for NEVs globally is primarily driven by politicians, not consumers. In authoritarian industrial economies such as China, consumers can be forced to demand NEVs by laws and ultimately by the mandated production of only NEVs. This is known as industrial policy planning. In the free-market economies, politicians attempt to do the same thing by artificial price manipulation, aka subsidies in the form of tax incentives or outright grants to make prices appear lower than they actually would be if only efficient market dynamics were involved. These payouts sourced from taxation are known as “free money” in the capitalist economies. This free money is of course a transfer of wealth from the general population to the wealthiest by the pretense that it is for the common good.

Legislators (a.k.a., politicians) attempting to drive, not just influence, the consumer market for energy use, do not understand thermodynamics as applied to the production and use of energy by man-made devices. The relatively inexpensive electrical energy derived by burning fossil fuels cannot economically or efficiently be substituted by more expensive methods of transforming sunlight and wind through the use of the scarce resources of the electronic and magnetic properties of metals that are scarce mainly because of the energy needed to collect, separate, purify, and concentrate them. That energy can never be recovered by using them to transform light energy or the kinetic energy of wind into useful forms of electricity. Alternate energy construction economics fails with wind and solar.

It is argued that, even so, such relatively inefficient methods of energy production are a common good, even a necessity, since their purpose is to preserve an environment that is best for human beings. This is a moral judgment not a scientific one, in any sense. In an open system, it is not possible to balance or preserve or recycle energy efficiently. The world is an open system and pretending it is a closed one is a thought experiment and is not realistic.

Natural resources available to us are limited by the amount of energy we are able to deploy economically to extract, refine, and fabricate them into forms useful not to the inanimate world but to our species for its comfort, health, safety, or survival. Extracting particular resources means reversing the natural forces that created and mixed them together in the first place, and this always needs an excess of energy input over what is recoverable from the use of the resource.

Natural resources are not organic. They do not reproduce themselves. Human beings use and must continue to use the energy of fossil fuels to produce the structural metals necessary to recover relatively tiny amounts of technology enabling metals for energy transformation and then pretend that the relatively small and expensive amounts of useful energy obtained by the use of the electronic or magnetic properties of the technology enabling metals are saving the world, but the net irreversible flow of energy used to obtain these metals overwhelms the useful production of electricity obtained and due to the fact that the new energy generators wear out (I.e. return to their natural oxidized and useless state relatively rapidly) can never be recovered. In fact, additional energy must be applied to recycle them to the metastable state in which they are useful. Peter is being used to rob Paul.

A good example is the production of lithium for lithium-ion

batteries. The best deposits of lithium currently used to produce it are the South American brines in which the lithium content is 2000 parts per million or 1/5 of 1 percent.

In order to produce 2000 tons of lithium, it is necessary to process 1,000,000 tons of water! It will be argued that most of the energy necessary for this is from natural solar evaporation, so that no fossil fuels need to be burned to create it. However, it must be noted that half of the world's lithium is still derived from hard rock deposits of the mineral spodumene. The average run of mine grade of spodumene is 1% Li, measured as metal, so that 2020's 50,000 tons of Li from spodumene required the moving, crushing, and processing of 5,000,000 tons of rocks.

The 140,000 tons of cobalt, measured as metal, produced in 2020 required the mining of 30,000,000 tons of copper and 2,500,000 tons of nickel in both of which the run of mine content of Co was less than 0.5%. The rock moved to produce this amount of copper, nickel, and cobalt was 3,000,000,000 tonnes.

The energy necessary to mine, crush, roast, smelt, extract, separate, purify, and fabricate these metals into useful forms is staggering, and it is all produced by burning fossil fuels!

Just as the Chinese were allowed to set costs of producing rare earths without considering environmental degradation, health, and safety so western politicians do not consider the energy costs or source development necessary to produce New Energy.

The Chinese minimize their need for the most energy intensive part of resource production, mining, by buying and importing ore concentrates whenever and from wherever possible. Lately, this has included even the rare earths. America and Europe have fallen far behind China in globally sourcing mined materials.

The amount of energy just consumed in mining, but not refining

critical materials outside of China is staggering. There is no way this can be economical or efficient. This need for energy will inhibit the development of countries such as the DRC in Africa, slow the development of Chile, Argentina, and Bolivia and raise the cost of living in Australia.

The prices for the critical metals for new energy production will continue to rise but if present trends continue their supply will only be what is leftover from Chinese domestic needs and from those sources outside of China not controlled by China, because it doesn't need them. China is the single largest producer of electricity of any nation; it has already allocated the necessary power for its new energy construction as well as obtained the necessary flow of raw materials without impeding its consumer's needs for their standard of living.

No one but the Chinese has looked at the life-of-mines of critical natural resources. This is the key to a new energy future.

The laws of nature supersede those of economics.

Only through a Secure Supply of EV Metals (Rare Earths) can a Hegemony Be.

written by Jack Lifton | May 31, 2022

It has been reported today that the Biden administration is looking to allied nations as primary sources of critical mined raw materials, and that it, the administration, will focus on

supporting the domestic American processing of such imported ores into useful products focused on domestic production of EVs, their batteries, and components. This is an example of a complete disregard by the Biden administration for America's competitive advantage, safety, and, ironically, its economy to placate a loud anti-mining luddism that pervades the American left. It is in two words, hypocritical and stupid. It's hypocritical because it assumes that out-of-sight, out-of-mind, will placate the left's "greens" into thinking that pollution in Australia, Canada, or Brazil and its attendant costs doesn't exist. It's stupid, because it makes no economic sense. Transporting raw material concentrates to the USA for processing is rarely cheaper than mining and processing them domestically. In the case of cobalt, for example, its "ore" is mostly a byproduct of copper or nickel production, and there is no cobalt mine in the USA and there is only one facility in North America (Canada) capable of processing the ore concentrate into "battery grade" cobalt. In the case of the rare earths almost all ores are radioactive and thus have to be "cleaned" at licensed and specialized facilities. Only one such private facility exists today in the USA.

There is today no commercial rare earth separation, metal making, alloy making, or rare earth permanent magnet manufacturing in the USA. The combined annual demand of the military and consumer industries in the USA for rare earth permanent magnets is between 10,000 and 15,000 tons per year. Never in American history has so much of any of these forms of rare earths been produced in a single year.

Yet Washington believes that the annual processing into fine chemicals and metallurgical forms of 170,000 tons each of lithium and cobalt (the amount required annually for 17 million BEVs if each has a 60 kWh battery [the smallest battery now offered by Tesla]) and of 50,000 tons per year of rare earth

permanent magnets (the amount required by 17 million EVs annually if each uses one rare earth permanent magnet motor) could be accomplished by 2030.

The Biden administration's plan for sourcing critical materials for EVs is also an indication of the end of American dominated natural resource globalization and the acceptance of the fact that China has already constructed and is operating a global sourcing system for critical materials for China's domestic economy, which includes an emphasis on domestic Chinese processing of the ores of critical materials and a total domestic Chinese supply chain for the end-use products that depend on downstream forms of the critical materials for their operation and use both in the civilian and military markets. China today processes 60% of the world's lithium and 80% of the cobalt as well as 90% of the rare earths!

China has published its China2025 plan to become independent in 10 key technologies by 2025. Its globalization of secure sources of technology materials to ensure the success of China2025 is for all practical purposes already complete, as planned.

It is said that we live in the age of technology, and that we are all enjoying the fruits of applied science (aka, technology), but we have to ask "What is the purpose of a technology, in human terms?" Is it the jobs and spin-offs from the manufacturing and distribution of high-tech, consumer-oriented, and quality-of-life-improvement -goods to the general population through the economies of miniaturization, which alone makes them economically available? Is it primarily for military uses? Is it for both, the civilian and military markets, needs, and satisfaction?

For the fifty years from the successful conclusion of the manned lunar landing program in 1969 until today the target of

technology has been upon making economically available business and leisure travel (civilian jet passenger and freight airliners), making individual wireless mass communication, both audio and video, cheap and available, and making electrical energy universally available and affordable.

The last of these, the universality of cheap available electric power, is now the basis of our technological civilization!

Unquestionably it was military patronage of science and engineering from 1940 to 1970 that brought about the discovery of deposits, production, and processing of the technology metals that enable the miniaturization, and thus widespread consumer availability, in today's society, of high-tech goods and services. But since President Nixon canceled the Space Shuttle Program in 1973 original research for product development in the USA has been the purview of private industry.

We are now at a turning point.

There are two directions to go for the need to have secure supplies of **technology enabling metals.**

One is to let the free market system as practiced in the USA make sure that items are always available through demand driven supply. The USA maintains a (ridiculously) small supply of critical materials for the Defense Department in case of emergencies, and private industry balks at inventory costs.

The other is to formulate and act upon an industrial policy, with which the State mandates a supply agenda and sets production quotas for all companies involved in a particular technology enabling metal supply chain. The Chinese government maintains large stocks of technology enabling metals to smooth out both demand spikes and prices.

The United States' financial system, known as free market capitalism, operates as if profit is the sole purpose of the existence of any manufacturing or service enterprise. China has adopted a Capitalism with Chinese Characteristics in which the sole purpose of any Chinese venture is to do something which is good for China. Private enterprise is allowed, and individuals may accumulate enormous wealth if and only if this purpose, the good of China, is the goal.

A hegemon is the first among equals. Athens was the first to be known as a hegemon, followed by Alexander's Macedon, then Imperial Rome, and more recently, the British Empire, and the United States. In 1947 America had half of the world's gold, produced half of the world's steel, the most powerful military in history, and was embarking on an unparalleled era of technological brilliance.

There can only be one hegemon, by definition.

Globalization of the sourcing of critical materials with American characteristics (Neoliberal, free market, economics) can't work. It's too late.

To paraphrase the poet: This is how hegemony ends. Not with a bang but with a whimper.

Giyani Metals CEO on huge market demand for manganese

written by InvestorNews | May 31, 2022
July 4, 2018 – "The market is very strong at the moment. I do

not know if you noticed, but CATL listed in Hong Kong raising over a billion dollars. They are going to be the largest battery manufacturer. Demand is just going to be huge for the manganese units going forward." states Robin Birchall, CEO & Director of Giyani Metals Corp. (TSXV: WDG), in an interview with InvestorIntel's Peter Clausi.

Peter Clausi: We are here to talk about Gyiani Metals and manganese. You have 3 properties in Botswana.

Robin Birchall: That is correct. We have the K. Hill, Otse, and Lobatse.

Peter Clausi: Which is your favorite?

Robin Birchall: I would say my favorite is K. Hill. It is the most advanced of all of them.

Peter Clausi: Did you buy that in advanced stage or were you the ones who moved it along?

Robin Birchall: No, we have moved everything along. We have done all the drilling this year. We have done that in a very short period of time, about 4 months, completed our drilling at K. Hill. We are now drilling at Otse, which is our second property. Because we are under budget, cash and meters wise we are even going to drill at Lobatse.

Peter Clausi: Nice. You do not hear that too often. How many holes did you drill at K. Hill?

Robin Birchall: We drilled 18 holes there. One of which was a metallurgical hole. We have drilled now 4 holes at Otse, a good 3 holes left to do there. We plan probably about 6 at Lobatse.

Peter Clausi: Where do you assay those? Is it in country or do you ship them out?

Robin Birchall: No. They go to SGS, Randfontein in South Africa. All the samples have gone from K. Hill to SGS, Randfontein and we are waiting for them to come back. They will be back in the next 10 days.

Peter Clausi: It takes what, about a week for you to compile those into a press release?

Robin Birchall: Yeah, I am hoping to have some initial results. Yeah, that is our next press release will be something on the grades we are seeing in the holes.

Peter Clausi: That is often a major catalyst; looking forward to seeing that. Will that include the second drill program as well or just K. Hill?

Robin Birchall: No, K. Hill is for resource and Otse is where it is not quite exploration, but it is not quite enough to be a resource. It is really for us to understand that deposit a little bit better.

Peter Clausi: If I remember your press releases correctly, you were counting on premium pricing for your manganese given its quality.

Robin Birchall: That is correct. From the visual inspection we are pretty happy with what we have got there, but obviously the assays have to come back.

Peter Clausi: What do you see happening in the manganese market?

Robin Birchall: That is a really good question. The market is very strong at the moment. I do not know if you noticed, but CATL listed in Hong Kong raising over a billion dollars. They are going to be the largest battery manufacturer. Demand is just going to be huge for the manganese units going forward…to access the complete interview, click here

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