

The million mile battery is ahead for electric vehicles – and investors

Nano One positioned for great things as the EV boom approaches

Superior battery technology continues to move towards significant breakthroughs such as the 'million mile battery' and 'low cost/fast charging' lithium ion batteries. These new advances will act as a huge boost for electric vehicle (EV) sales and allow the next generation of EVs to become super competitive with conventional cars. The **million mile battery** suddenly makes EVs the preferred choice for fleet operators (taxis, hire cars, deliveries, trucking etc) and the cheaper/fast charging batteries mean that by 2022 we should start to see EVs reach price parity with conventional cars. This will lead to a tsunami of EV sales.

All of this is only possible because of scientific breakthroughs by leading companies such as Nano One Materials Corp. (TSXV: NNO). Car and battery manufacturers are jumping onboard so that they can remain competitive in a rapidly changing auto world. Volkswagen's partnership with Nano One is just one of many examples.

Understanding the massive changes happening in the auto industry helps explain why Nano One's stock is up 145% over the past year as investors start to see their potential of the predicted US\$23 billion cathode market opportunity. Specifically, Nano One is targeting the licensing opportunity to improve cathodes estimated at \$1 billion in annual revenues by 2025.

Nano One's mission is to establish its patented technology as a leading platform for the global production of **a new generation of battery materials**. Nano One has developed patented technology for the low-cost production of high-performance lithium ion battery cathode materials.

Nano One is targeting a potential \$1b licensing opportunity in the \$23b cathode market by 2025

 Source

Investors might think that it is too late to buy into Nano One looking at recent stock price gains, but actually on the current market cap of C\$239m if Nano One can deliver the potential revenues below as per their targets the stock will have appeared cheap. This is because they are targeting about \$70m a year in revenues by 2025 and profit margins are expected to be extremely high.

Nano One potential revenues by 2025



Source

Nano One's patented cathode used for the 'million mile battery'

Nano One announced in June this year the development of a coated, single crystal cathode material for lithium ion batteries that is providing **up to 4 times improvement in longevity**. The technology is applicable to all of Nano One's cathode materials but is especially relevant to lithium nickel manganese cobalt oxide (NMC811). According to Nano One, "Increased durability is critical in enabling extended range, faster charging and even million mile batteries for electric vehicles."

This breakthrough makes the 'million mile battery' within

reach. Such a battery would mean EVs can last at least 4x longer than a conventional car. The implications are enormous. Fleet operators will be lining up to buy EVs with million mile batteries.

Nano One's other key projects (LFP cathodes, and solid state battery cathodes)

Nano One has also made great progress in reducing the cost and improving the performance of Lithium Iron Phosphate (LFP) cathodes. Nano One has developed patented 'one-pot cathode materials and production processes' that reduces both the time and cost of LFP production. Working with partners such as Pulead who specialize in LFP cathode production opens up the door for licensing opportunities.

Nano One is also working on a breakthrough for the 'holy grail' of batteries – a solid state battery. Nano One's patented cathode tests positively in solid state batteries with auto companies. Nano One says that their "cobalt free cathode reduces supply chain risk, increases power and enables fast charging," and their "coated nanocrystal cathodes (single crystal) boost durability, capacity and charge rates."

Nano One is partnered for success

Nano One is very well partnered into the EV/battery supply chain via partnerships with industry giants Volkswagen, Pulead, Saint-Gobain and other undisclosed global automotive interests. Added to this they have had the support of the Canadian government.

Closing remarks

With so many breakthroughs in one year it is little wonder that Nano One's stock price is up 145%. Great management, great technology, and great partners are always a winning formula.

Nano One currently has a market cap of C\$234m and looks poised for great things as the real EV boom is just about to begin.

Further learning

- Dan Blondal on Nano One's breakthrough in lithium-ion cathode materials and the 'million mile battery' (video)
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Nano One's Powerful Low-Risk Lithium Edge

As the global market for lithium batteries is expected to be worth a staggering US\$30 billion by 2020, largely driven by the exploding electric vehicle and mobile device markets, a multitude of companies have coalesced at various points in the supply chain hoping to share in the boom. Investors looking to participate will know that lithium plays are fraught with risk, but Nano One Materials Corp. (TSXV: NNO) ("Nano One") have cleverly positioned themselves to reap the benefits of the lithium story while completely avoiding the majority of the pitfalls.

The company has developed a patented technology that massively improves the performance of lithium-ion batteries, cuts costs, and eliminates the need to produce value-added lithium-hydroxide. Resultantly, batteries produced using Nano One cathode technology could store and provide more power than existing models by a considerable margin. The innovative manufacturing process gives a cathode that could last up to three times longer than current models, a fact that could very easily sway the market.

Furthermore, the fundamental process that the company has

created is far simpler than any technique currently used. Even the most promising battery-cathodes being produced today are made in upwards of a hundred stages, sometimes requiring production cycles of seven days. Nano One's technology can use lower grade raw materials, assemble them at the nanoscale into the desired components using only three stages, and all this is achieved in less than a day. The next step is to prove that this can be done on a large enough scale to significantly disrupt the technology materials sector.

The consequences of this emerging tech are massive; less handling, lower equipment and procurement costs, fewer failure points, higher safety, no waste solvents, 90-95% yield, and the flexibility to produce a myriad of nanoscale materials for an almost unimaginable number of markets. Not to mention the complete omission of the mining and exploration stage that a cleantech materials company would be expected to suffer through; Nano One really have jumped to the front of the line on this one.

Confidence in the team has been demonstrated since their inception in 2011; repeated large scale institutional and private investment has driven the company forward to the point where they now hold three confirmed patents, as well as beginning construction of a pilot plant, which is expected to be completed this year. The company reports that the plant is on schedule and on budget, so expect further movement on company stocks in the next few months as Nano One proves that high-volume production of their paradigm-shifting materials is truly feasible.

The cathode market alone is worth US\$2-3 billion, and this is expected to more than triple by 2025. Nano One has a real shot at becoming the supplier of choice for pretty much everyone, but more than that, their technology can move with the market, affording them a level of flexibility that feels incredibly secure; let's say that in five years, a new type of battery takes precedent and requires an entirely different cathode

material, it really wouldn't take these guys long to reconfigure their process to produce exactly that material in a shorter time and for less money than most. New technology always gets me excited, but high-volume nanoscale assembly is to materials science what the transistor was to electronics; simply revolutionary.

EV demand and Trump create the perfect stage for a Miss Cobalt

eCobalt Solutions Inc. (TSX: ECS | OTCQB: ECSIF) ("eCobalt") is a Canadian mineral exploration and mine development company primarily owning the Idaho Cobalt Project, a high-grade and primary cobalt deposit located in the United States; a fact from which eCobalt's ethical credentials are automatically derived. The metal's recent history has been chaotic, but it appears to be resolving into a clear demand for exactly what eCobalt is on-track to provide; it's no surprise, then, that the trailing twelve months has seen their share price risen from C\$0.53 in January 2016 to C\$ 0.7 in January 2017.

Cobalt is usually produced as a by-product of nickel and copper mining, but with declining prices of these metals closing operations worldwide, the focus has shifted strongly to the problem of primary supply. The highly-anticipated eCobalt Idaho Cobalt Project has this issue already covered and is by far the most advanced project in the region. The Idaho Cobalt Project should go online within a year since it has completed all preliminary steps, with full capacity expected within two. Over a 12.5 year mine life the Idaho

Cobalt Project is expected to produce almost 19,000 tonnes of cobalt sulphate.

Throughout 2016, concerns were raised over the involvement of child labour in the cobalt supply chain, particularly in the Democratic Republic of Congo (DRC). Amnesty International has been focused on the issue for some time and this year joined with African Resources Watch (Afresource) to publish a full report on the practices of artisanal miners in the southern regions of the conflict-ridden state. The research exposes significant weaknesses in the regulation of artisanal mining, from limited guidance on health and safety to insufficient labour rights.

The DRC is one of the poorest countries in the world and has suffered from decades of war and resulting political instability. Artisanal mining became a source of livelihood for many people when the largest state owned mining company collapsed in the 1990s, growing further during the Second Congo War when President Laurent Kabila encouraged people to dig for themselves since there was no hope of reviving industrial mining. These artisanal miners, referred to as creuseurs in the DRC, mine by hand using the most basic tools to dig out rocks from tunnels deep underground; children as young as seven scavenge for rocks containing cobalt in mountains of industrial mining debris before washing and sorting the ore for sale.

Now, with people around the world increasingly relying on rechargeable batteries to power a myriad of essential portable devices, the demand for cobalt is climbing; along with it, the need for honesty and due diligence becomes paramount. Regardless of a gadget's desirability, any firm will struggle to sell its products in today's market if it became known that children were enslaved for its creation.

Consumers today seek to rectify injustices. Insinuations of child labour or unethical production sends buyers scrambling

for genuinely ethical supply sources- great news for anyone already developing responsible cobalt supply sources.

The China Chamber of Commerce of Metals Minerals & Chemicals Importers & Exporters (CCCMC) has instigated the Responsible Cobalt Initiative (RCI), supported by Chinese and other Asian companies, including a major Chinese cobalt producer, mobile giant Huawei, Sony, Apple, HP and Samsung amongst others. The CCCMC will produce an action plan in the next 12 months focusing on promoting co-operation with the government of DRC, civil society at large and affected local communities on the ground.

Elon Musk ambitiously claims they will produce 500,000 electric vehicles a year by 2018, and has repeatedly stated that the cobalt will be sourced exclusively in North America. The price of cobalt is expected to continue rising over the next year. The mounting ethical pressures of the modern world has created the perfect stage for eCobalt to accept the position of Miss Cobalt, USA, graciously and on a platform of strong ethics.

Berry on graphite, lithium and the electric vehicle market revolution

May 21, 2015 – Chris Berry, co-editor of the Disruptive Discoveries Journal, founder of House Mountain Partners, LLC and Host for InvestorIntel in an interview with InvestorIntel Publisher Tracy Weslosky discusses the recent Tesla Motors Powerall battery announcement, and how it will increase demand for graphite, lithium, cobalt and copper. They also discuss

the supply and demand for the electric vehicle market revolution and why he is bullish on copper. They then go into the synthetic graphite market debate and the trend towards the declining cost of electric vehicle batteries.

Tracy Weslosky: Chris as one of the top experts in clean tech, one of our well-known speakers with technology metals, can you tell us a little bit about how the impact of the Powerall battery announcement by Tesla last week is going to affect demand in the sector?

Chris Berry: Well, overall, it's going to affect different metals differently. Obviously it's going to push up lithium. It's going to push up cobalt and it will probably have a material effect on graphite as well. Those are the big three. I think one of the metals that is overlooked with respect to the battery business is copper. That's another one that I'm particularly bullish on out over the next, say, 3 or 5 years.

Tracy Weslosky: So let me make sure I heard this properly. I haven't heard you promote copper before: you're hot for copper?

Chris Berry: Well, you know, copper is much different than some of the technology metals or the energy metals that I've covered in the past. You've got a situation where the lithium market globally is about 160,000 tons a year and copper is 23 million. So for all of the press that lithium gets, it really pales in comparison from a demand perspective. You know, when you start thinking about copper's ubiquity in terms of building out electrical infrastructure, not to mention electric vehicles, you know, the statistics that I have seen say that you need about 150 pounds of copper per full electric vehicle. When you start to think about demand— potential demand growth rates for full EVs, I mean, I've seen statistics that say by 2025, which is in 10 years, if electric vehicles are 10% of the global automotive fleet, you're going to need

about an additional million tons of copper per year, so that puts that in perspective.

A million tons a year is about the size of Escondida, which is one of the largest copper mines in the world. It's interesting because you can see that the demand is there and because copper prices have been depressed in recent years because of China slowing down and so on and so forth, the funding, if you will, for exploration and development of new mines just hasn't kept up with the demand. That's one of the reasons why I'm really bullish over the next 5 years.

Tracy Weslosky: I can see why. I want you to be one of my keynote speakers at next year's Technology Metals Summit. Further to this, if this is the, kind of, mind-blowing demand for copper that we're going to need globally for electric vehicles, what's going to happen to graphite?

Chris Berry: Well, graphite is a little bit different. Again, it's about a million and a half tons a year roughly from a demand perspective so it's much larger.

To access the rest of the interview, [click here](#)