

Can Tesla make money by manufacturing the Model 3?

I have just returned from London where I attended an event hosted by Patrick Hummel, the Executive Director and Head of European Autos & Mobility Research at UBS. He presented a detailed analysis on the manufacturing cost of the Chevy Bolt.

When they extrapolated this cost to the Model 3, the results were very surprising and demonstrated a way that Tesla may improve its bottom line.

For the purpose of this analysis, UBS Evidence Lab entered into a partnership with Munro & Associates of Auburns Hill, Michigan. This firm specializes in teardown benchmarking and accurate costing in the automotive industry. The project included a breakdown of all electric powertrain-related parts and components as well as the modules related to connectivity/HMI and ADAS (advanced driver assistance systems). The Munro cost estimates reflect the cost an automaker would pay a supplier. Generally, these costs are calculated by estimating the raw material costs, the amortization of parts tooling, an estimate of labour costs and applying an industry standard mark-up for supplier overhead and profit. To create its estimates, Munro looks for numerous variables, including materials and material comparisons, process, machinery, tooling, labour (modelled by region of production), geography, competition, and logistics.

The components of the Bolt under analysis turned out to be \$4,600 cheaper than previously anticipated. The car had the "Premier" trim but they also did the math for a "naked" Bolt without any options. The contribution margin of the "Premier" would be 14% or \$5,063 over all direct costs, while the contribution margin of the "naked" would be 10% or \$3,165. At the EBIT level though, both trims are unprofitable although over the next few years, the economics changes and they start

turning profitable. They are further expected to generate an EBIT margin of about ~20% by 2025, assuming the sticker price stays the same.

A lower manufacturing cost has an important impact on the total cost (TCO) of electric vehicle (EV) ownership. UBS now sees TCO parity with internal combustion engine (ICE) cars as early as 2018 in Europe. That's 2-3 years ahead of what they thought before analysing the Bolt. They see TCO parity in 2023 for China and in 2025 for the US where gas is cheaper and environment regulations more lenient.

There are many similarities between the Bolt and the Model 3. Thus UBS believe the profitability analysis of the Bolt can be applied to the Model 3. Both cars have similar base version pricing, range/battery capacity, a single e-motor with two-wheel drive and about the same interior space. The differences overwhelmingly play into Tesla's advantage. The Model 3 will enjoy the higher premium appeal of the brand which translate into more pricing power and a longer list of profitable options. The rear-driven Model 3 will use a different battery chemistry to be produced at the Gigafactory which will give Tesla more scale in battery manufacturing. The car's software will be kept current via over-the-air-upgrades and it will ship with autonomy-relevant hardware (cameras, sensors) as standard. Tesla's production target for the Model 3 is more than 10 times what GM has for the Bolt. Higher production will likely give Tesla better fixed cost absorption.

There are also differences in the distribution model and marketing. The absence of dealerships allows Tesla to receive the full retail price, whereas GM's manufacturer's suggested retail price (MSRP) includes a ~15% mark-up for the independent dealerships and incentives. However, Tesla has higher distribution costs.

UBS believes the biggest uncertainties in applying the read-

across from the Bolt to the Model 3 is the battery costs. Since Tesla has guided for a battery size of less than 60 kWh and accounting for cells with better energy density and economies of scales at the Gigafactory, UBS thus believe the Model 3's 55kWh battery pack will be 26% cheaper to build than the Bolt. They also analysed the expected manufacturing cost of the Model 3 against the BMW 330i and they came to the conclusion that Tesla will lose \$2,830 at the EBIT level for each "naked" Model 3 they sell, but will break even at a sticker price of \$41,000. For example, enabling autopilot functionality shall allow Tesla to make close to a 100% margin on that option alone. UBS thus sees the break-even price of \$41,000 likely to be exceeded on a high take rate of options.

eCobalt Locked & Loaded

The Idaho Cobalt project, wholly owned by Vancouver-based eCobalt Solutions Inc. (TSX: ECS | OTCQB: ECSIF) ("eCobalt"), is set to get busy after C\$15m of financing was sourced to advance the late-stage cobalt deposit. The project was placed on care and maintenance in May 2013 due to depressed financial markets and declining commodity prices; today, however, as cobalt shows strong signs of early recovery, its value as the only near-term and fully-permitted primary cobalt deposit in the United States is widely recognised.

Pre-hiatus, all major components of both the mill and concentrator, approximately C\$16m of equipment, was purchased and stored in warehouse and staging areas outside of the town of Salmon, close to the millsite. Since lithium-ion batteries were given the nod, the Idaho Cobalt project went from long-term slumber to significant head-start, newly able to make good on the rapidly expanding electric vehicle, grid storage,

and renewable energy sectors.

Previous cobalt demand had been contained to the manufacture of super-alloys, but it became clear that the quantities of cobalt sulphate required by emerging battery manufacturers would considerably outperform the needs of the people whose metals must simply be harder than everyone else's.

Preliminary checks at the site showed that the operation could potentially switch production focus to cobalt sulfate heptahydrate for the rechargeable battery sector, leading to the commissioning of a Preliminary Economic Assessment (PEA) in January 2015 seeking full confirmation. Previous technical results were based on the production of high purity cobalt (HPC) metal for critical applications in the aerospace sector, and the future return to production of HPC remains a viable option, adding a layer of security to the Idaho Cobalt project that is attractive.

eCobalt will ethically produce environmentally sound battery grade cobalt salts, made safely, responsibly, and transparently in the United States. The project is comprised of the mine & mill site near the town of Salmon, and a stand-alone hydrometallurgical facility, for processing concentrates into refined cobalt, copper and gold products, will likely be located somewhere in Southern Idaho. The mine is expected to produce the equivalent of 1,500 tonnes of high purity cobalt sulfate annually over a projected mine life of 12.5 years.

On February 15th, the company announced C\$13m in bought deal financing which was extended to C\$15m not twenty-four hours later. Closing of the offering is expected to occur on or about February 28, 2017, and, subject to the usual conditions, the team at eCobalt intend to use the net proceeds for advancing the Idaho Cobalt project towards production.

The asset represents a serendipitous stride into fortune; not only has the commodity price itself improved, but the recent

additional attention drawn to ethical issues in the cobalt supply chain prompted buyers to seek a more responsibly produced material. Since the Idaho Cobalt project is located far away from any areas of conflict or human rights abuses, we can be confident that eCobalt won't struggle to shift their wares.

Whether it be the Gigafactory, Canada or China, Idaho is about to be supplying someone with just under 19,000 tonnes of inoffensively produced cobalt sulphate that will eventually find its way into many of our pockets. Its key function in the storage of power is lifting cobalt out of its twitchy sleep and putting it to work; it just takes quite a lot of lifting.

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 (CCCMI) 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 CCCMI 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.

Alset Energy's "encouraging lithium results" in

Gigafactory country

Three years ago, Elon Musk announced he was building the world's largest lithium-ion battery manufacturing facility and the consequences were, of course, many. The Nevada Gigafactory site would be the factory-to-end-all-factories and junior mining companies the world over flocked to meet its hypothetical demands, driven by the promise to push lithium battery demand to an unprecedented scale.

Tesla quickly became a symbol that the cleantech world could be bigger and more powerful than petroleum. The very idea of it shifted the trajectories for both the automotive and energy-storage industries. This shift is behind by a projected 60% increase in electric vehicle ("EV") sales for this year; all without a single battery being produced.

2017 should see the Colossus of Sparks roll its conveyors for the first time, ideally transitioning from promises to proof – and there is a lot to prove. Currently, there are only three notable lithium brine regions globally, namely; South America's Lithium Triangle, Clayton Valley – not far from Tesla in Nevada – and Tibet. Apart from these three, Tesla has shown some interest in Mexican lithium production and Allan Barry Laboucan, CEO of Alset Energy Corp. (TSXV: ION) ("Alset") believes that he can kick-start the area into becoming the fourth globally renowned lithium brine region.

Despite the fact that Mexico has no history of lithium production, Alset recently took the decision to sell its one promising lithium project in Ontario to focus on the Mexican salars. The lithium/potassium bearing salars within these concessions have produced common table salt since the 16th century. Who knew then that this brine contained elements that would someday rival silver in value? These elements of course are lithium and potassium

What is amazing about the region is the high lithium concentration in the lagoon. Mexican government scientists analysed four samples of the lagoon water, showing concentrations up to 21,000 mg/l. For perspective, Albermarle's Silver Peak operation in Nevada's Clayton Valley concentrates lithium to about 7,000 mg/l by evaporation before feeding it to the lithium chemical production operation. So, without doing any concentrating, the salt plant produced a solution three times stronger than what is required for lithium chemical production.

Another interesting revelation was that the samples all contained silver, ranging from 0.5 ppm to 4.3 ppm. Geothermal activity is one of the first order characteristics in the preliminary deposit model for formation of lithium brines. The silica sinters and carbonate growth textures identified at the Mexican salars are ample evidence of the geothermal activity required. It is worth noting that this same geological process is also what typically produces many gold-silver deposits and these Mexican salars are situated in one of the most prolific silver producing regions in the world. Alset medium term plans is to follow up on the silver potential of these projects.

Allan Barry Laboucan, President and CEO of Alset shared the following thoughts on the project:

"We have just started the first phase in testing the chemical composition of our salars and our team is delighted with the results. In addition to the encouraging lithium results the potassium grades are encouraging as well. Currently Mexico imports all of its potassium and a domestic source would not only be a cost saver for Mexico but would create job opportunities in a crucial commodity for the farming sector. Furthermore, the silver results suggest there may be potential for precious metals and further work is required to assess this potential."

Laboucan went onto reiterate that Alset is in the very early

stages of assessing the realistic potential of the projects and went onto share his excitement about the results so far.

Given the current test results, we are also excited about the project's potential. While we caution that it is indeed early days, we are looking forward to the upcoming sample leach tests prior to drilling at several of the salars in the early part of 2017.

Tesla's Supply Chain – Triumph of Hope over Experience?

They say that second marriages are the triumph of hope over experience but we can't help thinking the same of Tesla's "belief" that when miners said to it that they would be able to provide enough Lithium, Cobalt and Graphite for its Gigafactory it actually believed them. We can't escape the feeling that the texting acronym ROFL (Rolling On the Floor Laughing) was made for exactly this situation.

However for a long time Tesla have painted themselves as being "the smartest guy in the room" and yet are we really supposed to swallow the line that Tesla actually believed that a whole swathe of projects in metals critical to their project would come to fruition when educated and informed people in the mining space knew that they would not? It would appear to be more of a case of didn't want to know rather than didn't know...

In this piece we shall follow on from the firestorm that John Peterson created in his piece last week with a specific look at how credible the chance of any of the many projects in the

three metals of import actually becoming productive was over the last five years.

Lithium

We have been covering this metal since late last decade. Prior to that point (like Rare Earths) there had been so few players that they were well below any analyst's radar. Moreover, with the pre-2008 focus on staples like precious metals and base metals, the specialty metals scarcely got a look-in. Our first exposure was the Rincon asset then embedded in an ASX-listed entity Admiralty Resources. Lingering effects of the 2008 crisis eventually forced Admiralty to divest this to Cayman Island based resource fund, Sentient, who have held it ever since. At the time we thought this was the vanguard of the Lithium push that would break the Cartel and fill the demand gap in the middle of this decade. Instead the asset appears to be totally becalmed and it most definitely has not filled any gap, real or imagined.

Then came the Lithium boom. The great star performer was Talison Lithium which was cobbled together out of the old Greenbushes asset (ergo, a past-producer) and the assets of Salares Lithium in Chile. The high-point of the first flush was this company being bought for over \$600mn by a Chinese group in league with Rockwood (one of the Cartel).

What was an initial field of around twenty lithium wannabes has shrunk by half over the last five years and is only now showing an uptick in interested new entrants. But as they say in the classics, "too little too late" to save Tesla's bacon. It's probably worth repeating here our Lithium Lifecycle chart, as a picture tells a thousand words:



An interesting microcosm of Tesla's dilemma is that it signed a much vaunted deal with Bacanora Minerals. That fired up the stock price of BCN but did not bring in a single dime from

Tesla in terms of investment. The attitude seemed to be “announce the deal, lift the price, go finance yourself”. Easier said than done as we all know when the capex is north of \$100mn. Understandably BCN has started to lose some of its rosy glow and the task of raising all the funds has now fallen upon the company. However even with the best will in the world (and easy money) this project would be years away from production.

If Tesla had really believed in this project or any other one, it should have taken a strategic stake and made funds available to move things along. Frankly, it did not.

Cobalt

This metal has until recently been one of the least talked about in the battery supply chain probably because it has an LME quoted price and thus this has given many the illusion that it is a “major trade metal”. Wrong! To put this in perspective the LME warehouses only have 614 tonnes of this metal in stock. Not exactly a base on which to build a major battery industry and still get a good night’s sleep.

But doesn’t it come as a by-product of major mines in other base metals? Oh, you mean the copper mines of the DRC with their on-again, off-again restrictions on exports and conflict mineral overtones? Or do you mean the big nickel mines, such as Ambartovy and Moa Bay that are scarcely fountains of cashflow for their owners (e.g. Sherritt et al.)? It is most correct to say that any manufacturer of size relying upon major base metals mines to continue providing them with cheap by-product Cobalt had better dust off their candles and light them to the Gods of Mining. The quantities produced from these mines is essentially driven by demand for the major metals and no major is going to ramp up copper or nickel production at a loss, or at breakeven, just to keep Tesla supplied with the Cobalt it needs.

As can be seen below has been on a long slide and has only just started to tick up. Frankly its price could double, but if the prices of nickel and copper have not moved commensurately, then it is unlikely majors will ramp up production.



This brings us then to the subject of primary Cobalt mines. These are rare unicorns indeed. Much air has been expended on this subject over the last fifteen years but little has been achieved in terms of bringing mines to production. The USGS produced a report on the Cobalt production outlook in 2013 and it included a frighteningly long table with the names of Cobalt projects that had been stopped in their tracks, mothballed or permanently decommissioned.



Below is our Lifecycle graph for the listed Cobalt developers, that we know of. This is the scantiest population of any of our "lifecycle graphs".



Formation Metals (FCO.to) is the obvious candidate for Tesla to "take out" if Tesla starts getting serious but even then, the project would probably not fully supply Tesla's needs. Then it might need to move on to the NiCoCo project of Fortune Minerals (FT.to) to be fully self-sufficient. The others are all too early stage or too small to be realistic help in ameliorating Tesla's looming Cobalt crunch.

Graphite

For a mineral that is literally as common as dirt, the surprising thing is how little has been achieved by the "wannabes" which makes us think that they just "wannabe bought". The most suspicious thing is that for a mineral that

has minimal processing requirements and very simple mining requirements (quarrying, pretty much) the capexes being touted are truly eye-popping. This brings us to our usual suspicion (very prevalent in the glory days of REEs) that the companies pump up the capexes because if the capexes were smaller than their cash-pile or financing ability then cheeky investors (and offtakers) might say "well, why aren't you building it?". This impolite stating of the obvious is a sure conversation killer.

In any case this is all history now as most graphite companies that did not speed towards development now find themselves short of cash and staring the Grim Reaper in the face. Names like Elcora and Flinders are either in production or on the cusp, while some of those that most vigorously played the "Tesla card" in their promotional efforts are down to their last shilling with little hope of reviving their credibility.

Tesla should move on one of the more stricken players, take it over and then announce that it has satisfied all its foreseeable needs. The mind boggles as to what that will do to the valuations of the other "wannabe Tesla suppliers".

Conclusion

There is an old adage of "put your money where your mouth is" and frankly Tesla has shown zero sign of expediting any of the projects that it has waved its magic wand over. That nothing has happened to move these projects forward thus makes us feel that Tesla's magic wand is limp indeed.

If this failure to abide by the commandment "Secure Thy Supply Chain" has gone unheeded then whatever the market dishes up to the company once it starts to explain away sourcing difficulties will be well-deserved. Did Tesla seriously think it was going to get a free ride from beaten down miners who can scarcely afford to pay their light-bills let alone developing mines with capexes north of \$100mn. With Tesla

still having a market cap of over \$26bn, it could acquire for stock the most likely player in each of the Lithium, Graphite and Cobalt spaces for less than 1% dilution. Think about it..

Unravelling Tesla

I must confess I have been like a rock in the stream of the unending torrent of Tesla boosterism over recent years. I just sit and the flow of this material just washes over me and leaves me totally unmoved. What was a car company seems to have morphed into a battery manufacturer now. The appearance of a new marque in the car world is a rare thing and the only one I can recall, besides Tesla, during the part of my life when I had awareness of such matters, was DeLorean. The less said about that the better. So when the Tesla auto appeared, I was underwhelmed.



The battery business seems to have been spawned by the car business and appears to now be the tail that wags the dog (no irony intended). Why should Tesla not venture into tires? Or into car stereos? What special skill does it bring to the business of making Lithium-based batteries?

Mining investors have piled onto the Tesla phenomenon like it is the last lifeboat to get away from the Titanic. In particular it has been graphite companies and their followers who have searched Tesla's tealeaves for signs favorable to their own stories. Therefore it is somewhat ironic that the first company to tangibly hitch its wagon to Tesla's star is a little known Lithium hopeful, Bacanora Minerals (TSXV:BCN).

The Tesla Deal

The announcement that got the market in a kerfuffle was a new lithium project in northern Mexico that received the “first seal of approval” to supply the Tesla Motors Gigafactory in Nevada. A few days back Bacanora Minerals and Rare Earth Minerals (LSE:REM) received the go-ahead to supply lithium hydroxide to Tesla’s lithium-ion battery “megafactory” from its clay deposit in Mexico’s north-west should the new project reach production.

Tesla agreed a five-year lithium hydroxide contract (from the date of the first order by Tesla) to “purchase agreed minimum tonnages with estimated forecast maximum tonnages to be determined following delivery of future production orders”. The Supply Agreement has an option to extend for a further five years.

Some parts of the deal remain less than clear. For instance, over the next two years, the Sonora Lithium Project must reach certain (undisclosed) performance milestones and successfully pass product specification qualifications. If these are achieved then Tesla – or its authorized purchasers – will buy lithium hydroxide to feed the manufacturing of batteries at Tesla’s plant.

One of the key milestones will be the confirmation that the Sonora Lithium Project will be able to supply lithium hydroxide in accordance with volumes and timeframes to be established by Tesla. Tesla will purchase minimum quantities in accordance with an agreed upon pricing formula, below current market pricing, with actual prices and volumes that can only be finalized during the development phase in due course. The forecast tonnages and delivery dates are structured to coincide with Tesla’s forecasted Gigafactory production. Sounds like Bacanora is the one having to jump hurdles here. It begs the question as to what happens if Bacanora meets the timeline, and specifications, and Tesla does not!?

Some have speculated that Tesla will consume as much as 80% of Bacanora's output and that the company will keep back the remnant to sell into spot markets. Frankly with Tesla not actually funding the mine-build, a commitment of 80% of one's output to a non-committal offtaker, that also wants a discount to market, is exceedingly generous.

The Sonora Lithium Project

The project consists of ten mining concession areas covering approximately 100 thousand hectares in the northeast of Sonora State. It is managed by a Joint Venture between Bacanora Minerals and the AIM-listed Rare Earth Minerals. It should be noted that the latter company has been accumulating a larger shareholding position in Bacanora and at last reports held around 15.4%.



The JV partners, through drilling and exploration work to date, established an NI43-101 Indicated Mineral Resource of 1.12mn tonnes LCE contained in 95mn tonnes of clay at a Li grade of 2,200 ppm and an Inferred Mineral Resource of 6.3mn tonnes LCE contained in 500mn tonnes of clay at a Li grade of 2,300 ppm.



The PEA

The Sonora Lithium Project Partners are working to develop a mineral-rich, lithium-bearing clay deposit into a planned low-cost, sustainable and environmentally conscious mining operation. It is estimated that the mine and processing facility will have an initial production capacity of approximately 35,000 tonnes of lithium compounds, with the scaling potential of up to 50,000 tonnes per annum.

It is currently anticipated that lithium hydroxide and lithium carbonate would be among the materials produced by the mine.

Lithium hydroxide is a key feedstock material in the manufacture of certain kinds of lithium-ion battery cells.

The metrics from the PEA are below and the capex is truly impressive for being as low as it is and with a rather short payback.



The attractions of this project are various but the main advantage it has is the clay nature of the mineralisation and the fact that it is relatively near surface (though with a basalt cap over much, but not all, of the deposit). A cross-section of the deposit is one of those pictures that “tell a thousand words”:



Bagging the Tesla deal is obviously a good first step. Now we need to see if financiers are as impressed with Tesla as a counterparty as retail investors seem to be. Whatever happens Tesla has shown no sign of digging into its own pocket so the Sonora Lithium Project Partners will need to raise finances to design and construct a mine and processing facility under their own steam.

Conclusion

It would be somewhat ironic if, ten years from now, the Sonora Lithium project was up and running and Tesla and its modestly named Gigafactory have gone the way of the DeLorean.



The chart above shows that Tesla certainly was good for a mighty pop in Bacanora’s stock price with the announcement pushing the stock from around \$1.30 per share to over \$2, before easing back.

The Sonora project is interesting for its clay component, its

good grade, its proximity to the US markets and its low capex. Whether the Tesla deal plays out or not is probably neither here nor there. If Tesla were really serious they would have snapped up the company (in an all-stock bid) or taken a sizeable strategic stake in Bacanora so they could have their cake and eat it too. They did neither.

Bacanora should get a financing done while the going is good and if Tesla ultimately doesn't turn out to have any relevance to Bacanora's future then it will have been a case of "nice knowing you, Tesla, and goodbye".