Electric Cars go mainstream thanks to Graphite

Since Tesla Motors introduced its Roadster, an all electric vehicle (EV), to the market in 2008, enthusiasm for the electric car has grown all over the world. The technical and scientific crowds love its efficiency, the environmentalists have bought into its 'clean' energy message and car fanatics liked its sporty styling. If a Facebook user were to post a picture of the Tesla roadster, or even that of the Model S sports-sedan, it would surely gather more 'likes' than any other vehicle. Tesla Motors has shifted electric motoring away from the preserve of a very socially conscious and, let's be frank, somewhat annoying bunch of biblical prophet sandal wearing eco-naggers to mainstream Hollywood celebrities and cool people everywhere. The cars send a very clear message, which is that the future belongs to them. Larger manufacturers are following suit. BMW is ready to launch the I3, a compact, Fiat is selling an all electric version of its already efficient 'Cinquecento' and just about all major manufacturers are offering hybrid or all-electric with gas powered charger cars from Nissan's Leaf to GM's 'Volt' and the Toyota Prius. Even Cadillac, a brand not long ago associated with wealthy retirees in Florida, introduced the electric power Cadillac ELR.

The image of EV's cannot be discounted; the market was very niche (note, this is for pure electric vehicles, not hybrid

cars like the Prius) and flat before Tesla built its first showroom; now the numbers are rising, even if this increase is moving at a pace that is barely visible to the naked eye. In general, the proportion of newly registered electric cars in the overall market in Europe and North America in 2013 did not exceed 0.5% of the total. The electric car has at best reached the level of a small niche product and it remains more of a curiosity. However, in some markets, electric cars are making a bigger swoosh (that would be the best onomatopoeic imitation of the sound they make). In Norway and the Netherlands, total sales of EV's in 2013 reached 5.5% and 1.3% respectively thanks to government subsidy incentives and other fiscal tricks, including free parking and permission to use bus lanes. However, the signal is clear, manufacturers will be introducing an ever wider selection of EV's and this is because, soon the fiscal incentives will not play such a persuasive role. The technology alone will do that; specifically, battery technology.

The big car companies are in fact developing new electric models. Many new models will be launched in 2014 – more than three dozen EV's and hybrids will be introduced or updated during the 2014 model year – and even more in the coming years and the batteries that power them will need ever larger quantities of graphite and lithium: these raw materials are in more demand than ever. Lithium-ion (Li-Ion) batteries are crucial to electric propulsion. The largest facility for Li-ion batteries in the USA is in Tennessee, a 1.7 billion-dollar business run by Nissan, capable of supplying up to 200,000 cars per year. Similarly, the German car manufacturer such as Volkswagen will invest a large portion of their annual research and development funds into electric mobility. In other words, the electric car market will go from minor niche to mainstream by the end of this decade. And this means that graphite and lithium producers will be in huge demand. In fact, graphite producers will experience even greater demand because it is used 7 to 11 times as much as lithium in the

batteries and in the entire manufacturing process. One of the signs of the imminent graphite 'boom' is that China has become increasingly stingy in its willingness to part with this commodity.

Both Focus Graphite (TSXV: FMS; OTCQX: FCSMF) and Northern Graphite (TSXV: NGC; OTCQX: NGPHF) have recognized that China has adopted exorbitant export duties (in the order of 20%) to discourage graphite exports and to encourage domestic graphite processing. This has caused a huge supply headache for manufacturers around the world, because, much as was the case for rare earths, by sheer neglect the West allowed China to build its graphite mining and processing industry in the 1980's and 90's. Now, graphite is slated to have an impact on technology no less significant than silicon had in the 1950's. In essence, graphite has placed junior mining firms at the helm of a major technological revolution trend, driven by accelerating demand for new battery technology. SiNode Systems is already working on a lithium-ion battery with ten times the energy capacity of a current Li-ion battery and with much faster charging. The lithium ion batteries currently on the market have graphite anodes, while the cathodes are cobalt oxide, iron phosphate or manganese oxide. SiNode Systems has created a new type of anode made of silicon, which can contain, thanks to a layer of graphene, more lithium ions than graphite. This should help EV's reduce weight and improve range and performance, further increasing market demand. Not surprisingly, Chinese graphite processors have taken pre-emptive action.

Last December, a Chinese-based industrial consortium signed an offtake agreement with Focus to buy as much as 90% of the latter's Lac Knife deposit's planned production of 44,200 tons/year. This is very unusual, as there has never been an off-take agreement in the graphite industry. It suggests that China's is transforming from graphite exporter to graphite importer in order to address the huge rise in demand. Now,

there are only two active graphite mines, in North America. Among the first that will come into production are Northern Graphite has the advantage of being able to offer a very high percentage of coarse, large and medium flake graphite with naturally very high grades of purity. Northern Graphite has also worked with Coulometrics LLC to develop a proprietary technology to make ‘spherical graphite’ (SPG), which are crucial to manufacturing Li-ion batteries. So far, most SPG has come from China, but with the export restrictions there will be less available to meet the EV driven market demand. For its, part, and perhaps in the opposite direction, Focus Graphite has managed to achieve very high grades of purity (99.96%) and it has earned the seal of approval from one of China’s largest end users through the offtake.