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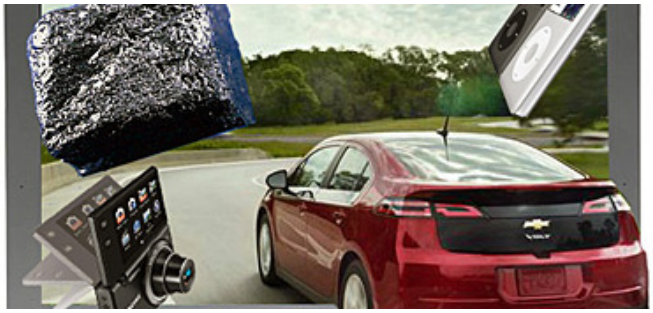
Clean Carbon

Black Fuel May Drive a Green Future

~ By Greg Klein - December 20 2011

According to environmentalists, a low-carbon economy will be integral to a green future of electric vehicles and clean energy. Paradoxically, however, many analysts, explorers, miners—and especially the market—believe that future will rely on a vastly increased supply of one form of carbon: graphite. "The historic uses for graphite are still growing," says Ryan Fletcher, a director at Zimtu Capital TSXV:ZC. "But new uses are putting incremental demand on the market."

Graphite, a carbon allotrope, can be considered coal at its highest grade and a cousin to diamonds. It is used most widely to create extremely heat-resistant coatings for steel manufacturing equipment, as well as an additive in steel itself. Among other uses, it's also found in brake linings, gaskets and clutches, golf clubs and tennis rackets and, under the alias of "lead," it's the key component in pencils.



Future projections link graphite to alternative energy: fuel cells, solar panels, pebble-bed nuclear reactors and, especially, lithium-ion batteries. Used for computers, cameras, cell phones and MP3 players, lithium-ion is now taking the place of nickel-metal hydride to power electric vehicles. The prognosis for electric vehicles, meanwhile, is dramatic. Today only about 2% of all vehicles sold are electric, and most are nickel-metal powered. But by 2020, electric vehicles powered by lithium-ion are expected to command anywhere from 5% to 18% of sales.

That will require new graphite sources. Throughout the last decade, world production hovered around 1.1 million tonnes a year. And about 70% to 80% of that came from China, which is now restricting exports through a 20% export duty, a 17% value-added tax and an export licensing system.
Fletcher emphasizes that graphite "isn't a homogenous market. There are different sizes of flake, different purity levels. Unlike many other commodities, there's no global market to sell into. That creates an intimate relationship between miners and customers."

Depending on the ore and milling process, graphite varies by grade, particle-size distribution (or mesh) and moisture content, among other factors. For example a large-flake product might be +80 mesh (0.177 millimetres) with a grade of 94% to 99% graphitic carbon, less than 0.5% moisture content, 1.3% volatile matter, 0.01% sulphur and 0.55g/cm3 loose-bulk density.

Less than half the graphite produced is the large-flake stuff essential to lithium-ion batteries and other new uses. About 60% of world production is of the fine-mesh or amorphous graphite used for traditional purposes such as steel making.

These facts are reflected in rising prices. This year large-flake graphite (+80 mesh) hit the $2,500 to $3,000 a tonne range, about twice 2010 prices. Medium-flake graphite has reached $2,200 to $2,500 a tonne and fine flake $2,200 to $2,400, while amorphous graphite has been selling for $850.

Byron Capital Markets expects to see annual graphite demand increase from 1.1 million tonnes to about 2.6 million tonnes by 2020. Even if the lithium-ion predictions don't pan out, Byron still sees demand steadily rising to 1.5 million tonnes by 2020.

But future demand won't necessarily be limited to increased lithium-ion usage. According to a January 2011 report from the US Geological Survey, "Large-scale fuel-cell applications are being developed that could consume as much graphite as all other uses combined." University of West Virginia researchers, meanwhile, say next-generation pebble-bed nuclear reactors could use the world's entire current output of flake graphite.

Not surprisingly, a July 2010 European Union report lists graphite as one of 14 raw materials considered economically critical.

Continued Chinese dominance in production is a major concern. The US Geological Survey credits China with producing 800,000 tonnes in 2010, far outpacing India (130,000 tonnes), Brazil (76,000 tonnes), North Korea (30,000 tonnes) and Canada (25,000 tonnes). All other countries combined produced just 32,000 tonnes. But the USGS estimates the world's inferred resources to exceed 800 million tonnes.

Just two mines account for Canada's fifth-place status. Eagle Graphite Corp produces high-flake graphite from its southeast BC mine, while Timcal Graphite & Carbon mines flake graphite at its Lac-des-Iles Mine in Quebec.

Other Canadian projects are in the exploration or development stage. "When it comes to graphite, Canada has some of the world's best terrain in the metamorphic belt extending from southeast Ontario up to northern Quebec," Fletcher reports.

Northern Graphite's TSXV:NGC Bissett Creek Property in eastern Ontario is scheduled to begin feasibility and permitting in 1Q 2012. Earlier this month, Focus Metals TSXV:FMS published a resource estimate for its Lac Knife Project in northeast Quebec.

Ontario Graphite Ltd plans to reopen the past-producing Kearney Mine in southeast Ontario, which it calls the largest confirmed graphite prospect in North America and one of the largest individual deposits outside of China and North Korea.

Under an agreement with Zimtu and one of its prospecting partners, Strike Gold Corp TSXV:SRK is earning a 100% interest the Deep Bay East and Simon Lake graphite properties in northern Saskatchewan.

Orocan Resource TSXV:OR has picked up 12 projects in three districts of Ontario and Quebec and just announced a $1-million private placement. Canadians exploring abroad include Mega Graphite Inc, which is negotiating with an ASX-listed company to acquire Australia's largest graphite property, the Uley Mine.

For the present, the graphite boom is still at the speculative stage. Should the Chinese economy falter, new battery technology emerge or electric vehicles go the way of the Edsel, graphite stocks might not be worth much more than a chunk of coal in a wayward kid's Christmas stocking. But one way or another, it looks like carbon will prevail.

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