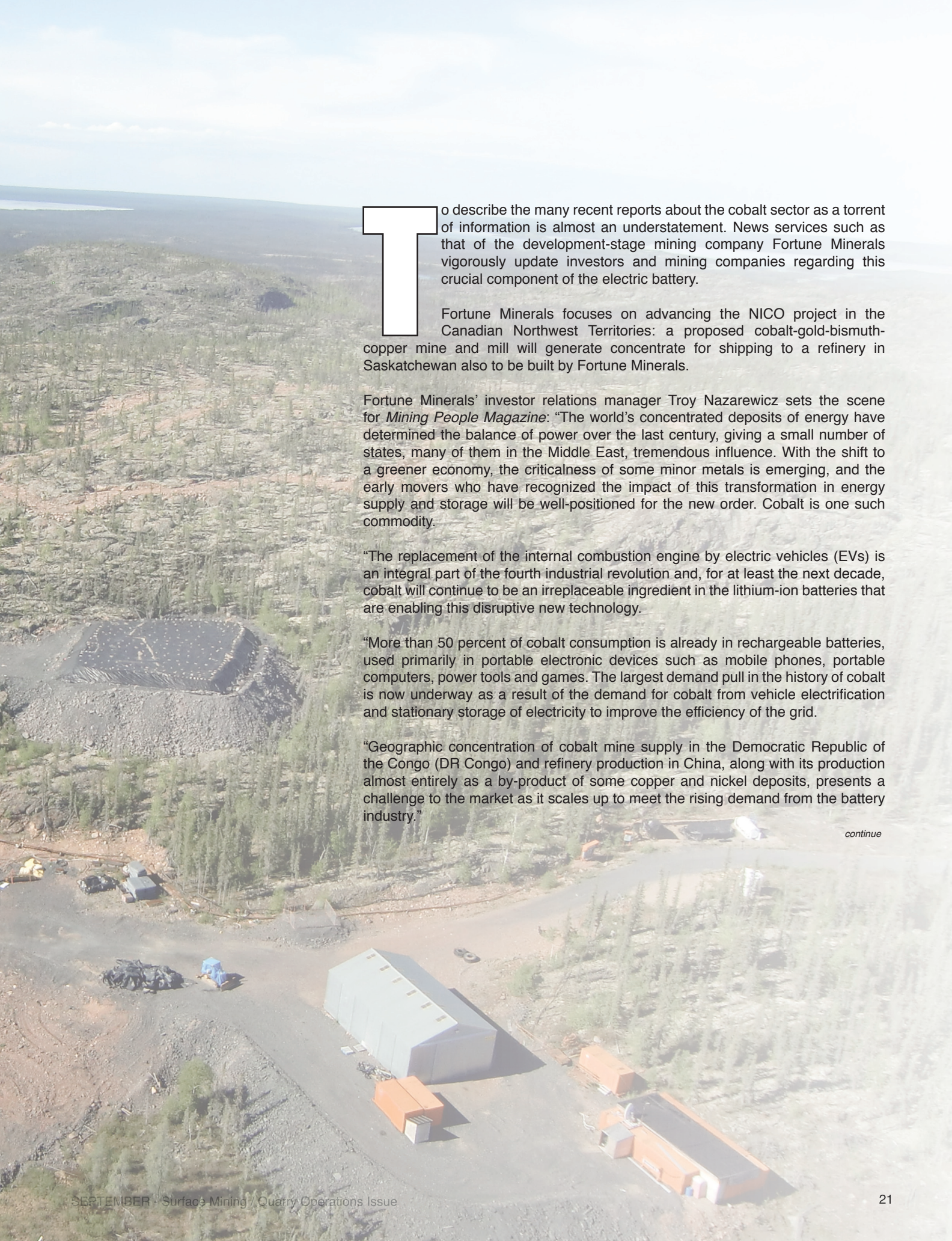
Cobalt: Can Canada Make a Difference?

by Michael Schwartz

NICO cobalt-gold-bismuth-copper project in Canada aerial view. photo courtesy of Fortune Minerals.



To describe the many recent reports about the cobalt sector as a torrent of information is almost an understatement. News services such as that of the development-stage mining company Fortune Minerals vigorously update investors and mining companies regarding this crucial component of the electric battery.

Fortune Minerals focuses on advancing the NICO project in the Canadian Northwest Territories: a proposed cobalt-gold-bismuth-copper mine and mill will generate concentrate for shipping to a refinery in Saskatchewan also to be built by Fortune Minerals.

Fortune Minerals' investor relations manager Troy Nazarewicz sets the scene for *Mining People Magazine*: "The world's concentrated deposits of energy have determined the balance of power over the last century, giving a small number of states, many of them in the Middle East, tremendous influence. With the shift to a greener economy, the criticalness of some minor metals is emerging, and the early movers who have recognized the impact of this transformation in energy supply and storage will be well-positioned for the new order. Cobalt is one such commodity.

"The replacement of the internal combustion engine by electric vehicles (EVs) is an integral part of the fourth industrial revolution and, for at least the next decade, cobalt will continue to be an irreplaceable ingredient in the lithium-ion batteries that are enabling this disruptive new technology.

"More than 50 percent of cobalt consumption is already in rechargeable batteries, used primarily in portable electronic devices such as mobile phones, portable computers, power tools and games. The largest demand pull in the history of cobalt is now underway as a result of the demand for cobalt from vehicle electrification and stationary storage of electricity to improve the efficiency of the grid.

"Geographic concentration of cobalt mine supply in the Democratic Republic of the Congo (DR Congo) and refinery production in China, along with its production almost entirely as a by-product of some copper and nickel deposits, presents a challenge to the market as it scales up to meet the rising demand from the battery industry."

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As Troy Nazarewicz pointed out during this interview, the cobalt industry has experienced over more than 20 years 6 percent compounded annual growth rates with consumption expected to accelerate to double digits as EV sales rise after 2020. At current prices for metal, the value of the cobalt market has risen to over US$10 billion, up from US$2.2 billion in late 2015. Mine production in 2017 was approximately 120,000 t. Exane BNP Paribas forecasts the market will grow to 240,000 t by 2025.

This article will in addition report the views of Brixton Metals Corporation, which is actively drilling its wholly-owned Langis-Hudson Bay silver-cobalt project 500 km north of Toronto.

Problems for Panasonic…
While cobalt enjoys great confidence among investors, it is important to note that certain obstacles exist which might hinder cobalt's upward financial trend. For example, Tesla has stated that the use of cobalt in its car batteries will almost disappear, while Panasonic also disclosed its intention to become less cobalt-dependent.

One challenge Panasonic has faced relates to cobalt mined on Cuba, which is subject to American sanctions. The Canadian-headquartered Sherritt Corp. no longer supplies cobalt to Panasonic precisely because of this situation. In fact, because the origin of cobalt supplies can be highly convoluted, whether by mixing cobalt supplies deliberately or otherwise, Panasonic can not state the percentage of its cobalt which comes from Cuba. Quite how Panasonic's cobalt supply issue will unfold is at the time of writing unclear.

…and for China
Adding to an atmosphere of some uncertainty for cobalt suppliers is China's concern as to how much cobalt it must import in order to fulfill its requirements. The Chinese Ministry of Natural Resources recently drew attention to this, pointing out that China relied on imports to the extent of 72 percent for nickel, 73 percent for both copper and iron ore, 75 percent for lithium, 79 percent for gold and a massive 90 percent for cobalt.

Thus the potential obstacle to China's ambition of heading up a global electric vehicle boom is clear, particularly as internal cobalt reserves grew by a mere 2.3 percent in 2017. China can, however, influence markets to get her own way: she herself owns very substantial reserves in rare earths (among other minerals) which can be released or held back as she sees fit.

As for DR Congo…
There is also, above all, the long-term question of the Democratic Republic of the Congo (DR Congo) where most cobalt is mined. This April, Gecamines, which is owned by the DR Congo government, started to end its Kamoto cobalt-copper operations with Glencore.

This latter dispute has now been resolved but DR Congo's new mining code allows the country to raise royalties from 2 percent to 10 percent as cobalt is now classed as a strategic mineral. Human rights issues such as under-age labor continue unresolved.

Chairman and CEO of Brixton Metals Gary R. Thompson replied to our questions: "Most of the world's cobalt comes from DR Congo, which has a history of corruption, child-labor, unstable government, and recent major increases in royalties and tariffs. DR Congo is quite insecure. The government can be unstable and irrational. It recently voted in favour of raising the royalty on cobalt from 2 percent to 10 percent.

"Yes, child labor is a large problem that DR Congo is faced with. Many large companies are now starting to demand cobalt from ethically-sourced locations. However, as China controls many of them, this may be difficult to trace. In 2007 the price of cobalt spiked to $52/lb due to supply disruption due to civil war in that country."

Troy Nazarewicz again: "The Second Congo War (1998-2003) resulted in 5.4 million deaths, making it the deadliest conflict since World War II. Political unrest is rampant and observers warn that the country could spiral out of control if President Kabila defies the constitution and seeks a third term in office or postpones elections for a third time since he was required to step down at the end of 2016.

"An estimated 10-20 percent of the Congo's cobalt production is from artisanal mines that Amnesty International, The Washington Post and others have linked to child labor, unsafe working conditions, and environmental degradation. This is a concern to global technology and automotive companies such as Apple, Samsung, Volkswagen and BMW that do not want their brands associated with unsustainable raw material procurement and want assurances that the cobalt in their products is ethically sourced. Both the US and European Union also have legislation that requires companies to be able to track the raw materials contained in their products to ensure they are not being used to finance conflicts and are from ethical suppliers."

Where does Canada fit in?
Mining People Magazine asked its two interviewees whether Canada can make a difference to the cobalt sector, for example, in companies showing a preference for Canadian-mined cobalt. Or quite simply, why Canadian cobalt rather than any other country's?

Gary R. Thompson for Brixton Metals: "Canada has the opportunity to supply ethically-sourced cobalt in a safe mining jurisdiction. This, combined with the geographic proximity to North American battery manufacturers, makes Canada an excellent alternative to DRC-sourced cobalt. Vale's Voisey's Bay mine, Fortune Minerals' NICO project and the Cobalt Camp in Ontario are all excellent examples of Canada making a difference. Canada has great potential but needs investment to advance its cobalt resource projects."

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And Troy Nazarewicz: "The world needs new sources of cobalt to help diversify the supply and help alleviate concerns related to geographic concentration in countries with political and/or policy risks and mines that do not practice sustainable and safe working conditions.

"Companies participating in the value chain for cobalt have been looking to countries like Canada that are politically safe and have a long history of responsible mining. And while Canada already produces cobalt in Sudbury, at Voisey's Bay and at Fort Saskatchewan, significantly more production will be required, particularly from primary deposits that do not impact the markets for copper and nickel.

"Fortune's NICO Project in Canada has had expenditures of more than $125 million and has been advanced from an in-house discovery in 1996 to one of the few new cobalt assets globally, with the potential to be in production by the early 2020s and meet the demand growth from transformation of the automotive industry. At full capacity NICO's production would be up to 2,000 t/y, representing less than 2 percent of the current world market. NICO is also a primary cobalt deposit with 65 percent of revenues projected to be from cobalt at current metal prices and with gold and bismuth produced as by-products."

There is then the financial question, with Troy Nazarewicz pointing out that cobalt prices will likely need to be sustained above the long-term inflation-adjusted average of ~US$25/lb to balance the market by encouraging miners to identify and develop new deposits. In the meantime, in his opinion, thrifting of cobalt in batteries and recycling may be required to mitigate the impending supply deficit.

Ian Thompson reinforces the potential for Canadian cobalt: "A stable, locally-sourced supply of cobalt would be preferred in Canadian manufacturing, as it would avoid any taxes/tariffs imposed now or in the future."

A green product

Both companies are very keen to stress their environmental credentials. Fortune Metals points out that it is a vertically integrated producer of environmentally responsible and ethical cobalt, and that it will be able to demonstrate not just supply chain transparency but also custody control of metals from ores through to production of value-added products.

Furthermore, as Troy Nazarewicz told this writer: "Canada is a country that requires development projects to go through a rigorous environmental assessment and permitting process to ensure the project is sustainable and meets high standards of environmental and social compliance. The NICO project is also supported by the local Tlicho indigenous government who approved the environmental assessment for the mine and concentrator."

Other advantages of "green" cobalt are clear: batteries enable the use of green renewable energy production from wind and solar to be used in grid base load by storing electricity when conditions permit and discharging when there is a lack of sunlight and/or wind. Another aspect from NICO is the bismuth that will be produced as a by-product, an "eco" metal that is environmentally safe and non-toxic and used to replace lead due to toxicity concerns. Bismuth is also a benign metal used in pharmaceuticals and medical devices, leveraging its anti-bacterial properties.

And the bottom line?

Both companies are confident that they can compete. Fortune Minerals, for example, believes that NICO will become one of the world's lowest cost cobalt producers on an operating cost basis. Its 2014 feasibility study demonstrated an attractive rate of return for the development at lower cobalt prices with more than 50 percent margins and a negative cash cost for cobalt (negative US$5.03/lb) net of gold and bismuth by-product credits.

Fortune Minerals is, however, realistic: the project also has high capital costs for a vertically integrated development with the associated refinery, and this makes the project less attractive with the cost of capital included. The company is currently updating the technical report for the 2014 feasibility study and examining a ~30 percent increased production rate as well as incorporating the flexibility to accommodate the sale of concentrates and other downstream process options.

Chinese interest in Canadian cobalt.

Fortune Minerals has received many expressions of interest in the NICO Project and has executed approximately 30 confidentiality agreements enabling prospective partners to review technical and financial data for the project, including several from China. Companies looking at the project from around the world include automobile and battery producers, mining firms, banks, financial investors, and refiners. Fortune's largest shareholder is a mining and infrastructure contracting company owned by a Chinese engineering, procurement and construction company.

Brixton Metals confirmed that it has had some discussions with various groups out of China, with some looking to secure cobalt in an off-take agreement, but which the company is simply too early-stage for, although it is encouraged to know that the demand is there.

Troy Nazarewicz brings home China's interest - and why it will dominate: "In recent years, China has positioned itself to dominate the renewable energy sector. With the aim of supporting its transition to eMobility, China has gone further than any other country to secure the critical commodities - like cobalt – that it needs to power these new energy vehicles. China is not only dominating refinery production but is also buying control of large deposits of cobalt and lithium around the world and investing in battery and EV technologies and penalizing owners of cars with internal combustion engines.

"Notably, China Molybdenum acquired Tenke Fungurume in 2016, which last year accounted for approximately 14 percent of global cobalt mine production. Earlier this year, Glencore plc, the world's top cobalt producer, also agreed to sell about a third of its output to a single Chinese supplier of battery chemicals - GEM Co. By increasing its control over the cobalt supply, China is effectively controlling the lithium-ion battery industry and is positioned to become the world's EV production centre."

Ian Thompson is of a similar mind: "China already dominates the cobalt market. It appears to be acquiring as much cobalt as possible and cornering the supply. This would lead to China having a monopoly on the production of battery-related products. Other nations need a strong supply of this strategic metal to compete on the global manufacturing landscape."

Lithium batteries: too much demand, too soon?

In reply to the question as to whether the move to lithium batteries had been too quick because cobalt production has not caught up, Troy Nazarewicz was

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forthright: "The move towards lithium-ion batteries has been anything but hasty. Lithium-ion batteries were first invented in the 1970s and commercialized by Sony in the 1980s. It has taken decades for the performance, safety, charge and discharge characteristics and costs to improve sufficiently to allow for vehicle electrification and stationary storage application.

"Similarly, the shift to eMobility has been a long process that has transitioned from hybrid-electric vehicles to plug-in models with or without secondary internal combustion engine backup powertrains. As batteries improved, Tesla, Nissan and others made EVs a desirable option.

"However, it was Volkswagen's 'Dieselgate' scandal that tipped the scales forcing all major auto OEMs to shift to greener alternatives to be compliant with pollution restrictions imposed by governments VW alone is investing over US$80 billion to electrify 25 percent of their sales and offer 80 electric models by 2025.

"The majority of automotive companies have settled on the nickel-manganese-cobalt (NMC) lithium-ion cathode chemistry, whereas Tesla/Panasonic have opted for nickel-cobalt-aluminum (NCA) chemistry – both of which contain cobalt. More than 36 battery megafactories (plants that produce in excess of 2 GWh of batteries per annum) have now been announced or are under construction to support the transition to eMobility.

"Like any new technology that requires certain raw materials, geologists will eventually be successful in identifying new deposits to bring the cobalt market into balance and the price will be determined by the marginal cost of production plus a reasonable profit margin."

Ian Thompson replied that the move towards lithium batteries has been accelerated due to the pending effects of climate change, as well as improvements in battery technology. This rapid change, in his opinion, is seen as a necessary advancement, and companies will find ways to supply the needed materials.

The transition to EVs is for Troy Nazarewicz a global phenomenon; countries worldwide have imposed deadlines banning the future use of cars with internal combustion engines. As EVs approach cost parity with internal combustion engines, the superior maintenance and performance of electric drive trains and concerns about pollution make the transition to eMobility inevitable.

Trump may slow the process of this transformation in the US, but will only make American auto companies fall further behind their competitors in the rest of the world in transitioning to this disruptive new technology in the auto industry and energy production and supply. Furthermore, OEMs in the US will need to produce EVs if they want to sell automobiles in a global economy.

The last confident words are those of Ian Thompson: "We have some of the highest-grade cobalt deposits, so will likely be on the low end of the cost-curve. Canada can produce a safe, stable, ethically-sourced supply of cobalt."