

Cobalt: Demand; Supply; and Pricing

eResearch Corporation is pleased to provide its overview of the cobalt industry.

Cobalt: Introduction

The world is undergoing a transformation in energy needs and wants. Climate change has thrust upon the world stage the vital requirement to alter our very way of life. The overwhelming need to reduce carbon emissions has put the internal combustion engine in the cross-hairs of civilization. The clarion call to reduce the world's use of fossil fuels has put alternate energy sources into the spotlight.

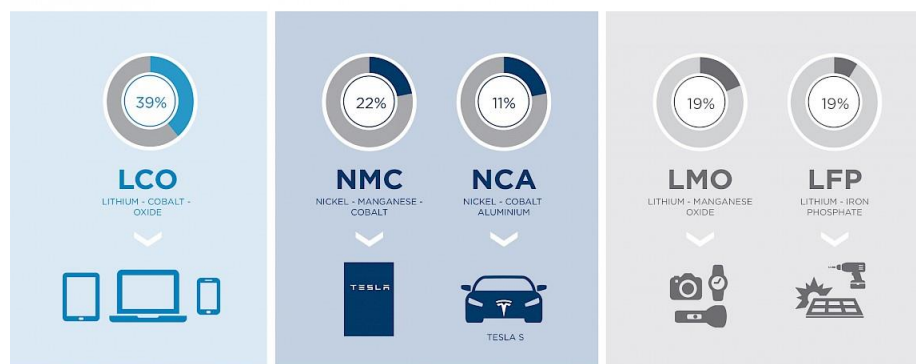
The burgeoning energy storage industry is front-and-centre, and is causing increasing demand for key battery metals. This has led to opportunities to increase battery production with the consequent building of large factories to accommodate this demand.

Cobalt is a by-product metal. It is mined in conjunction with primary metals: copper (60% of cobalt production), and nickel (38%). Primary cobalt production accounts for just 2%.

With demand for traditional metals being soft for the last few years, the metals industry is facing supply constraints in by-product metals, such as cobalt. But this metal is essential to the battery market.

Driven by Demand

COBALT CRITICAL TO LITHIUM ION BATTERY CHEMISTRY



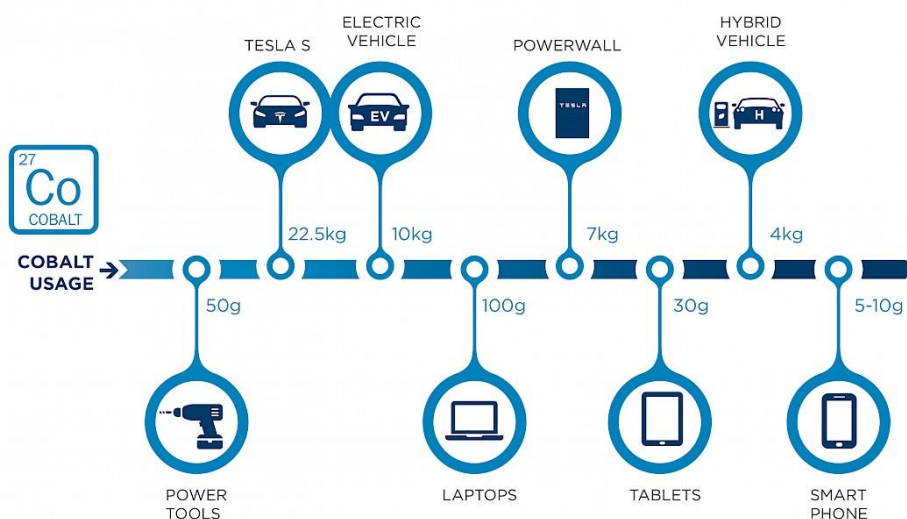
75% of all Lithium Batteries will contain Cobalt
1/5 of Cobalt demand will be driven by Electric Vehicles

Cobalt: Demand

The demand for cobalt has been escalating in recent years, and this growth is anticipated not only to continue but also, possibly, to escalate. Demand for the metal is coming from: (a) the energy storage sector, (b) rechargeable batteries for consumer electronics, and (c) the prospects for the electric vehicle market.

Specifically, usage for cobalt is as follows: (1) Chemical applications, principally in rechargeable batteries: lithium-ion batteries in electric vehicles, personal-computers, lap-tops, and smart-phones. (2) Metallurgical applications, primarily super-alloys in the aerospace, defense, power generation, and in high-speed steel, carbides, and diamond tools and magnets. The use in lithium-ion batteries is far out-stripping the demand from all other uses.

Powered by Cobalt



Source: Global Energy Metals Corp.

Total cobalt demand was 94,000 tonnes in 2016 and 101,000 tonnes in 2017, and is estimated to reach 108,000 tonnes in 2018, 114,000 tonnes in 2019, and exceed 120,000 tonnes in 2020. Approximately 60% of this demand will be accounted for by battery consumption.

The rechargeable battery segment is the largest and, potentially, the fastest growing use of cobalt. This growth in battery consumption is anticipated to come primarily from the increasing demand for electric vehicles. The lithium-ion battery for use in the electric vehicle market represents the key “driver” for the demand for cobalt in the future.

Cobalt: Supply

Although cobalt is mined around the world, about 60% of global production comes from the Democratic Republic of Congo (DRC). This country is highly unstable and widely-known for being notorious for internal conflict, child labour, and decaying infrastructure. China, which controls the majority of refined global cobalt output, relies on the DRC to provide it with over 90% of its needed cobalt supply.

Clearly, there is considerable geo-political risk to global cobalt supply in having the DRC as the world’s primary source of cobalt production. As such, production of copper and nickel in stable areas of the world becomes a key determinant in assessing cobalt production requirements.

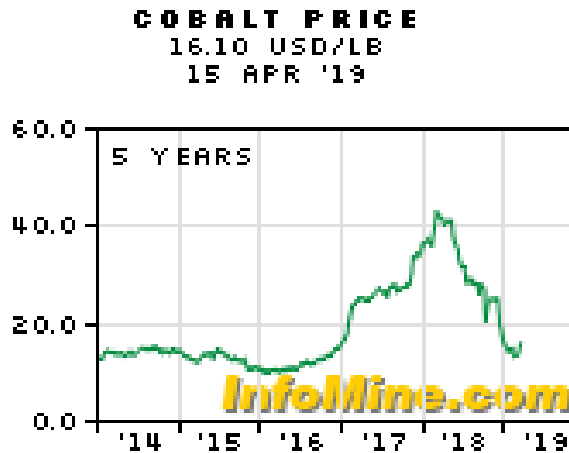
Global cobalt production has trended slowly upward over the last five years (in tonnes):

- 2014: 91,754;
- 2015: 98,113;
- 2016: 93,889;
- 2017: 116,937;
- 2018: 122,729.

This trend is expected to continue growing at 5% - 8% per annum.

Cobalt: Pricing

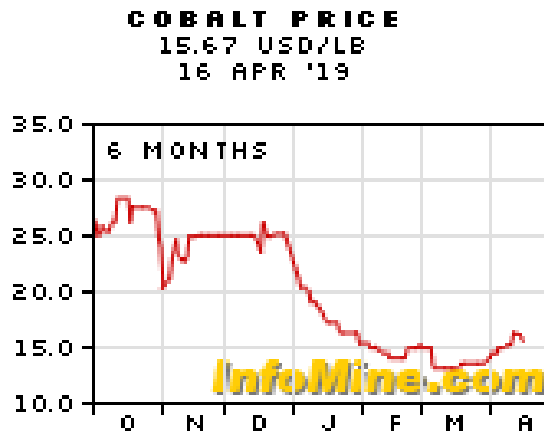
The following chart, courtesy of InfoMine, shows the trend in cobalt pricing over the last five years. After a brief spike in 2017, the market returned to a normal, stable basis by the end of 2018.



2018 saw a decline in the price of cobalt. This is attributable primarily to increased supply from the world’s largest cobalt market, the DRC. Market volatility impact on pricing was also created by constraints on the availability of credit and a slight softening in demand from China, the world’s largest end-market.

Another issue that had an impact on cobalt prices in 2018 was the implementation of subsidy changes in China, which affected the demand for electric vehicles and, therefore, batteries for them. However, longer term, the subsidies are instrumental in generating cobalt demand for electric vehicles that can achieve longer driving distances because this will require utilizing lithium-ion batteries that include nickel, cobalt, and manganese (NCM batteries). The initial electric vehicle batteries did not include cobalt in them.

The next chart shows the trend in cobalt prices over the last six months. After bottoming in March 2019, prices began to firm in April.



Certain supply disruptions are expected to be resolved in H1/2019 and lead to a possible supply surplus. This is not anticipated to be resolved until Q4/2019 since new electric vehicle sales tend to be concentrated in the final quarter of the year.

Looking ahead, there are mounting concerns about the DRC's new mining code since it involves raising taxes and royalties to 10%. Falling prices and rising taxes are putting cost pressures on operators, particularly those operating at the margin.

A cloud on the horizon is Tesla's announcement that it intends to phase out cobalt use in its batteries. If implemented, this could put a crimp on cobalt pricing. In the meantime, demand for cobalt remains strong across all end-uses and this should provide solid support for a rising trend in cobalt prices.

Thus, prices are expected to firm slightly throughout 2019 and without the spike, up and down, seen in 2017/2018. Pushing prices higher is the increase in cobalt demand given the move to NCM batteries. The favourable trend in cobalt pricing in the next few years is expected to come from increased electric vehicle sales, from both organic growth and the introduction of additional models.

Information for our cobalt industry report was sourced from the following:

- Global Energy Metals Corp.: <https://www.globalenergymetals.com/>
- Cobalt Institute: <https://www.cobaltinstitute.org/statistics.html>

COMPARABLES

Set out on the next two pages are a list of publicly-quoted cobalt companies.

Bob Weir, CFA
Contributing Analyst

eResearch was established in 2000 as Canada's first equity issuer-sponsored research organization. As a primary source for professional investment research, our Subscribers (*subscription is free!!!*) benefit by having written research on a variety of small- and mid-cap, under-covered companies. We also provide unsponsored research reports on middle and larger-sized companies, using a combination of fundamental and technical analysis. We complement our corporate research coverage with a diversified selection of informative, insightful, and thought-provoking research publications from a wide variety of investment professionals. We provide our professional investment research and analysis directly to our extensive subscriber network of discerning investors, and electronically through our website: www.eresearch.ca.

Note: All of the comments, views, opinions, suggestions, recommendations, etc., contained in this Article, and which is distributed by eResearch Corporation, are strictly those of the Author and do not necessarily reflect those of eResearch Corporation.

Name	Ticker	Prev. Close	Mkt Cap C\$ (M)	Cash (M)	Debt (M)	EV (M)	Description
21C Metals Inc.	CNSX:BULL	\$0.18	\$11.0	\$0.4	\$0.0	\$10.6	21C Metals Inc., a mineral exploration company, engages in the acquisition and exploration of mineral assets in Europe. It holds 100% interests in the Tisová/TGER copper-cobalt properties located in Europe.
Australian Mines Limited	ASX:AUZ	\$0.03	\$74.7	\$0.6	\$1.5	\$81.1	Australian Mines Limited engages in the exploration and pre-development of battery metals projects in Australia. The company explores for cobalt, nickel, scandium, copper, and gold and base metal deposits. Its flagship project is the Sconi cobalt-nickel-scandium project located in northern Queensland.
Canada Cobalt Works Inc.	TSXV:CCW	\$0.30	\$23.3	\$0.0	\$0.0	\$23.3	Canada Cobalt Works Inc. engages in the acquisition, evaluation, exploration, and development of mineral properties in Canada. The company primarily explores for silver and cobalt deposits. It focuses on exploring and developing the Castle cobalt silver mine covering 19 claims, 34 leases, and two licenses located in Ontario; and the Beaver and Violet cobalt and silver properties located in the township of Coleman, Ontario.
CBLT Inc.	TSXV:CBLT	\$0.03	\$2.1	\$0.6	\$0.0	\$1.5	CBLT Inc. engages in the acquisition, exploration, development, and sale of mineral properties in Canada. The company explores for cobalt, gold, palladium, copper, zinc, nickel, and lead.
Cobalt 27 Capital Corp.	TSXV:KBLT	\$3.53	\$301.5	\$34.9	\$0.0	\$266.5	Cobalt 27 Capital Corp. operates as a minerals company. It holds physical cobalt material; owns a cobalt stream on Vale's worldclass Voisey's Bay mine; and manages a portfolio of nine royalties, as well as intends to invest in a cobalt-focused portfolio of streams, royalties, and direct interests in mineral properties containing cobalt.
Cobalt Blue Holdings Limited	ASX:COB	\$0.16	\$18.0	\$7.2	\$0.6	\$12.7	Cobalt Blue Holdings Limited engages in the development and commercialization of cobalt deposits. It holds 70% interest in the Thackaringa project that covers an area of approximately 63 square kilometers located in the Broken Hill, New South Wales.
Cruz Cobalt Corp.	TSXV:CUZ	\$0.05	\$3.5	\$2.3	\$0.0	\$1.2	Cruz Cobalt Corp., an exploration stage company, engages in the acquisition, exploration, and evaluation of mineral properties in Canada and the United States. The company explores for cobalt and lithium properties. It holds interests in nine cobalt projects located in North America, including five in Ontario, two in British Columbia, one in Idaho, and one in Montana.
eCobalt Solutions Inc.	TSX:ECS	\$0.27	\$44.1	\$3.1	\$0.0	\$41.0	eCobalt Solutions Inc. engages in the exploration and development of mineral properties in Canada, the United States, and Mexico. It primarily explores for base and precious metals, and uranium, as well as copper, gold, silver, lead, and zinc deposits. The company owns 100% interest in its primary asset, the Idaho Cobalt project that includes a mine/mill site located in Lemhi County, Idaho, producing battery grade cobalt salts for rechargeable battery and renewable energy sectors.
Edison Cobalt Corp.	TSXV:EDDY	\$0.05	\$3.2	\$1.1	\$0.0	\$2.1	Edison Cobalt Corp., a junior mining exploration company, engages in the procurement, exploration, and development of mineral properties in North and South America. The company primarily explores for cobalt, lithium, and other elements.
Explore Resources Inc.	CNSX:EX	\$0.27	\$5.8	\$0.2	\$0.0	\$5.6	Explore Resources Inc. engages in the acquisition, exploration, and development of mineral properties in Eastern Canada. The company explores for silver, lead, zinc, copper, and gold, as well as cobalt and nickel deposits.
First Cobalt Corp.	TSXV:FCC	\$0.16	\$57.7	\$1.8	\$0.0	\$55.9	First Cobalt Corp. engages in the acquisition and exploration of resource properties. The company's principal assets include the Greater Cobalt project, including the cobalt north, south, and central camps located in Ontario, Canada; and the Iron Creek project that is situated in Idaho, the United States. It also operates a cobalt refinery in North America.
Giga Metals Corporation	TSXV:GIGA	\$0.20	\$10.8	\$3.4	\$0.0	\$7.4	Giga Metals Corporation engages in the acquisition, exploration, and development of mineral properties in Canada. The company explores for nickel-cobalt sulphide deposits. It owns a 100% interest in the Turnagain property comprising 72 mineral claims covering an area of 40,016.7 hectares located in the Liard Mining Division of northern British Columbia.

<continued>

Name	Ticker	Prev. Close	Mkt Cap C\$ (M)	Cash (M)	Debt (M)	EV (M)	Description
Global Energy Metals Corporation	TSXV:GEMC	\$0.08	\$5.7	\$0.1	\$0.0	\$5.6	Global Energy Metals Corporation invests, explores, and evaluates for resource properties in Canada and Australia. The company explores for cobalt, copper, and base metal deposits. It holds interests in the Werner Lake property located in northwestern Ontario.
King's Bay Resources Corp.	TSXV:KBG	\$0.04	\$2.8	\$0.2	\$0.0	\$2.5	King's Bay Resources Corp. engages in acquiring, exploring, developing, and evaluating mineral resource properties in Canada. The company has 100% interests in the Lynx Lake cobalt-copper property consisting of 66 mineral claims covering 20 square kilometers located in southern Labrador; and the Trump Island property consisting of 8 mineral claims covering an area of 2 square kilometers located in north-central Newfoundland.
LiCo Energy Metals Inc.	TSXV:LIC	\$0.05	\$1.4	\$0.2	\$0.0	\$1.2	LiCo Energy Metals Inc., an exploration stage company, engages in the acquisition, exploration, and development of energy metals projects. The company holds a 100% interest in the Glencore Bucke cobalt project covering 16.2 hectares (ha) located to the east-northeast of Cobalt, Ontario; and an option to acquire a 100% interest in the Teledyne cobalt project with 5 patented mining claims covering an area of 79.1 ha.
M2 Cobalt Corp.	TSXV:MC	\$0.17	\$10.8	\$0.4	\$0.4	\$10.8	M2 Cobalt Corp., an exploration stage company, engages in the exploration and development of cobalt properties in Canada and the Republic of Uganda. The company also explores for nickel and copper rock, and soil. It holds a 100% interest in the Silverside cobalt project comprising 15 mineral claims covering approximately 2,736 hectares in Lundy, Auld, Barr, and Klock Townships.
Marquee Resources Limited	ASX:MQR	\$0.04	\$1.4	\$1.2	\$0.0	\$0.3	Marquee Resources Limited engages in the mineral exploration activities. The company holds a 100% interest in the Clayton Valley lithium project located in Nevada, the United States. It also has interests in the Werner Lake and Skeleton Lake cobalt projects located in Ontario, Canada.
MetalsTech Limited	ASX:MTC	\$0.02	\$1.7	\$0.4	\$0.0	\$1.4	MetalsTech Limited explores for and develops lithium and cobalt deposits in Canada.
Meteoric Resources NL	ASX:MEI	\$0.02	\$19.0	\$2.1	\$0.0	\$18.4	Meteoric Resources NL engages in the exploration of mineral tenements in Canada, Western Australia, and Northern Territory. It explores for copper, gold, iron, cobalt, diamond, nickel, and platinum and palladium properties.
Pacific Rim Cobalt Corp.	CNSX:BOLT	\$0.17	\$10.4	\$4.9	\$0.0	\$5.5	Pacific Rim Cobalt Corp. focuses on the acquisition, exploration, and development of cobalt deposits for lithium-ion battery industry. Its principal project is the TNM Project covering an area of 5000 hectares with 9 prospects located in Indonesia.
Power Group Projects Corp.	TSXV:PGP	\$0.10	\$1.5	\$1.3	\$0.0	\$0.2	Power Group Projects Corp., an exploration stage company, engages in the acquisition, exploration, and development of mineral properties in Canada. It primarily explores for cobalt and silver properties. The company holds interests in Smith-Cobalt Project consisting of 14 patented claims and 10 staked mineral claims covering an area of approximately 863.6 hectares located in Cobalt, Ontario.
Quantum Cobalt Corp.	CNSX:QBOT	\$0.04	\$1.6	\$0.0	\$0.0	\$1.6	Quantum Cobalt Corp., a resource company, engages in identifying, exploring, and developing mineral properties. It primarily focuses on cobalt properties. The company holds 100% interest in the Musgrove Creek project located in Lemhi County, Idaho; and a 90% interest in the Grew Creek property located in the Watson Lake Mining District, southeast Yukon.
Supreme Metals Corp.	CNSX:ABJ	\$0.02	\$3.1	\$0.0	\$0.0	\$5.4	Supreme Metals Corp., an exploration stage company, engages in the acquisition, exploration, and development of natural resource properties. It primarily focuses on green and energy metals.