Battery Metals Report 2020

Everything you need to know about the Battery Metals Lithium, Cobalt, Nickel and Vanadium!

SRC swiss resource capital ag

Disclaimer

Dear reader,

Please read the complete disclaimer in the following pages carefully before you start reading this Swiss Resource Capital Publication. By using this Swiss Resource Capital Publication you agree that you have completely understood the following disclaimer and you agree completely with this disclaimer. If at least one of these point does not agree with you than reading and use of this publication is not allowed.

We point out the following:

Swiss Resource Capital AG and the authors of the Swiss Resource Capital AG directly own and/or indirectly own shares of following Companies which are described in this publication: Canada Nickel, Giga Metals, Millennial Lithium, NeoLithium, Plateau Energy, Sierra Metals.

Swiss Resource Capital AG has closed IR consultant contracts with the following companies which are mentioned in this publication: Canada Nickel, Millennial Lithium.

Swiss Resource Capital AG receives compensation expenses from the following companies mentioned in this publication: Canada Nickel, Giga Metals, Millennial Lithium, NeoLithium, Plateau Energy, Sierra Metals.

Therefore, all mentioned companies are sponsors of this publication.

Risk Disclosure and Liability

Swiss Resource Capital AG is not a securities service provider according to WpHG (Germany) and BörseG (Austria) as well as Art. 620 to 771 obligations law (Switzerland) and is not a finance company according to § 1 Abs. 3 Nr. 6 KWG. All publications of the Swiss Resource Capital AG are explicitly (including all the publications published on the website http://www.resource-capital.ch and all sub-websites (like http://www.resource-capital.ch/de) and the website http://www.resource-capital.ch itself and its sub-websites) neither financial analysis nor are they equal to a professional financial analysis. Instead, all publications of Swiss Resource Capital AG are exclusively for information purposes only and are expressively not trading recommendations regarding the buying or selling of securities. All publications of Swiss Resource Capital AG represent only the opinion of the respective author. They are neither explicitly nor implicitly to be understood as guarantee of a particular price development of the mentioned financial instruments or as a trading invitation. Every investment in securities mentioned in publications of Swiss Resource Capital AG involve risks which could lead to total a loss of the invested capital and – depending on the investment – to further obligations for example additional payment liabilities. In general, purchase and sell orders should always be limited for your own protection.

This applies especially to all second-line-stocks in the small and micro cap sector and especially to exploration and resource companies which are discussed in the publications of Swiss Resource Capital AG and are exclusively suitable for speculative and risk aware investors. But it applies to all other securities as well. Every exchange participant trades at his own risk. The information in the publications of Swiss Resource Capital AG do not replace an on individual needs geared professional investment advice. In spite of careful research, neither the respective author nor Swiss Resource Capital AG will neither guarantee nor assume liability for actuality, correctness, mistakes, accuracy, completeness, adequacy or quality of the presented information. For pecuniary losses resulting from investments in securities for which information was available in all publications of Swiss Resource Capital AG liability will be assumed neither by Swiss Capital Resource AG nor by the respective author neither explicitly nor implicitly.

Any investment in securities involves risks. Political, economical or other changes can lead to significant stock price losses and in the worst case to a total loss of the invested capital and – depending on the investment – to further obligations for example additional payment liabilities. Especially investments in (foreign) second-line-stocks, in the small and micro cap sector, and especially in the exploration and resource companies are all, in general, associated with an outstandingly high risk. This market segment is characterized by a high volatility and harbours danger of a total loss of the invested capital and – depending on the investment – to further obligations for example additional payment liabilities. As well, small and micro caps are often very illiquid and every order should be strictly limited and, due to an often better pricing at the respective domestic exchange, should be traded there. An investment in securities with low liquidity and small market cap is extremely speculative as well as a high risk and can lead to, in the worst case, a total loss of the invested capital and – depending on the investment – to further obligations for example additional payment liabilities. Engagements in the publications of the shares and products presented in all publications of Swiss Resource Capital AG have in part foreign exchange risks. The deposit portion of single shares of small and micro cap companies and low capitalized securities like derivatives and leveraged products should only be as high that, in case of a possible total loss, the deposit will only marginally lose in value.

All publications of Swiss Resource Capital AG are exclusively for information purposes only. All information and data in all publications of Swiss Resource Capital AG are obtained from sources which are deemed reliable and trustworthy by Swiss Resource Capital AG and the respective authors at the time of preparation. Swiss Resource Capital AG and all Swiss Resource Capital AG employed or engaged persons have worked for the preparation of all of the published contents with the greatest possible diligence to guarantee that the used and underlying data as well as facts are complete and accurate and the used estimates and made forecasts are realistic. Therefore, liability is categorically precluded for pecuniary losses which could potentially result from use of the information for one's own investment decision.

All information published in publications of Swiss Resource Capital AG reflects the opinion of the respective author or third parties at the time of reparation of the publication. Neither Swiss Resource Capital AG nor the respective authors can be held responsible for any resulting pecuniary losses. All information is subject to change. Swiss Resource Capital AG as well as the respective authors assures that only sources which are deemed reliable and trustworthy by Swiss Resource Capital AG and the respective authors at the time of preparation are used. Although the assessments and statements in all publications of Swiss Resource Capital AG were prepared with due diligence, neither Swiss Resource Capital AG nor the respective authors take any responsibility or liability for the actuality, correctness, mistakes, accuracy, completeness, adequacy or quality of the presented facts or for omissions or incorrect information. The same shall apply for all presentations, numbers, designs and assessments expressed in interviews and videos.

Swiss Resource Capital AG and the respective authors are not obliged to update information in publications. Swiss Resource Capital AG and the respective authors explicitly point out that changes in the used and underlying data, facts, as well as in the estimates could have an impact on the forecasted share price development or the overall estimate of the discussed security. The statements and opinions of Swiss Capital Resource AG as well as the respective author are not recommendations to buy or sell a security.

Neither by subscription nor by use of any publication of Swiss Resource Capital AG or by expressed recommendations or reproduced opinions in such a publication will result in an investment advice contract or investment brokerage contract between Swiss Resource Capital AG or the respective author and the subscriber of this publication.

Investments in securities with low liquidity and small market cap are extremely speculative as well as a high risk. Due to the speculative nature of the presented companies their securities or other financial products it is quite possible that investments can lead to a capital reduction or to a total loss and – depending on the investment – to further obligations for example additional payment liabilities. Any investment in warrants, leveraged certificates or other financial products bears an extremely high risk. Due to political, economical or other changes significant stock price losses can arise and in the worst case a total loss of the invested capital and – depending on the investment – to further obligations for example additional payment liabilities. Any liability claim for foreign share recommendations, derivatives and fund recommendations are in principle ruled out by Swiss Resource Capital AG and the respective authors. Between the readers as well as the subscribers and the authors as well as Swiss Resource Capital AG no consultancy agreement is closed by subscription of a publication of Swiss Resource Capital AG because all information contained in such a publication refer to the respective company but not to the investment decision. Publications of Swiss Resource Capital AG are neither, direct or indirect an offer to buy or for the sale of the discussed security (securities), nor an invitation for the purchase or sale of securities in general. An investment decision regarding any security should not be based on any publication of Swiss Resource Capital AG.

Publications of Swiss Resource Capital AG must not, either in whole or in part be used as a base for a binding contract of all kinds or used as reliable in such a context. Swiss Resource Capital AG is not responsible for consequences especially losses, which arise or could arise by the use or the failure of the application of the views and conclusions in the publications. Swiss Resource Capital AG and the respective authors do not guarantee that the expected profits or mentioned share prices will be achieved.

The reader is strongly encouraged to examine all assertions him/herself. An investment, presented by Swiss Resource Capital AG and the respective authors in partly very speculative shares and financial products should not be made without reading the most current balance sheets as well as assets and liabilities reports of the companies at the Securities and Exchange Commission (SEC) under www.sec.gov or other regulatory authorities or carrying out other company evaluations. Neither Swiss Resource Capital AG nor the respective authors will guarantee that the expected profits or mentioned share prices will be achieved. Neither Swiss Resource Capital AG nor the respective authors are professional investment or financial advisors. The reader should take advice (e. g. from the principle bank or a trusted advisor) before any investment decision. To reduce risk investors should largely diversify their investments.

In addition, Swiss Resource Capital AG welcomes and supports the journalistic principles of conduct and recommendations of the German press council for the economic and financial market reporting and within the scope of its responsibility will look out that these principles and recommendations are respected by employees, authors and editors.

Forward-looking Information

Information and statements in all publications of Swiss Resource Capital AG especially in (translated) press releases that are not historical facts are forward-looking information within the meaning of applicable securities laws. They contain risks and uncertainties but not limited to current expectations of the company concerned, the stock concerned or the respective security as well as intentions, plans and opinions. Forward-looking information can often contain words like "expect", "believe", "assume", "goal", "plan", "objective", "intent", "estimate", "can", "should", "may" and "will" or the negative forms of these expressions or similar words suggesting future events or expectations, ideas, plans, objectives, intentions or statements of future events or performances. Examples for forward-looking information in all publications of Swiss Resource Capital AG include: production guidelines, estimates of future/targeted production rates as well as plans and timing regarding further exploration, drill and development activities. This forward-looking information is based in part on assumption and factors that can change or turn out to be incorrect and therefore may cause actual results, performances or successes to differ materially from those stated or postulated in such forward-looking statements. Such factors and assumption include but are not limited to: failure of preparation of resource and reserve estimates, grade, ore recovery that differs from the estimates, the success of future exploration and drill programs, the reliability of the drill, sample and analytical data, the assumptions regarding the accuracy of the representativeness of the mineralization, the success of the planned metallurgical test work, the significant deviation of capital and operating costs from the estimates, failure to receive necessary government approval and environmental permits or other project permits, changes of foreign exchange rates, fluctuations of commodity prices, delays by project developments and other factors.

Potential shareholders and prospective investors should be aware that these statements are subject to known and unknown risks, uncertainties and other factors that could cause actual events to differ materially from those indicated in the forward-looking statements. Such factors include but are not limited to the following: risks regarding the inaccuracy of the mineral reserve and mineral resource estimates, fluctuations of the gold price, risks and dangers in connection with mineral exploration, development and mining, risks regarding the creditworthiness or the financial situation of the supplier, the refineries and other parties that are doing business with the company; the insufficient insurance coverage or the failure to receive insurance coverage to cover these risks and dangers, the relationship with employees; relationships with and the demands from the local communities and the indigenous population; political risks; the availability and rising costs in connection with the mining contributions and workforce; the speculative nature of mineral exploration and development including risks of receiving and maintaining the necessary licences and permits, the decreasing quantities and grades of mineral reserves during mining; the global financial situation, current results of the current exploration activities, changes in the final results of the economic assessments and changes of the project parameter to include unexpected economic factors and other factors, risks of increased capital and operating costs, environmental, security and authority risks, expropriation, the tenure of the company to properties including their ownership, increase in competition in the mining industry for properties, equipment, qualified personal and its costs, risks regarding the uncertainty of the timing of events including the increase of the targeted production rates and fluctuations in foreign exchange rates. The shareholders are cautioned not to place undue reliance on forward-looking information. By its nature, forward-looking information involves numerous assumptions, inherent risks and uncertainties both general and specific that contribute to the possibility that the predictions, forecasts, projections and various future events will not occur. Neither Swiss Resource Capital AG nor the referred to company, referred to stock or referred to security undertake no obligation to update publicly otherwise revise any forward-looking information whether as a result of new information, future events or other such factors which affect this information, except as required by law.

48f Abs. 5 BörseG (Austria) and Art. 620 to 771 obligations law (Switzerland)

Swiss Resource Capital AG as well as the respective authors of all publications of Swiss Resource Capital AG could have been hired and compensated by the respective company or related third party for the preparation, the electronic distribution and publication of the respective publication and for other services. Therefore the possibility exists for a conflict of interests.

At any time Swiss Resource Capital AG as well as the respective authors of all publications of Swiss Resource Capital AG could hold long and short positions in the described securities and options, futures and other derivatives based on theses securities. Furthermore Swiss Resource Capital AG as well as the respective authors of all publications of Swiss Resource Capital AG reserve the right to buy or sell at any time presented securities and options, futures and other derivatives based on theses securities. Therefore the possibility exists for a conflict of interests.

Single statements to financial instruments made by publications of Swiss Resource Capital AG and the respective authors within the scope of the respective offered charts are not trading recommendations and are not equivalent to a financial analysis.

A disclosure of the security holdings of Swiss Resource Capital AG as well as the respective authors and/or compensations of Swiss Resource Capital AG as well as the respective authors by the company or third parties related to the respective publication will be properly declared in the publication or in the appendix.

The share prices of the discussed financial instruments in the respective publications are, if not clarified, the closing prices of the preceding trading day or more recent prices before the respective publication.

It cannot be ruled out that the interviews and estimates published in all publications of Swiss Resource Capital AG were commissioned and paid for by the respective company or related third parties. Swiss Resource Capital AG as well as the respective authors are receiving from the discussed companies and related third parties directly or indirectly expense allowances for the preparation and the electronic distribution of the publication as well as for other services.

Exploitation and distribution rights

Publications of Swiss Resource Capital AG may neither directly or indirectly be transmitted to Great Britain, Japan, USA or Canada or to an US citizen or a person with place of residence in the USA, Japan, Canada or Great Britain nor brought or distributed in their territory. The publications and their contained information can only be distributed or published in such states where it is legal by applicable law. US citizens are subject to regulation S of the U.S. Securities Act of 1933 and cannot have access. In Great Britain the publications can only be accessible to a person who in terms of the Financial Services Act 1986 is authorized or exempt. If these restrictions are not respected this can be perceived as a violation against the respective state laws of the mentioned countries and possibly of non mentioned countries. Possible resulting legal and liability claims shall be incumbent upon that person, but not Swiss Resource Capital, who has published the publications of Swiss Resource Capital AG in the mentioned countries and regions or has made available the publications of Swiss Resource Capital AG to persons from these countries and regions.

The use of any publication of Swiss Resource Capital AG is intended for private use only. Swiss Resource Capital AG shall be notified in advance or asked for permission if the publications will be used professionally which will be charged.

All information from third parties especially the estimates provided by external user does not reflect the opinion of Swiss Resource Capital AG. Consequently, Swiss Resource Capital AG does not guarantee the actuality, correctness, mistakes, accuracy, completeness, adequacy or quality of the information.

Note to symmetrical information and opinion generation

Swiss Resource Capital AG can not rule out that other market letters, media or research companies are discussing concurrently the shares, companies and financial products which are presented in all publications of Swiss Resource Capital AG. This can lead to symmetrical information and opinion generation during that time period.

No guarantee for share price forecasts

In all critical diligence regarding the compilation and review of the sources used by Swiss Resource Capital AG like SEC Filings, official company news or interview statements of the respective management neither Swiss Resource Capital AG nor the respective authors can guarantee the correctness, accuracy and completeness of the facts presented in the sources. Neither Swiss Resource Capital AG nor the respective authors will guarantee or be liable for that all assumed share price and profit developments of the respective companies and financial products respectively in all publications of Swiss Resource Capital AG will be achieved.

No guarantee for share price data

No guarantee is given for the accuracy of charts and data to the commodity, currency and stock markets presented in all publications of Swiss Resource Capital AG.

Copyright

The copyrights of the single articles are with the respective author. Reprint and/or commercial dissemination and the entry in commercial databases is only permitted with the explicit approval of the respective author or Swiss Resource Capital AG.

All contents published by Swiss Resource Capital AG or under http://www.resource-capital.ch – website and relevant sub-websites or within www.resource-capital.ch – newsletters and by Swiss Resource Capital AG in other media (e.g. Twitter, Facebook, RSS-Feed) are subject to German, Austrian and Swiss copyright and ancillary copyright. Any use which is not approved by German, Austrian and Swiss copyright and ancillary copyright needs first the written consent of the provider or the respective rights owner. This applies especially for reproduction, processing, translation, saving, processing and reproduction of contents in databases or other electronic media or systems. Contents and rights of third parties are marked as such. The unauthorised reproduction or dissemination of single contents and complete pages is not permitted and punishable. Only copies and downloads for personal, private and non commercial use is permitted.

Links to the website of the provider are always welcome and don't need the approval from the website provider. The presentation of this website in external frames is permitted with authorization only. In case of an infringement regarding copyrights Swiss Resource Capital AG will initiate criminal procedure.

Information from the Federal Financial Supervisory Authority (BaFin)

You can find further information on how to protect yourself against dubious offers in BaFin brochures directly on the website of the authority at www.bafin.de.

Liability limitation for links

The www.resource-capital.ch – website and all sub-websites and the www.resource-capital.ch – newsletter and all publications of Swiss Resource Capital AG contain links to websites of third parties ("external links"). These websites are subject to liability of the respective operator. Swiss Resource Capital AG has reviewed the foreign contents at the initial linking with the external links if any statutory violations were present. At that time no statutory violations were evident. Swiss Resource capital AG has no influence on the current and future design and the contents of the linked websites. The placement of external links does not mean that Swiss Resource Capital AG takes ownership of the contents behind the reference or the link. A constant control of these links is not reasonable for Swiss Resource Capital AG without concrete indication of statutory violations. In case of known statutory violations such links will be immediately deleted from the websites of Swiss Resource Capital AG. If you encounter a website of which the content violates applicable law (in any manner) or the content (topics) insults or discriminates individuals or groups of individuals, please contact us immediately.

In its judgement of May 12th, 1998 the Landgericht (district court) Hamburg has ruled that by placing a link one is responsible for the contents of the linked websites. This can only be prevented by explicit dissociation of this content. For all links on the homepage http://www.resource-capital.ch and its sub-websites and in all publications of Swiss Resource Capital AG applies: Swiss Resource Capital AG is dissociating itself explicitly from all contents of all linked websites on http://www.resource-capital.ch – website and its sub-websites and in the http://www.resource-capital.ch – newsletter as well as all publications of Swiss Resource Capital AG and will not take ownership of these contents."

Liability limitation for contents of this website

The contents of the website http://www.resource-capital.ch and its sub-websites are compiled with utmost diligence. Swiss Resource Capital AG however does not guarantee the accuracy, completeness and actuality of the provided contents. The use of the contents of website http://www.resource-capital.ch and its sub-websites is at the user's risk. Specially marked articles reflect the opinion of the respective author but not always the opinion of Swiss Resource Capital AG.

Liability limitation for availability of website

Swiss Resource Capital AG will endeavour to offer the service as uninterrupted as possible. Even with due care downtimes can not be excluded. Swiss Resource Capital AG reserves the right to change or discontinue its service any time.

Liability limitation for advertisements

The respective author and the advertiser are exclusively responsible for the content of advertisements in http://www.resource-capital.ch – website and its sub-websites or in the http://www.resource-capital.ch – newsletter as well as in all publications of Swiss Resource Capital AG and also for the content of the advertised website and the advertised products and services. The presentation of the advertisement does not constitute the acceptance by Swiss Resource Capital AG.

No contractual relationship

Use of the website http://www.resource-capital.ch and its sub-websites and http://www.resource-capital.ch – newsletter as well as in all publications of Swiss Resource Capital AG no contractual relationship is entered between the user and Swiss Resource Capital AG. In this respect there are no contractual or quasi-contractual claims against Swiss Resource Capital AG.

Protection of personal data

The personalized data (e.g. mail address of contact) will only be used by Swiss Resource Capital AG or from the respective company for news and information transmission in general or used for the respective company.

Data protection

If within the internet there exists the possibility for entry of personal or business data (email addresses, names, addresses), this data will be disclosed only if the user explicitly volunteers. The use and payment for all offered services is permitted – if technical possible and reasonable – without disclosure of these data or by entry of anonymized data or pseudonyms. Swiss Resource Capital AG points out that the data transmission in the internet (e.g. communication by email) can have security breaches. A complete data protection from unauthorized third party access is not possible. Accordingly no liability is assumed for the unintentional transmission of data. The use of contact data like postal addresses, telephone and fax numbers as well as email addresses published in the imprint or similar information by third parties for transmission of not explicitly requested information is not permitted. Legal action against the senders of spam mails are expressly reserved by infringement of this prohibition.

By registering in http://www.resource-capital.ch – website and its sub-websites or in the http://www.resource-capital.ch – newsletter you give us permission to contact you by email. Swiss Resource Capital AG receives and stores automatically via server logs information from your browser including cookie information, IP address and the accessed websites. Reading and accepting our terms of use and privacy statement are a prerequisite for permission to read, use and interact with our website(s).

Invest with the commodity professionals

You do not have to be a stock market professional to make wise investment decisions.
Invest together with Swiss Resource Capital AG and Asset Management Switzerland AG in the mega-trend commodities. Since 05.03.2020 the experts‘ specialist knowledge has been available as a Wikifolio certificate:

SRC Mining & Special Situations Zertifikat
ISIN: DE000LS9PQA9
WKN: LS9PQA
Currency: CHF/ Euro*
Certificate fee: 0.95 % p.a.
Performance fee: 15 % p.a.

*Trading in Euro is possible at the Euwax in Stuttgart.

Currently the following titles are represented in the SRC Mining & Special Situations Certificate (4/2020): FRANCO NEVADA | BHP BILLITON | R.DUTCH SHELL B | MAG SILVER CORP. | ENDEAVOUR SILVER | AGNICO EAGLE | RIO TINTO | TOTAL FINA ELF SA B EO 10 | CALEDONIA MINING O.N. | FREE MCMORAN COP | ANGLO AMERICAN | URANIUM ENERGY CORP. | DYNACERT INC. | OSISKO GOLD ROYALTIES LTD | SIBANYE STILLWATER LTD | CHEVRON | FIORE GOLD LTD | URANIUM PARTICIPATION CORP. | MAPLE GOLD MINES LTD | ROYAL NICKEL CORP. | NEWMONT CORP. DL 1,60 | BLUESTONE RESOURCES | AURYN RESOURCES INC. | BARRICK GOLD CORP. | GOLDMINING INC. | COPPER MOUNTAIN MINING CORP. | MILLENIAL LITHIUM CORP. | ISOENERGY LTD. O.N. | SKEENA RES LTD NEW | AURANIA RES CAD R.S. | ENWAVE.

Table of Contents

Imprint

Editor
Swiss Resource Capital AG
Poststr. 1
9100 Herisau, Schweiz
Tel : +41 71 354 8501
Fax : +41 71 560 4271
info@resource-capital.ch
www.resource-capital.ch

Editorial staff
Jochen Staiger
Tim Rödel

Layout/Design
Frauke Deutsch

Editorial Deadline: 04/20/2020
Cover nrqemi/adobestock.com
page 12: ©ser_igor/stock.adobe.com
page 28: alexander schimmeck, unsplash
Back:
 # 1: ssarwas0, Pixabay
 # 2: TravelCoffeeBook, Pixabay
 # 3: andreas160578, Pixabay
 # 4: Hookyung Lee, Pixabay

All images and graphics are, unless otherwise stated, by the companies.

Charts: 04/28/2020

Preface

Dear Readers,

It is with pride and pleasure that we enter the fifth year of publication of our Battery Metals Report.

Our special report series started with lithium, as we see this metal, just like cobalt, vanadium and nickel, as one of the great energy future metals and, despite the recent drop in prices, as a great opportunity and potential. E-mobility is on the advance and since 2020, the eagerly awaited new models of German manufacturers but also of international volume manufacturers are finally coming onto the market. In addition, there are hybrid versions that have batteries on board in addition to the combustion engine. The ranges are increasing and with them the acceptance of the end customers, i.e. the car buyers. Tesla alone now produces over 100,000 cars per quarter and Volkswagen wants to focus exclusively on e-mobiles. Volkswagen alone is planning around 70 models by 2030 in the e-sector, as are Mercedes, Audi and BMW, which also look very good visually. The electric car is now established and has won a place among consumers. At the end of 2019, there were over 8 million electric cars on the road worldwide. By the end of 2020 we should be able to break the 10 million mark despite the corona madness. Of course, electromobility is taking up more and more space in the production of raw materials, which is also true. After all, you can't want to drive „green", whereby the battery metals are obtained through child labor ... Lithium and cobalt are the main components of all batteries and accumulators available in large series and are therefore the main link in the electric mobility dream. Interesting are the movements in Germany, where Tesla wants to build a factory (Gigafactory) but is then hindered by environmentalists. Sometimes you wonder what you want to do in a nature conservation camp. On the one hand, they shoot down the German car industry, but then they wonder why short-time work and layoffs are making the rounds and the tax revenues are decreasing.

Even though many a do-gooder has taken up arms against the car, an automobile is still indispensable for commuters, commercial travellers and people who are active in business; not to mention personal freedom. 2020 is the year of the breakthrough for e-mobiles on a grand scale worldwide, as all major manufacturers – especially the Germans – are launching massive new e-models on the market. Away from the concept car and the study to mass production and day-to-day e-cars. All these will be enormous drivers of the demand for lithium, cobalt, nickel and vanadium, but above all copper. In general, copper is currently being played as a recession barometer on the futures exchanges. However, according to the German government, another 30,000 charging points are to be added by 2030. This means millions of tons of copper, which are not only needed for cars, but above all for the charging infrastructure. 2020 should not only be the beginning of a new decade, but it looks like a decade for commodities, as they are – and will remain – the basis of our economic activities. Supply will hardly keep pace with the demand that will set in once the corona virus has been overcome.

Swiss Resource Capital AG has set itself the task of providing up-to-date and comprehensive information on a wide range of commodities and mining companies to commodity investors, interested parties and those who would like to become such. On our website www.resource-capital.ch you will find more than 20 companies and a lot of information and articles about commodities.

With our special reports we would like to give you the necessary insights and provide you with comprehensive information. In addition, our two raw material IPTV channels www.Commodity-TV.net & www.Rohstoff-TV.net are available to you free of charge at any time. When you are on the move, we recommend our new Commodity TV App for iPhone and Android, which provides you with real-time charts, quotes and also the latest videos.

My team and I hope you enjoy reading the Battery Metals Special Report and that we can provide you with a lot of new information, impressions and ideas.

Yours, Jochen Staiger

Jochen Staiger is founder and CEO of Swiss Resource Capital AG, located in Herisau, Switzerland. As chief-editor and founder of the first two resource IP-TV-channels Commodity-TV and its German counterpart Rohstoff-TV, he reports about companies, experts, fund managers and various themes around the international mining business and the correspondent metals.

Tim Rödel is Manager Newsletter, Threads & Special Reports at SRC AG. He has been active in the commodities sector for more than twelve years and accompanied several chief-editor positions, e.g. at Rohstoff-Spiegel, Rohstoff-Woche, Rohstoffraketen, the publications Wahrer Wohlstand and First Mover. He owns an enormous commodity expertise and a wide-spread network within the whole resource sector.

The electric age has begun! The battery metals lithium, nickel, cobalt and vanadium will experience an incredible boom in the beginning decade! – The corona crisis will further accelerate the looming supply shortage!

The „Golden 20s“ become the breakthrough for electric propulsion

The leap from the age of fossil combustion and the most immediate consumption possible to the decentralization of energy production, the corresponding need for on-site storage and, ultimately, a true revolution in mobility has begun. The electric boom will now really take off, and not only in the automotive industry. After more than 100 years of the combustion engine, the next stage of development is finally taking off, and it is called electric mobility. The corona crisis will even accelerate this effect.

Electric mobility is picking up speed!

Many countries are now putting their full weight on the electric mobility map

Many countries have now jumped on the electric mobility bandwagon, especially in order to achieve the climate targets they have set themselves, and have introduced measures that will further accelerate the move away from the combustion engine and at the same time turn to the electric motor.

The following objectives have already been clearly formulated:

- **Kanada**: 30% electric vehicles sold by 2030 - the province of Quebec aims to reduce emissions to zero by 2050
- **USA:** 10 states aim to have reduced emissions to zero by 2050, including the New England states of Connecticut, New Hampshire, Maine, Massachusetts, Rhode Island and Vermont, as well as New York, California and Oregon
- **Mexico:** 30% electric vehicles sold by 2030
- **Brazil:** 30% electric vehicles sold by 2030
- **Great Britain:** End of sales of burners by 2040
- **France:** End of sale of burners by 2040
- **Ireland:** End of sale of burners by 2030
- **Norway:** End of sales of burners by 2035
- **Netherlands:** End of sale of burners by 2035
- **Sweden:** end of sales of internal combustion engines by 2035 - 30% electric vehicles sold by 2030
- **Germany:** End of sale of burners by 2030
- **Italy:** 30% electric vehicles sold by 2030
- **EU:** 30% electric vehicles sold by 2030
- **Israel:** End of sale of burners by 2030
- **India:** End of sales of burners by 2030
- **Japan:** 30% electric vehicles sold by 2030
- **South Korea:** 30% electric vehicles sold by 2030
- **China:** 20% electric vehicles sold by 2025

Car manufacturers plan to build many millions of electric vehicles

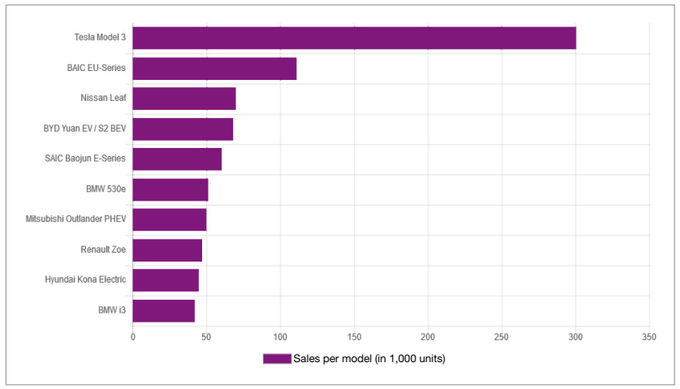
These planned measures put pressure on the car manufacturers, so that they have already reacted and issued the following company targets:

- **BMW**: By 2025, 15 to 25% of all vehicles produced are to be powered purely electrically, which means a total of about 300,000 to 600,000 vehicles;
- **China:** The now more than 170 Chinese car manufacturers want to put at least 4.5 million electric vehicles on the road from this year on;
- **Daimler:** Ten new electric models by 2022. 15 to 25% of all vehicles produced are to be purely electric by 2025, which means a total of about 300,000 to 600,000 vehicles;
- **Ford:** By 2022, at least 13 models are to be powered electrically, which is about 10 to 25% of the complete model range;
- **General Motors:** 20 new electric models by 2023 and complete conversion to electric mobility - period still open;
- **Honda:** In 2030, two thirds of all models are to run on electric motors - about 3.3 million today;
- **Hyundai:** At least 10% electric vehicle share by 2025 - 800,000 vehicles;
- **Peugeot:** 80% conversion to electric drive by 2023;
- **Porsche:** conversion of 90% of the product range to electric drives;
- **Renault/Nissan:** 1.5 million vehicles from 2021;
- **Tesla:** 1 million vehicles from 2020;
- **Toyota:** 50% conversion to electric drive and hybrid by 2030;
- **Volvo:** 100% conversion to electric and hybrid drive by 2022 (500,000 vehicles);
- **VW Group:** By 2025, 20 to 25% of all vehicles produced are to be powered purely electrically, which means a total of about 2 to 3 million vehicles. By 2030, 300 electric models are to be brought onto the market.

Overall, the leading car manufacturers plan to produce more than 20 million electric vehicles per year from 2025 alone. From 2030, 25 million electrically powered vehicles per year can be expected, and from 2040, this figure will rise to 60 million vehicles per year. Daimler alone plans to invest more than 80 billion euros in electromobility in the coming years. Bloomberg expects every second new vehicle to be equipped with an electric drive by 2040 at the latest.

Special factor Corona will accelerate the changeover to electric power

The corona crisis continues to have a firm grip on the global economy - negatively. Car manufacturers in particular are struggling with collapsed supply chains and sales problems. What currently appears to be a total loss, however, is likely to be reversed soon in additional stimulus programs to boost sales. Electric vehicles, which are already subsidised by the state, are likely to receive additional start-up assistance, especially from



Worldwide car sales 2019

(Source: own representation)

countries such as Germany, China and Scandinavia, which may even make them more attractive (economically) than internal combustion engines. In 2021 and 2022 in particular, the model ranges of leading carmakers with regard to electric drives - especially for small and medium-sized cars - should finally appeal to the masses and provide an additional boost to demand.

There is currently no way around the lithium-ion battery

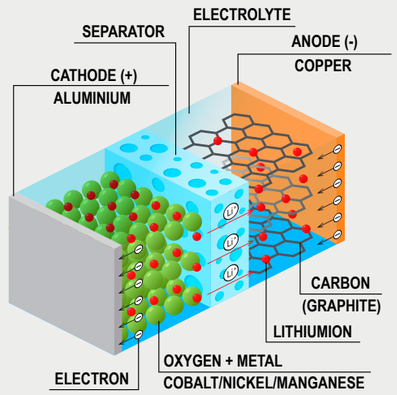
In addition to the motor, the heart of every electric vehicle is the energy storage unit, i.e. a rechargeable battery (in short: battery). In order to be operated economically in the long term, electric vehicles, but also increasingly widespread decentralized storage systems - for example for photovoltaic or wind power plants - require increasingly powerful batteries. The lithium-ion battery has now emerged as the clear favourite. One reason for this is that within a lithium-ion battery the voltage is achieved by exchanging lithium ions. Because of their high energy density, lithium-ion batteries deliver constant performance over the entire discharge period and do not exhibit a so-called memory effect, i.e. a successive loss of capacity over many years of use or frequent partial discharge. The name „lithium-ion battery“ is

Composition and operating principle of a lithium-ion accumulator

Composition of a lithium-ion accumulator

Essentially a lithium-ion accumulator consists of the following components and materials:

- **Positive electrode (cathode):**
  Lithium-Cobalt(III)-oxide
  Lithium-Nickel-Manganese-Cobalt-Oxide
  Oxygen
  Aluminum as conductor material
- **Negative electrode (anode):**
  Graphite or related carbon materials
  Silicon
  Tin dioxide
  Copper as conductor material
- **Electrolyte (solution)**
- **Separator of polymer membrane**



In simple terms a lithium-ion accumulator generates an electromotive force by the movement of lithium-ions. During charging the positive lithium-ions migrate through the electrolyte and the separator from the positive to the negative electrode. In the process the lithium-ions can move freely between the two electrodes through the electrolyte within the accumulator. Unlike the lithium-ions the transition metal and graphite structures of the electrodes are stationary and protected by a separator from a direct contact. The mobility of the lithium-ions is necessary for the compensation of the external current during recharging and discharging so that the electrodes stay largely electrically neutral. The negative electrode is a so-called graphite intercalation compound where lithium exists as cation. During discharge the intercalation compound emits electrons which flow back to the positive electrode via the extern circuit. Simultaneously many Li+ ions migrate from the intercalation compound through the electrolyte also to the positive electrode. At the positive electrode the lithium-ions do not receive the electrons of the external circuit but the present structures of the transition metal compounds. Depending on the type of accumulator these are cobalt, nickel, manganese or iron ions that change their charge.

only the generic term for a whole range of possible chemical structures, such as the lithium-cobalt (dioxide) battery, the lithium-manganese (dioxide) battery, the lithium-iron-phosphate battery and - less commonly used - the lithium-titanate battery and the tin-sulfur-lithium-ion battery.

Decentralized storage facilities will clearly dominate the market in the future

Vanadium redox batteries are better suited for use in the field of renewable energies

The use of lithium, cobalt and nickel in lithium-ion batteries or accumulators of the same name in automotive engineering is one side of the coin. Correspondingly larger energy storage units are increasingly being used to store electricity from alternative energy sources. The virtually explosive expansion of energy generation from wind farms or by means of solar cells is a huge step forward in terms of environmental protection, but it is an enormous challenge for the power grids. This is because renewable energy sources often exhibit extreme fluctuations in power generation. When the wind blows or the sun shines, large quantities of Electricity is „pumped“ into the pipeline network. In the short term, this results in enormous overcapacities of electricity that are not needed at all. According to calculations, up to 20 percent of the annual yield of a wind farm is already lost because the turbines have to be shut down at short notice due to grid overload. This can be remedied by storage facilities that initially absorb the surplus energy and later release it back into the grid when needed, i.e. when there is a threat of undersupply. The vanadium redox accumulator in particular plays a decisive role here.

Vanadium redox battery – Higher operational reliability than the lithium-ion battery, but not suitable for electric vehicles

The vanadium redox accumulator is a so-called flux accumulator, which uses vanadium compounds in aqueous solutions in both electrolytes. Vanadium redox flow cells offer a very high degree of operational safety compared to other storage systems (especially lithium-ion accumulators), as the electrolyte is neither flammable nor explosive due to its high-water content. The currently available commercial batteries are used exclusively for stationary applications, such as in the field of regenerative energy sources for covering peak loads and as load balancing, and also in the field of uninterruptible power supplies. By the end of 2019, more than 80 large vanadium redox flow batteries were in operation worldwide. The largest vanadium redox flow battery in Germany, with a capacity of 2 megawatts and 20 MWh energy storage capacity, was completed in September 2019 in Baden-Württemberg. The largest battery in the world is also to become a vanadium redox flow battery. This is to have a capacity of 200 megawatts in northeast China and be able to store 800 MWh of energy. The vanadium redox accumulator, on the other hand, is not an option for high-performance electric cars, because the volumetric energy density of the accumulator is much too low, i.e. the accumulator takes up too much space.

The largest future application area for vanadium redox batteries: decentralized energy storage

So-called smart grid systems require a large number of short and medium-term energy storage devices that can absorb too much generated energy and later, when there is no wind or sun, release it back into the grid. Vanadium redox batteries can clearly provide a remedy here by temporarily storing the over-generated energy and only releasing it back into the grid when needed. Many manufacturers are already trying out efficient

vanadium redox batteries, which are to be used primarily on a decentralised basis, i.e. directly in the household of a family with a photovoltaic system on the roof or near wind farms.

Asians dominate the battery sector

North America is Tesla country...

Outside Asia, North America in particular has taken the dominant position in lithium-ion battery production. Tesla Motors, in particular, has a big say in this. The company has been operating the so-called „Gigafactory 1“ in Nevada since 2016. Lithium-ion batteries, battery packs, electric motors and drive units for up to 500,000 electric vehicles per year are built there. The „Gigafactory 2“ is a photovoltaic factory located in Buffalo, New York. The „Gigafactory 3“ was completed in record time in China, near Shanghai, and will produce the same number of vehicles as the plant in Nevada.

... the EU is finally making progress...

In Germany, Tesla plans to build another gigafactory near Berlin this year, where it will primarily manufacture SUVs from 2021. However, the furthest away is currently the Swedish company Northvolt, which wants to build a gigafactory in Skellefteå in the north of Sweden, about 700 kilometres from the capital Stockholm. Initially, annual cell production of around eight gigawatt hours (GWh) is to be achieved, followed by 32 GWh from 2023. This would enable around 650,000 cars to be equipped with a 50-kilowatt hour battery. VW recently announced that it would enter the project with 20%. The car manufacturer is investing about 900 million euros in this project. Daimler is already one step ahead, already operates a plant in Saxony and wants to invest 20 billion euros in a battery cell production network by 2030. The partners are mainly from Asia. The EU has made a total of 3.2 billion euros available for the construction of two gigafactories with a capacity of 32 GWh each. Great Britain plans to provide 15 GWh within two years.

... but the music is made in Asia!

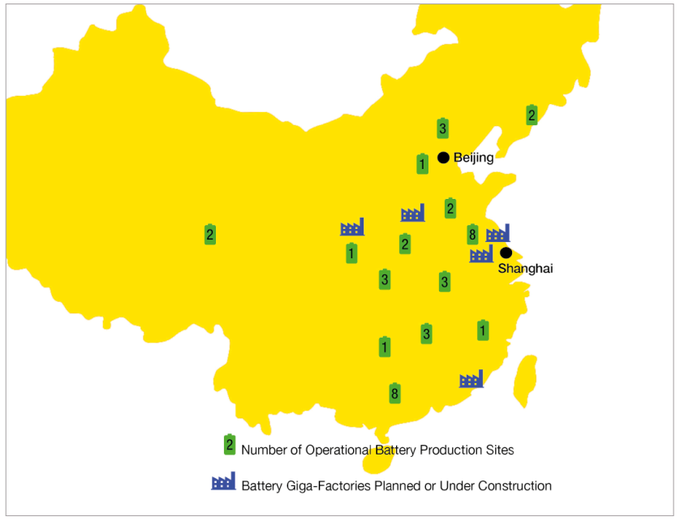
China alone already accounts for about one third of the total demand for lithium-ion batteries. According to expert estimates, this percentage will even increase, as China continues to have by far the largest output of rechargeable batteries. This stimulates the country‘s immense lithium and cobalt consumption. It is still expected that China will continue to experience the strongest annual increase in lithium and cobalt demand of all major market players over the next 5 to 10 years, mainly due to an expected multiplication of the number of rechargeable batteries. Other major suppliers of lithium-ion batteries, including South Korea and Japan, are also expected to ensure robust growth in lithium and cobalt demand. The electronics giants Panasonic, Samsung, LG Chem, BYD, Boston Power, Lishen, CATL, Dynavolt and Great Wall are the most prominent.

Further gigafactories are already being created

Tesla is by far not the only lithium and cobalt consumer planning to start a larger production of lithium-ion batteries. LG Chem has already started production for Chevy in Michigan in October 2015. Foxconn, BYD (the world‘s largest producer of rechargeable batteries, primarily for mobile phones), Lishen, CATL and Boston Power are also working on the construction of their own gigafactories, including for so-called power banks, i.e. decentralized power storage facilities. Outside of Asia and North America there are currently only a few serious players. Worthy of mention are Northvolt from Sweden and Terra E Holding from Germany, each of which is aiming for a production capacity similar to Tesla. In China, 5 gigafactories are currently being built in parallel. In addition, there are already about 40 larger companies producing lithium-ion batteries.

Lithium-ion batteries are the state of the art and market leader

In addition to the raw materials lithium, cobalt, nickel and manganese already mentioned, a lithium-ion battery essentially consists of aluminium, copper, graphite, zinc, tin, silver and steel. The majority of the (lithium-ion) batteries currently on the market are lithium-cobalt (dioxide) batteries, which is why this report focuses primarily on the „battery metals“ lithium, nickel and cobalt.



China already has more than 40 major production facilities for lithium-ion batteries (Source: own representation)

Lithium

The element lithium

Lithium is a light metal from the group of alkali metals. It has the lowest density of all known solid elements. It is only about half as heavy as water, naturally silvery white and relatively soft. Lithium is highly reactive, which is why it basically always occurs in nature as a lithium compound. It tarnishes rapidly in air, which is due to the formation of lithium oxide and lithium nitride. In pure oxygen it burns with a bright red flame at 180°C to form lithium oxide. Lithium reacts very strongly with water to form lithium hydroxide.

Lithium production is either lengthy or expensive

Worldwide lithium production is divided into several different branches, producing the following types of lithium compounds:

1. Lithium carbonate,
2. Lithium hydroxide,
3. Lithium chloride,
4. butyllithium and
5. Lithium metal.

Metallic lithium is usually produced from lithium carbonate in a multi-stage process and is usually traded with a purity of 99.5%. This metallic lithium is used as a catalyst in the chemical and pharmaceutical industry and for the production of aluminium-lithium alloys.
The industry essentially distinguishes three types or qualities of lithium compounds:

1. „Industrial Grade“, with a purity of over 96%, mainly for glass, casting powder and lubricants,
2. „Technical Grade“, with a purity of about 99.5%, mainly for ceramics, lubricants and batteries and

3. „Battery Grade“, with a purity of over 99.5%, mainly for high-end cathode materials in batteries and accumulators.

There are two types of lithium deposits

Lithium is generally obtained from two different sources.

1. So-called „brine“, i.e. (salt) sheet or brine deposits: Mainly in salt lakes, lithium carbonate is obtained from lithium-containing salt solutions by evaporation of the water and addition of sodium carbonate. To obtain metallic lithium, the lithium carbonate is first reacted with hydrochloric acid. This produces carbon dioxide, which escapes as a gas, and dissolved lithium chloride. This solution is concentrated in the vacuum evaporator until the chloride crystallizes.
2. So-called „hard rock spodumene“, i.e. hard rock pegmatite deposits: Here, lithium compounds are not extracted from the salt of lakes, but from spodumene, a lithium-bearing aluminium silicate mineral. Produced using conventional mining technology, the resulting concentrate is often converted to lithium carbonate with a purity of more than 99.5%. The intensive thermal and hydrometallurgical process required for this is considered very costly. Such deposits are currently exploited almost exclusively in Australia, with most of the further processing taking place in Chinese facilities.

New processing methods and lithium sources could revolutionize production

Recently, more and more exploration and development companies have started to focus on novel technologies, which should make it possible to extract lithium from brine deposits within days or even hours, not by natural evaporation, but by means of specially developed processes in appropriate facilities. The processes developed by Tenova Batemán and IBC Advanced Technologies should be mentioned here.

In addition, several lithium development companies have identified a third lithium source. This offers the possibility of extracting lithium from old, depleted oil reservoirs. The lithium is extracted from the wastewater remaining in the reservoirs. It has already been proven several times that this process works. Moreover, this seemingly unusual method of extracting lithium also appears to be economically feasible. As a result, (former) oil fields containing brine are also becoming a focus of the lithium industry.

Larger lithium deposits are concentrated in a few regions

Lithium has a share of about 0.006 % of the earth‘s crust and is thus somewhat less abundant than zinc, copper and tungsten and somewhat more abundant than cobalt, tin and lead. The US Geological Survey estimates that there are approximately 40 million tonnes of lithium reserves recoverable worldwide. About 67% of this in the South American countries Chile and Argentina alone. The largest lithium carbonate production currently takes place in the Salar de Atacama, a salt lake in the northern Chilean province of Antofagasta. However, around 61% of global lithium production comes from Australia, albeit at much higher costs than in South America. In addition, significant lithium deposits are found mainly in North America and China.

Lithium production is currently concentrated mainly in four countries and few companies

Australia, Chile, China and Argentina currently also account for around 96 percent of the world‘s total lithium production, with only a few companies sharing this share among themselves. As a result, the entire lithium market is very non-transparent, which is why the large battery and accumulator manufacturers such as Panasonic have recently been relying primarily on long-term supply contracts with relatively small development companies, some of which will not be producing until 2023. As a result of this supply oligopoly, lithium is currently not traded on the stock exchange either, and the actual trading prices are kept strictly confidential treated. One reason for this, which is always gladly mentioned by the few providers, is that the available and required lithium qualities are too different for a standardized stock exchange trading place.

Main applications are alloys, lubricants and batteries

Its special and versatile properties mentioned above make lithium a sought-after material in a wide range of different applications. So, it should not be surprising that the main field of application of lithium has been constantly changing in the past. Initially used mainly in medicine, the element began its triumphal march as a component of alloys in the 1950s. Its low weight, but also its positive properties in terms of tensile strength, hardness and elasticity, made it an established component, especially in aerospace technology. This picture has changed once again over the past 20 years. In the course of the incipient electrical revolution, it was quickly recognized that it was almost perfectly suited as an anode in batteries due to its low normal potential. Lithium batteries are characterized by a very high energy density and can generate particularly high voltages. However, lithium batteries are not rechargeable. Lithium-ion batteries, on the other hand, have this property, with lithium metal oxides such as lithium cobalt oxide connected as cathode. As a raw material for the production of rechargeable batteries and batteries, however, higher purity levels than 99.5% are required. Lithium hydroxide in „Industrial“ quality is used, among other things, as a raw material for lubricants and coolants. With the higher „Technical“ quality grade, it is also used in battery and accumulator production. Lithium carbonate - crystalline, granulated or in powder form - is used, for example, in the electrolytic production of aluminum, in the ceramic and pharmaceutical industries and in alloying technology. Special purity grades of lithium carbonate in the form of very fine powder (battery grade powder) are suitable as raw material for the production of lithium-ion batteries. The extraction and processing of (especially high-grade) lithium is considered very costly.

The production of lithium-ion batteries requires a large amount of lithium

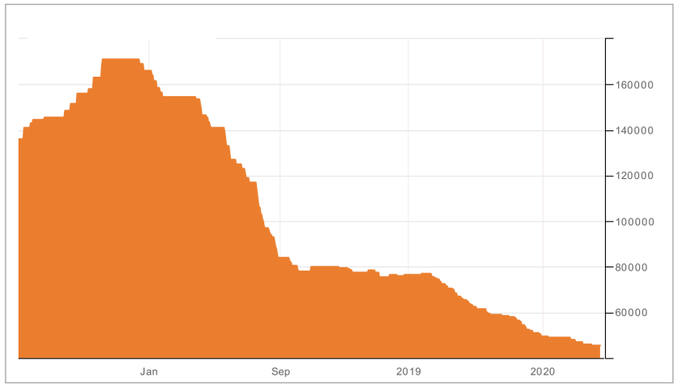
A large amount of lithium is required for the production or operation of lithium-ion batteries. Each smartphone requires between 5 and 7 grams of LCE (lithium carbonate equivalent). In the case of a notebook or tablet, it is already 20 to 45 grams. Power tools such as cordless screwdrivers or electric saws need about 40 to 60 grams for their batteries. A 10 KWh accumulator for household use needs about 23 kilograms of LCE, while the batteries for electric cars need between 40 and 80 kilograms. An energy storage unit with a capacity of 650 MWh needs about 1.5 tons of LCE. With quantities in the billion (smartphone) or high million range (notebook, tools, cars, e-bikes, etc.), several 100,000 tons of LCE demand per year quickly accumulate.

Lithium production will (and must) increase strongly

In 2018, worldwide lithium production amounted to around 175,000 tons of LCE. Projections assume that this figure could rise to about 350,000 tons of LCE by 2021, although no concrete mine expansions or new mines have been determined for the time beyond that, so that lithium could practically run into a huge supply deficit. In addition, recent reports of several postponed mine starts have caused additional uncertainty on the supply side.

The decisive factor is always the price, but this is relatively insignificant for battery production!

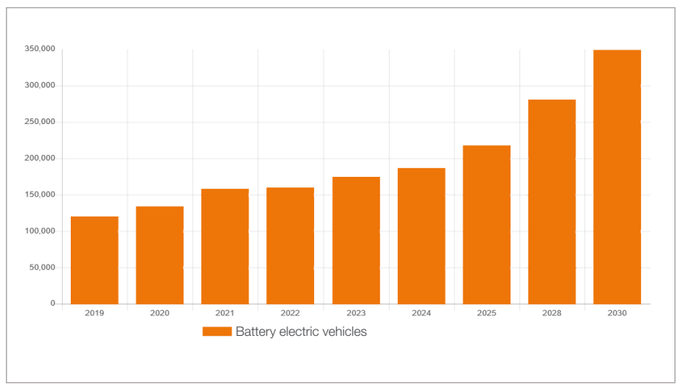
Ultimately, it is the price alone that determines the economic viability of the existing lithium deposits. In mid-2015, the price of lithium



Lithium carbonate price in yuan/tonne
(Source: own representation)

carbonate was around US$ 6,000 per tonne, but since then it has soared to a peak of over US$ 20,500. It has currently settled at just under US$ 10,000. Certainly, only a snapshot. It can be assumed that in the medium to long term it will level off at between US$ 10,000 and US$ 12,000 per tonne of lithium carbonate. Either way, this is a lucrative business for the producers, since the pure production costs for the current projects are only around US$ 1,800 (Chile) to US$ 6,700 (China) per tonne. The situation is similar for lithium hydroxide. **Since lithium makes up a considerable part of a battery in terms of volume, but is only responsible for about 4-5% of the costs of a battery, the lithium price is ultimately relatively insignificant for the production of lithium-ion batteries and should therefore be kept at a level that is economically viable for lithium producers.**

Lithium demand due to Battery-powered vehicles in tons per year
(Source: own representation)



Development companies are working flat out on new projects, ...

While the big names Albemarle, SQM, Livent (formerly FMC) and Tianqi have plans to expand their production, but at the same time are probably not very interested in falling lithium prices, numerous development companies are working on advancing new lithium projects and identifying concrete deposits and resources.

... partly in new lithium hot spots

In addition to the classic lithium regions of South America and Australia, more and more North America and especially Canada, Mexico and (due to the proximity to the future top consumer Tesla Motors) the USA are emerging as a lithium hot spot. Another important lithium hot spot is in northwest Argentina, where Orocobre operates the Olaroz lithium mine. There and in neighboring Chile are also several development companies that have already reported several high-caliber results, such as Millennial Lithium.

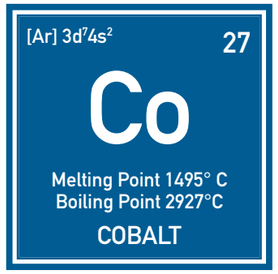
Conclusion: The demand for lithium is growing rapidly!

The demand for lithium appears to be almost gigantic, not only because of the new boom sector of electromobility, but above all because of it! Whereas in the case of lithium in the year 2000 the demand was still at around 65,000 tons of LCE, by 2017 it was already 220,000 tons of LCE per year. Experts expect the demand for LCE to rise to over 900,000 tons per year by 2025.
The main driving force will be demand from the battery and accumulator sector and, in connection with this, the automotive industry. Industry experts expect demand for batteries and accumulators for electric vehicles alone to increase from 120,000 tons of LCE in 2019 to 350,000 tons of LCE in 2030.

Cobalt

The element cobalt

Cobalt is a steel-grey, very tough heavy metal (ferromagnetic transition metal) with a density of 8.89 g/cm3. As a typical metal, it conducts heat and electricity well; its electrical conductivity is 26 percent of that of copper. Its chemical behaviour is similar to that of iron and nickel, and it is resistant to passivation in air; it is only dissolved by oxidising acids.



Cobalt extraction is relatively simple and inexpensive

Cobalt extraction is a well-known, relatively simple process. Cobalt is mainly extracted as a by-product from copper and nickel ores. In this process, a part of the iron sulphides present is first converted into iron oxide by roasting and then slagged with silicon dioxide as iron silicate. This produces the so-called rough stone, which contains nickel, copper and other iron as sulphide or arsenide in addition to cobalt. Further sulphur is removed by further roasting with sodium carbonate and sodium nitrate. During this process, sulphates and arsenates are formed from some of the sulphur and arsenic, which are leached out with water. The corresponding metal oxides remain, which are treated with sulphuric or hydrochloric acid. Only copper does not dissolve, while nickel, cobalt and iron go into solution. With chlorinated lime, cobalt can then be selectively precipitated as cobalt hydroxide and thus separated. This is converted into Co3O4 by heating and then reduced to cobalt with coke or aluminium powder.

Most of the cobalt deposits are under the seabed

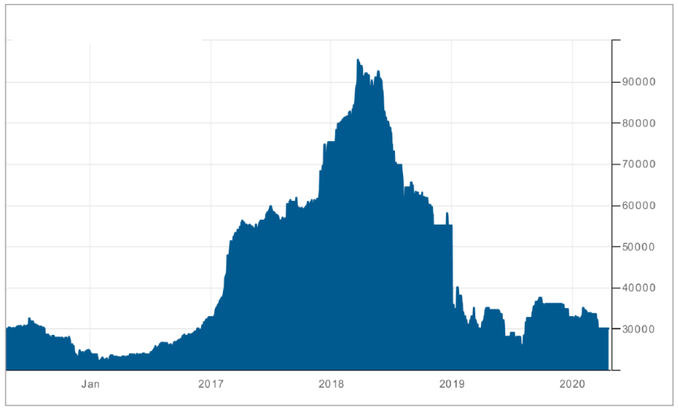
Cobalt is a rare element with a frequency of 0.004 percent in the earth‘s crust. This puts it in thirtieth place in the list of elements ordered by frequency. Cobalt can be found in many minerals but is usually only found in small quantities. The element is always associated with nickel, often also with copper, silver, iron or uranium.
The world‘s known cobalt reserves amount to about 25 million tonnes, with the largest deposits being in the Democratic Republic of Congo, Zambia, Canada, Morocco, Cuba, Russia, Australia, Uganda and the USA. Over 100 million tonnes of cobalt are believed to be found in the earth‘s crust on the floors of the Atlantic, Pacific and Indian Oceans.

So far, cobalt has been mined mainly in politically unstable regions

Most of the annual supply of cobalt comes from mines in the Democratic Republic of Congo. About 55% of the total production comes from the Central African civil war country. Followed by China with 6.3%. A further 5% was recently extracted from Russia, 3.7% from Zambia, 3.4% from Cuba and just under 3% each from the Philippines and Madagascar. These are all countries that are considered to be rather unstable or at least not necessarily inspiring confidence. The remaining production is split between Canada (just under 6%), Australia (4.15%), South Africa (2.45%) and several other countries with even lower production volumes.
Given the current producers, future security of supply appears to be extremely critical, which is why there have recently been increasing attempts to develop new mines and increase production accordingly, especially in Canada, Australia and the USA.

Main applications are paints, alloys, medicine, magnets and batteries

Historically, cobalt has been used in the form of oxides, sulphates, hydroxides or carbonates for heat-resistant paints and pigments. Probably the best-known decorative application is blue cobalt glass. Today, cobalt is mainly used as an alloy component to increase the high-temperature strength of alloyed and high-alloy steels, especially high-speed steel and superalloys, as a binder phase in hard metals and diamond tools, as a component of magnetic alloys, as a drier for paints and varnishes, as a catalyst for desulphurisation and hydrogenation, as hydroxide or lithium cobalt dioxide (LiCoO2) in batteries, in corrosion- or wear-resistant alloys and as a trace element for medicine and agriculture. Cobalt is also used in the production of magnetic data carriers such as audio and video cassettes, where it improves the magnetic properties by doping. Since the 1990s, cobalt has been used as anode material in the anode of lithium-ion batteries.



Cobalt price development of the last 5 years (US$/tonne)
Source: own representation)

Electric vehicles in particular require a lot of cobalt – but not only

Similar to lithium, cobalt also has a similar relationship to the quantities consumed in corresponding batteries. Thus, depending on the model, between 5 and 10 grams of cobalt flow into a single smartphone. In the case of a notebook or tablet, it is already 30 to 100 grams. Power tools need about 50 grams for their batteries. A 10 KWh storage unit for domestic use (such as Tesla‘s Powerwall) requires about 7 kilograms of cobalt, while batteries for hybrid vehicles require about 4 kilograms and those for purely electric cars require 10 kilograms of cobalt. Tesla‘s Model S even comes to 22.5 kilograms. A passenger plane devours about 4,000 kilograms of cobalt. With quantities in the billion (smartphones) or high million range (notebooks, tools, cars, e-bikes, etc.), the demand for cobalt can quickly reach several 100,000 tons per year.

The supply of cobalt must be increased

An increase in supply is urgently needed, as the lithium-ion battery sector will demand ever larger quantities of cobalt in the coming years. While annual production in 2016 was still around 123,000 tonnes, leading experts believe that it will be difficult to expand this production at present. Nevertheless, it is a fact that Congo will remain the absolute world market leader for the time being and even increase its market share to as much as 70% by 2021. The two world‘s largest mines, Kamoto and Kolwezi, will play a major role in this, which alone produce (or will produce) around 50,000 tonnes of cobalt per year. Outside the Congo, several companies are working on expanding their existing mines (including Glencore, Norilsk, Umicore, Sumitomo and Vale), but these mine expansions are likely to be only a drop in the ocean due to the expected increase in demand.

Cobalt price explodes(s)!

Many market participants have already recognized that cobalt production cannot be expanded so easily from now to immediately, which is why the price of cobalt has exploded from around US$5,000 to almost US$100,000 per metric ton since mid-2016 and is currently at around US$30,000 per ton. A similar increase can be expected once the leading car manufacturers drastically expand their model ranges, which is announced for 2021/2022.

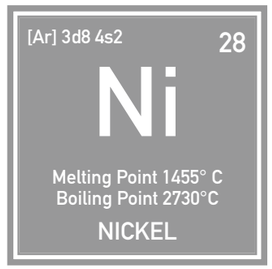
Conclusion: Cobalt will experience an immense surge in demand and a supply deficit in the coming years!

The demand for cobalt is expected to explode in the coming years! Whereas in 2008 it was still around 60,000 tonnes, by 2017 demand was already 125,000 tonnes per year. By 2025, experts expect the demand for cobalt to rise to over 300,000 tonnes per year.
The driving factor will be demand from the battery and accumulator sector. Due to the current situation, in which demand is rising sharply while at the same time only a few existing mines have the opportunity to increase their production, there are signs of a considerable supply shortfall for cobalt in the coming years. This is likely to gradually increase and exceed 10,000 tonnes per year as early as 2021.

Nickel

The element nickel

Nickel is a metallic, silvery shining transition metal. It is medium hard, malleable and can be easily polished. Like cobalt, nickel is ferromagnetic and is also highly resistant to air, water, hydrochloric acid and alkalis at room temperature, which makes it ideal for use in lithium-ion batteries.



Extraction

Most of the nickel is extracted from iron ores containing nickel and copper. Copper-nickel fines, which consist of about 80% copper and nickel and about 20% sulphur, are produced by a multilayer process. To obtain the raw nickel, the nickel must be separated from the copper. To obtain pure nickel, the raw nickel is refined electrolytically. The purity of electrolytic nickel is around 99.9 %.

Reserves and extraction

Nickel occurs in the earth‘s crust at a content of about 0.008%, i.e. with about twice the amount of cobalt and somewhat more frequently than lithium. Solid, i.e. nickel is rarely found in its elementary form. Until 2019, only about 50 sites for solid nickel were known worldwide. The most important deposits are in Canada, New Caledonia, Russia, Australia and Cuba.
The majority of nickel production comes from sulphide ores. In addition, lateritic nickel ores are also mined as raw materials for nickel production. Due to the exploitation of the classic sulphide deposits, extraction is increasingly shifting to lateritic nickel ores, which, however, means more expensive extraction.

Main application: steels and nickel alloys

Most of the annual nickel production (about 85%) is used for the production of stainless steels and nickel alloys. Nickel is one of the most important alloying metals, mainly used for steel refinement. It makes steel resistant to corrosion and increases its hardness, toughness and ductility. Steels high-alloyed with nickel are used in particularly corrosive environments. About 20% of the extracted

nickel is used to produce nickel alloys such as constantan, nickel silver and monel.

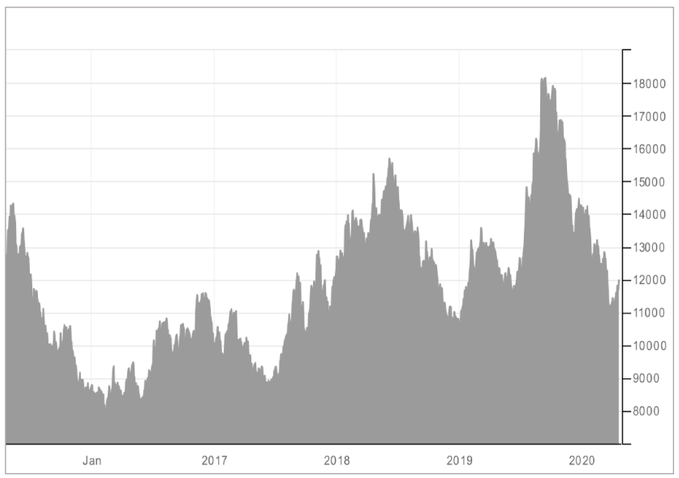
Other uses

Pure nickel metal is used in finely divided form as a catalyst in the hydrogenation of unsaturated fatty acids. Due to its chemical resistance, nickel is used for apparatus in chemical laboratories and the chemical industry, such as nickel crucibles for digestions. Nickel metal is used to produce nickel alloys, for example for coins. Nickel-base superalloys are alloys especially for use at high temperatures and under corrosive media. They are used, for example, in aircraft turbines and gas turbines of power plants.

Nickel for accumulators and batteries

For batteries and accumulators, so-called class 1 nickel, with a purity of at least 99.98% is required. Only about 45% of the total nickel production of about 2 million per year is suitable for the production of class 1 nickel. More than half of this is needed for alloys and other applications. Less valuable Class 2 nickel goes exclusively into steel production.

Nickel price development (US$/tonne) over the last 5 years
(Source: own representation)



Development from cobalt- to nickel-dominated batteries

Due to the fact that the development of lithium-ion batteries is moving more and more from cobalt- to nickel-dominated cathode materials, an already existing supply deficit is expected to widen in the coming years. For the nickel market as a whole, this has already been the case since 2016, and for Class 1 nickel such a supply deficit is expected from 2023 at the latest, with a strong upward trend. For 2030 it is expected that 825,000 tonnes of nickel will be missing. In 2040 the supply deficit is expected to increase to 2 million tonnes per year - noting that this figure already includes new nickel projects.

Further developments also concern the lithium iron phosphate accumulator, in which the cobalt content is almost completely eliminated in favor of iron phosphate. In addition, Toyota plans to present the first solid-state battery ready for series production at the 2021 Summer Olympics in Tokyo, which uses porous carbon as the cathode. However, the latter application is still in its infancy.

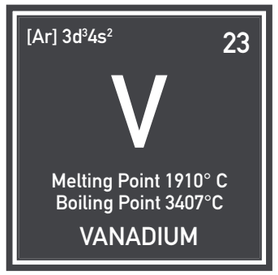
Conclusion: Supply shortfall inevitable, first signs already noticeable

A foretaste of what is yet to come was provided by LME stocks, which fell from around 400,000 to around 60,000 tonnes between the beginning of 2018 and the end of 2019. At the same time, the nickel price rose by about 60% to around US$18,000 per metric ton during this period but is still far from its peak of US$50,000. All in all, it looks as if nickel and its producers and developers will be the next big winners of the electro(mobility) boom! Especially because Indonesia still has a strict export ban on nickel.

Vanadium

The element vanadium

Vanadium is a steel-grey, bluish shimmering transition metal which is very soft in its pure state. Although pure vanadium is relatively soft, it becomes harder when mixed with other elements and then has a high mechanical strength. Most of the vanadium is therefore used as so-called ferrovanadium in steel production. The addition of vanadium in chromium-vanadium steels leads to an increase in toughness and thus to increased resistance of the steel.



The extraction is simple

Although the extraction of vanadium involves many intermediate steps, it has been tried and tested over decades and is therefore now quite simple. In order to obtain pure vanadium, expensive calcium or aluminium is used as a reducing agent, as otherwise a high degree of purity cannot be achieved. While pure vanadium is obtained directly with calcium, a vanadium-aluminium alloy is first formed with aluminium, from which pure vanadium is obtained under vacuum. However, most of the vanadium is not processed as pure metal, but in the form of the iron-vanadium alloy ferrovanadium, which contains at least 50% vanadium. To produce ferrovanadium, the slag containing vanadium and iron is reduced to ferrovanadium with ferrosilicon and lime. This alloy is sufficient for most technical applications.

Reserves and extraction

Vanadium is a relatively common element, with a similar element frequency to chlorine and chromium. Its share of the continental crust is about 120 parts per million (ppm). The element occurs predominantly bound in various minerals. Despite the abundance of vanadium, deposits with high concentrations of the element are rare, many vanadium minerals are not abundant. Most of the vanadium is found in traces of other minerals, especially iron ores. The main producing countries are South Africa, China and Russia.

Main field of application: (steel) alloys

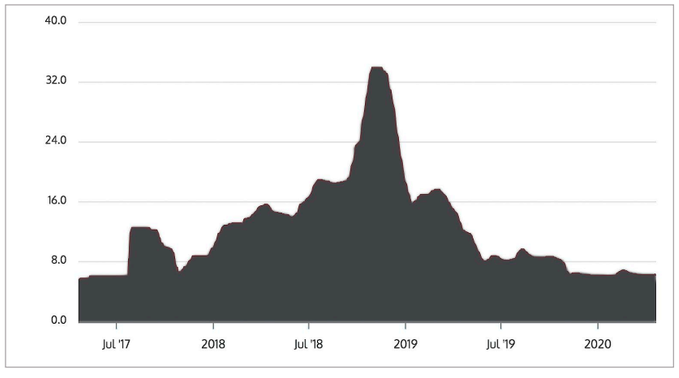
91% of the vanadium mined in 2017 was used in a variety of alloys, mostly with the metals iron, titanium, nickel, chrome, aluminium or manganese. This means that vanadium has a particularly high use in buildings, bridges, tunnels and automotive parts, as well as in the aerospace industry. It is also frequently used to line pipelines and to reinforce power lines and high-voltage pylons. Vanadium is also used for many infrastructural applications, such as chemical plants, oil refineries, offshore platforms, railway lines, railway cars, freight containers, construction machinery and ships.

Use in the field of renewable energies as load balancing for wind farms and photovoltaic systems

More recently, there has been a growing use in the field of renewable energies, for covering peak loads and as load balancing, often in close proximity to wind farms or photovoltaic systems. By the end of 2018, more than 60 large vanadium redox flow accumulators were in operation worldwide. The largest such battery is located in Japan and has a capacity of up to 15 MW. Some vanadium redox flow systems are also in use in Germany. The largest vanadium flow battery in Germany, a flow cell system with 660 cubic meters

tank capacity and initially 1 MW capacity and 10 MWh energy storage capacity, was commissioned in 2017. The largest battery in the world is also to become a vanadium redox flow cell battery. It should be able to provide 200 MW and store 800 MWh of energy. It will be installed in northeast China on the peninsula near Dalian and will consist of ten units of 20 MW and 80 MWh each.

The Irish company redT was awarded the contract for a similarly large project to be realised in Germany in July 2018. The company signed an exclusivity agreement with Energy System Management GmbH (ESM), a German energy development company belonging to WWF solar, for the supply of two 40 MWh grid-connected energy storage projects in Germany, with a further 690 MWh of projects planned for the future.



Vanadium price development (US$/tonne) over the last 3 years (Source: own representation)

Vanadium price had increased sixfold in the meantime

The number of plants commissioned and their size have multiplied in recent years, mainly due to the fact that ways must finally be found to make fluctuating power generators such as wind turbines or photovoltaic plants capable of providing half-basic load capacity by means of battery storage technology. From the beginning of 2016 to the end of 2018, the price of vanadium has increased six-fold to over US$ 30 per pound and is currently around US$ 7.

Although experts predict that global steel production will grow by only 2% per annum from 2017-2025, the increasing intensity of vanadium consumption combined with specific growth drivers for the end consumer will allow vanadium demand to continue to grow. Incidentally, the growth in global steel production rates has caused 87% of the increase in vanadium consumption from 2001 to 2018.

Conclusion: The price of vanadium will continue to rise, since the current production is needed for steel production alone

Vanadium therefore has one advantage: the current vanadium production is almost entirely used for the production of steel alloys. The expected demand from the storage technology sector cannot be met at the moment. The expected exponential development of demand from this new area of application will therefore immediately lead to a shortage in the supply of vanadium, which can already be seen from the constantly rising vanadium price. On the other hand, only few or no new vanadium mines can be put into operation at present. If so, vanadium can only be increasingly extracted from old tailings piles, for example from uranium mines, within the next 2 to 3 years. There will clearly be a need for new primary mined vanadium capacity in the future, which historically has always been a major challenge and cannot be achieved within 2 or 3 years. Vanadium will thus become a boom element that has been relatively unnoticed to date, because one thing is certain: decentralized storage of excess energy will become THE decisive issue in the future when it comes to the question of where base loadable energy for „filling up“ millions of electric vehicles will come from.

Conclusio: The electric revolution is just starting to take off and will lead to a long-lasting boom in lithium, cobalt, nickel and vanadium! – The corona crisis will bring forward the time of supply shortage by several years!

The demand for lithium, cobalt, nickel and vanadium will in future be determined by three different parties:

1. From the Asian electronics companies, which are mainly focused on the mass production of powerful lithium-ion batteries and accumulators for everyday use, in multimedia devices, etc.
2. From the automobile manufacturers and (initially) primarily from Tesla Motors, but also from almost all established automobile manufacturers worldwide.
3. From the manufacturers of decentralized energy storage systems, which are used wherever electricity is generated by photovoltaic or wind power plants and is to be used later by means of storage.

This constellation will cause the demand for lithium, cobalt, nickel and vanadium to increase many times over in the coming years, with decentralized storage facilities in particular generating the greatest increase in demand and even overshadowing the other two areas.

A summary of the above is therefore not too difficult, a look at the most important estimates is basically sufficient. The number of electric vehicles will multiply in the coming years: From 1.2 million electric cars in 2017 to at least 20 million electric vehicles per year from 2025. 25 million electrically powered vehicles per year from 2030, and even 60 million vehicles per year from 2040. In parallel, the demand for lithium-ion batteries will rise from 21 GWh in 2016 to 1,550 GWh in 2028! By 2021 alone, capacity demand will rise to an estimated 270 GWh, driven by the expansion plans of the upcoming storage production giants LG Chem, Samsung SDI, CATL, Lishen, Tesla and others.

Procurement from dubious sources and China‘s market power in reprocessing

Lithium, cobalt and also graphite belong to the so-called „red group“ in the EU and thus also in Germany, i.e. materials with a very high supply risk. Most of them come from countries with dubious mining methods or high political risk. In addition to the actual procurement risk, issues such as lack of environmental compatibility or lack of social acceptance also play a role here. Another crucial point is that China currently controls a large part of the cobalt and lithium processing. A circumstance that will lead to either more projects outside China‘s sphere of influence or higher prices in the future. Recycling does not play any role at the moment and therefore cannot be seen as a source of needed materials.

The imminent supply shortfall will reward especially the more advanced developers

Overall, there are signs of a supply shortfall in the near future for both the lithium, cobalt, nickel and vanadium markets, as the increase in demand is likely to exceed the increase in supply (by far) in the future. However, due to the ongoing corona crisis and the associated expectation of additional purchase incentives for electric vehicles, it is now assumed that the supply shortage will be brought forward from around 2025/26 to 2023. This is strongly indicated by recent reports of projects that have come to a standstill, where production has been cut back and expansion plans delayed.

Since there is no end in sight to the increase in demand beyond 2025 and, moreover, there are no major production projects worth mentioning in the pipeline, this situation is likely to continue for the foreseeable future.

The development companies in particular, which have already advanced their respective projects to a high degree, should offer the greatest share price opportunities in the coming months, also with regard to a possible consolidation, i.e. through takeover scenarios.

Some of these committed development companies, but also prospective producers, are introduced to you in the following.

Interview with Tobias Tretter –
Manager of the Structured Solutions Next Generation Resources Fund

Tobias Tretter has been active in the mining sector since 2000. During his activity at Dr. Jens Ehrhard Wealth Management he supported the management of the DJE Gold & Resources Fund, which was awarded as the best performing commodity fund of 2003. From 2005 to 2008 he co-managed the Stabilitas Funds, which have been awarded as the "best performing Gold Fund" in 2006. Since 2009, Mr. Tretter acts as CEO and responsible person for the Index- and Portfolio-Managements of Commodity Capital AG. He is managing the Commodity Capital Global Mining Fund (ISIN: LU0459291166), the Structured Solutions Next Generation Resources Fund (ISIN: LU0470205575) and the Managed Accounts of Commodity Capital. Tobias Tretter holds a business diploma degree from the University of Bayreuth.

Mr. Tretter, the prices of many battery metals, especially lithium, have fallen in recent months, in some cases noticeably. So, when will the big breakthrough for battery metals and corresponding equities come and what impact will the corona crisis have on battery metals?

The Corona crisis is causing significant problems and uncertainty for all industries worldwide and I believe we are still far from understanding the massive medium- and long-term impact of Covid-19. As long as there is no vaccination against Covid-19, it will be impossible to return to „normality“ and we do not expect the approval of a vaccination for the general public before 2021. This means that social distancing and quarantine measures will accompany us for a very long time. And the implications for electric mobility will also be considerable.

Basically, the corona crisis has not changed the long-term trend towards electromobility, and I remain firmly convinced that we have so far only seen the beginning of a long-term cycle. The switch to electromobility has so far been primarily a topic in the media, to a small extent already a practice in Asia, but otherwise we are still a long way from penetrating the mobility sector. But electric mobility will continue to advance inexorably, and the current figures speak for themselves. While sales figures for cars with combustion engines have slumped massively in recent months due to Covid-19, registration figures for electric cars have actually increased! In March there was a new registration record for purely electric vehicles in Germany of 10.329 new cars. In China, registrations for Tesla alone rose by 450% on a monthly basis and the Tesla share has so far survived the stock market crash largely unscathed and is still trading 85% higher than at the beginning of the year. The story and especially the success of the electric car is therefore anything but over and the current crisis could even accelerate the switch to electric mobility once again. A new „scrapping premium“ is anything but unimaginable and it would not be surprising if politicians were to promote electric cars first and foremost.

We are on the verge of significant milestones in electromobility, with and without corona. In my opinion, the big breakthrough will come with the sale of the first electric cars from the major manufacturers. Up to now, private individuals have only been able to buy relatively expensive cars, such as the Tesla or BMW I8, and the cheaper models are still significantly more expensive than equivalent petrol or diesel cars. The broad mass market is still completely untouched. This will change with the upcoming model offensive of the renowned manufacturers and the infrastructure for electric cars is also improving day by day. We expect a „hello and wake-up“ effect in 2021 and 2022 in particular, when the renowned manufacturers come onto the market with new electric models. This should also be the time when the market realizes that we are moving unabatedly towards an extreme shortage of battery metals and will probably not be able to close it. If currently about 180,000 tons of lithium are produced, at least 800,000 to 1 million tons of lithium will be needed by 2025. China alone will need more than 500,000 tons of lithium per year (!) to reach the target of 7 million electric cars sold. An increase in production, which from today‘s point of view is not only unlikely but seems completely impossible.

Research into new battery concepts - keywords being nickel-manganese-cobalt-oxide battery and solid-state battery - is in full swing. Which battery metals will play the most important role in the future?

This is one of the crucial questions. When we take part in the international lithium conferences, the discussions do not revolve around the extent to which electromobility will prevail or whether the price of lithium will rise or fall in the coming months, but primarily around the extent to which it can be ensured that there will be enough lithium at all for the switch to electromobility and the coming generations of lithium batteries. There are constant innovations in this area and there will be enormous changes in the coming years, with corresponding improvements in batteries. First and foremost, I don‘t mean that batteries will become cheaper and cheaper, but in particular that batteries will become more durable, or that they will be able to store more energy in a denser space with less weight. Proverb the range of cars will be significantly extended in the coming years and by reducing the weight of the battery, energy consumption will of course also be reduced accordingly. This will lead to a development away from NMC (111) towards NMC (532) and finally NMC (811) in the coming years. NMC stands for nickel, magnesium and cobalt and the number corresponds to their ratio. In the coming years there will therefore be a gradual increase in the use of nickel at the expense of magnesium and cobalt. By contrast, the proportion of lithium will remain constant. The lithium content of the NCA (nickel-cobalt-aluminum) batteries preferred by Panasonic and Tesla will also remain the same in the next generation, only the cobalt content will be further reduced in favor of nickel. And last but not least, the Holy Grail, the commercial use of the solid-state battery, is of course coming ever closer. All battery manufacturers are working flat out on the solid-state battery, which does without the liquid electrolytes for transporting the voltage. In addition to the advantage of a higher energy density, solid state batteries can also be charged faster. They are smaller, lighter, safer and offer greater range. However, research is still required, especially on the service life and performance of the batteries in practice outside the laboratory at low temperatures, for example. Nobody doubts that the solid-state battery will revolutionize the entire electromobility and the only question is how long it will take until the first solid state battery is ready for series production.

For us as investors, the developments in batteries mean first and foremost that there is no way around lithium. There is no alternative to lithium and there will be no practical alternative for the next 5 years. With regard to the other battery metals, we currently see a supply shortfall for cobalt, which should drive prices up again in the medium term. However, cobalt will no longer play a role in the production of batteries with the solid-state battery at the latest. Nickel, on the other hand, is one of the most critical metals for us, and in addition to lithium, we see an enormous supply shortfall for nickel in particular, which cannot be eliminated in the short or medium term.

In recent months, it has been observed that a veritable lobby has formed against the electric car. It is repeatedly argued that the mining of the battery metals required for this purpose either pollutes the environment (for example, through excessive water consumption in lithium production) or uses inhumane mining methods - for example, child labor in cobalt production in Congo. What is your opinion on this?

As so often in life, you have to look at things in a differentiated way and there is no black and white. Let‘s talk about cobalt first. Cobalt is produced primarily as a by-product of copper production and the copper projects in Congo in particular are rich in cobalt. And while there are extreme environmental regulations in North America or Australia, there are no regulations in Africa and especially in the Democratic Republic of Congo (DRC). Child labour, lack of safety standards or the use of mercury are strictly forbidden in most countries, but still standard here. So, it is not the extraction of cobalt per se that is reprehensible, but the way and the existing lax controls and regulations, if there are any at all. Ultimately, it is up to us as investors or the buyers. Do we want cobalt from the Congo, or do we pay 20% more and obtain the cobalt from a safe mine, for example from Idaho

(Source: alexander schimmeck, unsplash)

in America? Do we investors want the last percent margin, or do we settle for less margin, but we know that our money is used to mine raw materials sustainably. For our part, we do not invest in countries like DRC, China or Mongolia. Africa is not a No Go for us, but it is extremely difficult to continuously monitor working conditions, etc., so that we refrain from investing in Africa as far as possible. At the moment there is no company in our portfolio which is mainly active in Africa.

When we talk about lithium, we must first look at the alternatives. And these are first of all the conventional combustion engine and secondly the fuel cell. The conventional combustion engine is extremely efficient, and every car driver knows the advantages and disadvantages of producing and burning gasoline and diesel. Now we cannot turn back the wheel of time and politicians want to get away from fossil fuels and the excessive emission of CO2. The fuel cell is certainly an alternative, but the efficiency of the fuel cell is much lower than that of lithium batteries. Especially the discrepancy between the efficiency theoretically achievable in the laboratory and that in practice is striking. For example, a lot of energy is lost when the car‘s chemical reaction is activated in cold condition. When the car is warm, on the other hand, the energy of the water vapor produced decreases. In addition, there are also problems with storage and energy losses when refuelling. Ultimately, research here is certainly not at an end, but there are indications that the fuel cell can be used in buses or trucks. In our discussions with the major battery manufacturers there were also no fears whatsoever that the electric car would not become established. China has provided very clear fronts in this respect. In the Middle Kingdom, the electric drive is the only alternative for the future. So if we now come to the conclusion that there is no way around lithium batteries and that lithium is irreplaceable as a raw material in the future, the question arises as to how we can extract lithium in the most sustainable way. And there are two methods for this. On the one hand from dried up salt lakes and on the other hand from solid rock, the so-called Hard Rock Projects. Hard rock projects are currently being produced primarily in Australia. Lithium is mined and processed there and then sent to China as a concentrate. There it is processed in refineries to lithium carbonates or hydroxide. In itself a sustainable process, although it would of course be desirable if the lithium could be processed directly in Australia, as the final processing is very energy-intensive and most of the electricity in China is still generated from coal.

Let us come to the second mining process, extraction from Brines, i.e. dried up salt lakes, mainly in South America. Here, water containing salt and lithium is extracted from a depth of several hundred metres and then evaporated in huge basins before it is finally processed further. This process is often portrayed as harmful to the environment. However, a number of factors must be taken into account. Firstly, long-term studies are needed to ensure that the extraction of water is environmentally sound. The salt lakes are also far from being as „dry“ as one might expect. The projects depend on sufficient water flowing in from the surrounding mountains and that the water reservoirs are not reduced. You have to imagine the whole thing like a cave system, in which the water flows, but it also prevents the whole structure from collapsing. Since the lithium projects are designed for several decades of production, it is crucial to control the water flow and ensure that the water table does not sink. So, the environment would be particularly affected if too much is produced. This was also one of the reasons why we were certain that the gigantic expansion of the Atacama Salt Lake, which hovered over the sector like a sword of Damocles at the beginning of last year, was not, or is not, feasible either in terms of size or in the time frame envisaged. The production of raw materials is always an intervention in nature, but these interventions can be managed in a correspondingly sustainable manner and from our project visits I can report that this is also the case in the vast majority of cases. And black sheep, which circumvent laws or criminal machinations unfortunately exist in all sectors.

Some of the most important deposits of battery metals are located in regions that have not exactly shone with political certainty recently (keyword Argentina). What role could geopolitical uncertainties play in the future supply of battery metals?

I think the political risks are not even remotely reflected in the current lithium price and they are causing extreme headaches not only for us investors but for the industry as a whole. Unfortunately, the problem in the mining sector is that you can‘t simply dismantle projects like a factory and rebuild them somewhere else. Additionally, it takes 10 years from the discovery of a deposit to the final production and then another 3 years or so to earn the initial investment (break-even). This means that political stability is one of the most important factors for investment in mining projects and this is where the problem currently lies. A large part of the Brine production comes from the salt lakes in Chile and Argentina. Argentina is certainly not famous for long term stability and the election of populist Alberto Fernandez as new president last year certainly does not have a positive impact on long term investment in mining in Argentina. Most companies are likely to find it very difficult in the future to find investors for projects in Argentina. Chile is generally known for long-term stability, but there are dark clouds here too, making it difficult for investors to invest money in new projects. Although the country is very investment-friendly, every company needs licenses and approvals from the state-owned company Corfo to export lithium. And just that company announced last year that 25% of the theoretical (!) production of SQM will be confiscated and sold independently to interested parties. Corfo will thus confiscate more than 10% of the total global production from one of the top producers. For us this is certainly not an action we would have expected from a country that advertises with investment friendliness, but rather reminds us of the action of socialist regimes. All in all, we currently see an increase in political risks, especially in South America.

Hard Rock production takes place primarily in Australia, one of the most stable countries in the world. However, the companies currently still have to sell the lithium concentrate to China and are therefore very dependent on a partner who is not necessarily known for transparency and fair conduct. Even without political risks, we see little chance of

expanding production to up to 1 million tonnes of lithium by 2025. With the increased risks and in particular the increased uncertainty regarding long-term stability in South America, we consider this goal to be unattainable. In addition, the Covid-19 pandemic has made it clear to all companies. Supply chains around the globe and pure „just in time“ production are a dangerous game with fire. Even before Corona, we could observe a tendency that European car manufacturers in particular are anxious to reduce their enormous dependence on China and Asia for the supply of lithium and ultimately lithium batteries. These tendencies are likely to become even more pronounced after the Corona crisis and we expect that the car manufacturers, but also the battery manufacturers, will increasingly consider to what extent and by what means a secure supply can be guaranteed in the coming years.

In addition to the points already mentioned, what do you pay particular attention to in your assessment of a battery metal mining company or a corresponding resource?

In addition to many geological and technical aspects, the quality and track record of the management is crucial for us, in addition to the political stability already mentioned. Among all the problems facing the sector, one is the most serious! And that is the lack of experts. We fly to all our core investments and look at the projects directly on site to convince ourselves that the project is operated in a sustainable way, that the local population is involved in the project and that the management is able to take the necessary steps not only to explore the project or bring it into production, but also to raise the necessary capital, to maintain the relationship with the local population and to obtain the environmental permits quickly and successfully.

You are manager of the Structured Solutions Next Generation Resources fund. Which battery metals or equity securities does this fund cover?

We are trying to invest in all battery metals, but we still follow a stock picking approach. This sometimes makes it difficult to find the right companies although we are convinced of the potential of a commodity. The focus of our investments is on lithium companies, as we believe that they will be the biggest winners in the transition to electromobility. In addition to lithium, the portfolio also includes a cobalt company and several base metal companies. We see the greatest potential in nickel and copper, which was over-sold last year due to the trade dispute between the US and China and for which the fundamental outlook remains excellent. Enormous quantities of copper are needed to expand the power supply and build the corresponding infrastructure for electromobility, and many of the old mines are nearing their end. By contrast, new projects are in short supply and we expect a deficit here in the coming years.

Finally, let‘s take a look at the opposite side of the supply chain, i.e. the battery manufacturers and carmakers. In your opinion, who is currently ahead in this area and why don‘t the big names actually enter the mining sector themselves?

Who will ultimately be ahead is certainly difficult to answer, but for our investments it is also not really decisive who will ultimately prevail. Similar to the sellers of shovels during the gold rush. It didn‘t really matter who finds the gold as long as everyone wanted shovels to dig. We believe in the success of electric mobility. Who will emerge as the winner in the end will be seen, but I wouldn‘t be surprised if a completely new player like Google or Amazon emerged as the winner in the end. The technical requirements for an electric car are certainly many times lower than for a car with a combustion engine, and in the end, autonomous driving and networking will probably be the deciding factors. But as I said, it is impossible to say how such a young sector will develop in the coming years.

Why the large producers are so reluctant to invest in mining companies is easier to explain. The companies simply lack the know-how and in recent decades they have tried to outsource all „non-core competencies“ and reduce the value chain as much as possible. To go back 5 steps and take care of the production of the raw materials themselves is of course difficult. However, even before the Corona Pandemic, we saw the first signs that the car manufacturers were beginning to realize how serious the supply shortage of lithium would become. Toyota and Tesla already have joint ventures with mining companies and also VW and BMW signed an agreement for the supply of lithium with Gangfeng. It is particularly interesting in this context that Gangfeng has signed long-term supply contracts with Tesla, BMW, LG Chem and VW, but there was no explanation as to how far Gangfeng will be able to produce the required quantities of lithium itself. We are extremely curious to what extent Gangfeng will be able to meet the supply obligations with own projects and we see Gangfeng as a company which will be forced to take over new producers with a premium in the coming years.

The impact of Covid-19 is still extremely difficult to assess at this stage, but we see only a short-term dent, if any, in the sale of new electric cars. The trend towards electromobility will certainly be unstoppable, so we continue to assume that demand for lithium will quadruple or quintuple by 2025. The effects on the production side, however, could be considerable. Despite the current crisis, the price of lithium in China has risen in recent months for the first time since May 2018, and we currently see the main risk that existing expansion plans will be further postponed or that new projects will not be financed. This is likely to have considerable medium-term effects on the lithium price and we expect significant increases in lithium prices and share prices of lithium producers in the coming months and years.

Millennial Lithium focuses on sustainability at its Pastos Grandes project (Source: Millennial Lithium)

Canada Nickel

One of the world‘s largest nickel deposits with mega development potential

Mark Selby, CEO

Canada Nickel is a Canadian mining development company specializing in the base and battery metal nickel. The company was only listed at the end of February 2020 after a successful private placement of CA$6.8 million. Canada Nickel owns 100% of the Crawford nickel-cobalt sulphide project, which hosts one of the world‘s largest nickel deposits in an established mining camp and is adjacent to the existing infrastructure north of Timmins, Ontario, Canada.

Crawford flagship project - location and infrastructure

The Crawford nickel-cobalt project, covering approximately 2,300 hectares, is located approximately 35 kilometres north of the mining town of Timmins, within the Timmins Mining Camp of the same name, which has a history of a hundred years as a mining district. Highway 655 runs right through the project site, as does a 550kV power line. The Lower Sutrgeon Power Station is only three kilometers away. Glencore‘s Kidd Creek mine and mill, including train connection, are only about 10 kilometers away, while the Hoyle smelter/refinery is about 40 kilometers by road and 25 kilometers by rail from Kidd Creek. Timmins itself has sufficient mining experienced personnel.

Flagship Crawford Project – Limited Historic Exploration Activities

The Crawford project has only recently moved into the focus of modern exploration. In the 1960s, Inco drilled several holes, all of which indicated larger nickel anomalies. In the 1970s and 80s there was minimal exploration activity. By 2011, the entire area was owned by forest companies, so that no exploration took place for several decades and the project was almost forgotten. In addition, only a few nickel outcrops were found on the site. In 2011, Noble Mineral Resources finally acquired the project. The mineralization at Crawford is contained within a serpentinized ultramafic area that has a distinct geophysical signature. Crawford has several structures with approximately 7.9 kilometres of strike length.

Crawford Flagship Project – Resource

In February 2020, Canada Nickel was able to publish a resource estimate based on the Canadian NI43-101 resource calculation standard. This showed that Crawford hosts a resource with a higher grade core of approximately 263 million tonnes of Measured and Indicated resources of 0.31% nickel, 0.013% cobalt and 0.038 g/t palladium + platinum within a total Measured and Indicated resource of approximately 600 million tonnes of 0.25% nickel and 0.013% cobalt. In addition, an inferred resource at a higher grade of approximately 66 million tonnes containing 0.29% nickel and 0.013% cobalt within a total inferred resource of approximately 310 million tonnes containing 0.23% nickel and 0.013% cobalt. This places the Crawford resource among the 12 largest nickel deposits in the world!

Crawford flagship project – exploration potential

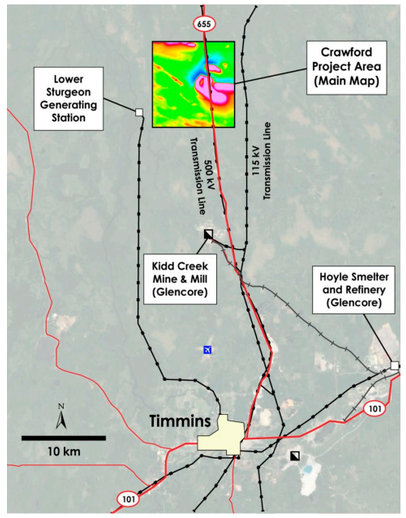
Although the Crawford resource already appears huge, only about 1.75 kilometres of the total strike length of nearly 8 kilometres have been drilled in 2018 and 2019. This resource alone is still open on all sides. The remainder, i.e. about 75% of the structures known to date, have not yet been tested for further mineralization. Likewise, the higher-grade core area is still open on several sides, so that there is further potential for high grade deposits. To date, it has only been possible to trace this over a length of 1,600 metres, a width of 160 to 230 metres and to a depth of around 650 metres. There is also enormous potential, especially at depth. For example, a borehole could be drilled to a vertical depth of 850 metres. The analysed sample contained on average 0.31% nickel, 0.013% cobalt, 0.022g/t palladium and 0.008g/t platinum over 901 metres. In addition, the last 200 metres are outside the current resource and were not included in the last resource estimate.

Crawford flagship project – platinum-palladium discovery

In March 2020, Canada Nickel announced the discovery of a new palladium-platinum zone discovered through drilling. A total of five drill holes intersected this zone, starting at bedrock contact and extending to a depth of 500 metres over a strike length of 600 metres. The separate PGM zone returned grades of up to 1.7g/t palladium + platinum over 7.5 metres. With palladium prices in excess of CA$3,000 per ounce and few new palladium discoveries worldwide, the discovery of this new multi-gram near-surface palladium-platinum zone, which is parallel to Crawford‘s existing nickel-cobalt palladium resources, underscores Crawford‘s significant potential and provides additional options in the development of the project.

Extension of the Crawford project

In March 2020, Canada Nickel announced that it had reached an agreement with Noble Mineral Resources to expand the Crawford project. Under the terms of the agreement, the company will pay CA$500,000 in cash plus 500,000 treasury shares to acquire the Crawford Annex area. This covers 4,909 hectares. In addition, Canada Nickel may acquire up to 80% of the other 5 option areas, Crawford-Nesbitt-Aubin, Nesbitt North, Aubin-Mahaffy, Kingsmill-Aubin and MacDiarmid, ranging in size from 903 to 5,543 hectares, subject to various one-time payments and exploration expenses.



The Crawford Project is one of the largest nickel-cobalt sulphide resources located in a well established mining camp with infrastructure.
(Source: Canada Nickel)

Undervalued in comparison to the peer group

If one sets the current resources to market capitalisation, it becomes clear that Canada Nickel seems to be massively undervalued. Most of the competitors within the peer group have valuations, which in some cases are twice to six times higher than those of Canada Nickel shares.

Successful and experienced management

Canada Nickel has a successful and experienced management team.
Chairman & CEO Mark Selby most recently served as President and CEO of RNC Minerals (Royal Nickel Corporation) where he led a team that successfully financed over $100 million and advanced the Dumont Nickel-Cobalt Project from initial resource to a fully approved project. Since 2001, Mr. Selby has been recognized as one of the leading authorities in the nickel market.

Director David Smith is Agnico Eagle's Senior Vice-President, Finance and Chief Financial Officer and has held this position since 2012 and has also held the position of Senior Vice President, Strategic Planning and Investor Relations. Prior to joining the Company's investor relations team in 2005, Mr. Smith, a professional engineer, was a mining analyst and held a number of mining engineering positions in Canada and abroad. He is a Chartered Director who holds a director position at Sprott Resource Holdings Inc. and was previously a director at eCobalt Solutions Inc.

Director Russell Starr has over nineteen years of experience in corporate finance, investment and business development, and has held senior management and advisory positions with financial institutions such as RBC Capital Markets, Scotia Capital, Orion Securities and Blackmont. Following his departure from Bay Street, Starr held senior management positions at Cayden Resources (successfully acquired by Agnico Eagle Mines Limited in 2014) and Auryn Resources.

Summary:
This could become a real monster resource!

Canada Nickel owns 100% of the Crawford nickel-cobalt sulphide project, a completely new nickel discovery with even greater potential in an established mining camp, one of Canada's best infrastructures. Crawford is not only one of the top 12 nickel sulphide sources worldwide, but also appears to have significant platinum and palladium deposits, which will be further explored in the coming months and will ensure a continuous news flow. Initial mineralogical test results also show that 89% of the nickel in nickel sulphide and nickel-iron alloy minerals is contained in higher grade resource areas. Crawford has significant potential for expansion as less than 20% of the existing anomalies have been tested to date. The newly acquired areas are also exciting. Given Crawford's proven track record of success, it offers much larger areas to fully develop Crawford and additional exploration targets that may potentially host nickel-cobalt deposits similar to Crawford. Canada Nickel is in a very strong financial position, having financed approximately $6.8 million since September 2019.

Exclusive interview with Mark Selby, CEO of Canada Nickel

What have you and your company achieved in the past 12 months?

Canada Nickel Company owns 100 per cent of the Crawford Nickel-Cobalt Sulphide Project - a new discovery in the world class Timmins-Cochrane mining camp in Ontario, Canada. Since the company was founded 7 months ago, we completed over $6 million in financing privately and have aggressively advanced the project. We completed a drilling campaign that delivered an initial resource that places Crawford as one of the 12 largest nickel sulphide resources globally - on just 20% of the target structure, made a separate palladium-platinum discovery, delivered an initial set of mineralogy results which exceeded expectations, and began trading within past seven weeks on the TSX Venture Exchange under the code "CNC" and Frankfurt under the code A2P0XC. The company has a tight shareholder base and has just 57 million shares outstanding and no warrants

The drilling and mineralogy work is ongoing and in April 2020, despite challenging market conditions, we are successfully raising a further $4 million to begin the achievement of our next milestones.

What are the most important company catalysts for the next 6 to 12 months?

We have an active work program to deliver steady news flow over the coming months.

Specifically, work being undertaken includes:

- A series of drilling results as we explore further the 8km structure, with the objective of demonstrating the higher-grade potential and large size and scale of the deposit.
- Continue our mineralogy and metallurgical test work to confirm nickel, cobalt, palladium and platinum recoveries.
- Complete a Preliminary Economic Assessment (PEA) in 2020 and a Feasibility Study by year-end 2021.

How do you see the current situation on the market for battery metals?

Nickel has undergone "supercycles" every 15-20 years as nickel supply periodically fails to keep pace with nickel's robust demand growth rate of 5% per year - and appears to be headed for a new supercycle by the mid-2020s. During past supercycles, nickel prices exceeded $100,000 per tonne (in today's dollars) in the late 1960s, spiked again in the late 1980s, and again in the mid-2000s exceeding $50,000 per tonne.

Nickel is set to become "the new gasoline" as it makes a vital contribution to the batteries that power much of the electric vehicle revolution by delivering greater energy density and greater range at lower cost.
This combination of strong trend demand growth with new demand from electric vehicles will drive the requirement for an additional 1 Mt of nickel supply by 2025 and a doubling (2.5Mt) of today's nickel supply by 2030. This demand growth comes at a time when the nickel project pipeline outside of Indonesia is largely empty after a decade of underinvestment, particularly outside of Indonesia. This supercycle should begin to gain momentum later this year as nickel supply is curtailed as Indonesia's ban on ore exports will begin reducing the amount of nickel supply available to NPI producers in China.

Canada Nickel Company

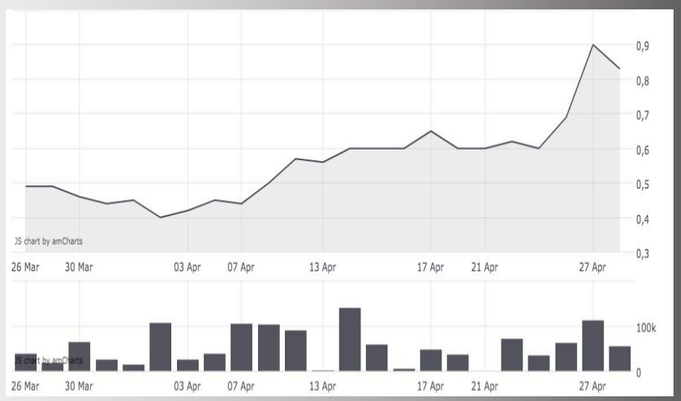
ISIN: CA13515Q1037
WKN: A2P0XC
FR**A:** 4E0
TSX-V: CNC

Shares outstanding: 57.0 million
Options/RSUs: 6.5 million
Warrants: -
Fully diluted: 63.5 million

Contact:
Canada Nickel Company
30 King St West, Suite 1900
Toronto, ON, M5X 1E3, Canada

Phone: +1-647-256-1954

info@canadanickel.com
www.canadanickel.com



Giga Metals

World-class nickel-cobalt project in the feasibility phase

Mark Jarvis, CEO

Giga Metals is a Canadian mining development company focused on the development of its giant Turnagain nickel-cobalt project in the Canadian province of British Columbia. Turnagain is considered to be one of the largest nickel-cobalt projects in the world, which led cobalt royalty company Cobalt 27 to secure a net smelter royalty in 2018 at a price higher than Giga Metals' market capitalization at the time. The company will shortly publish a pre-feasibility study.

Turnagain Nickel-Cobalt Project – Location and Infrastructure

Turnagain lies just north of the Turnagain River near its confluence with Hard Creek. The community of Dease Lake, on Highway 37, is located 70 kilometers west of the license area. A side road extending east from Dease Lake has been used in recent years by large, articulated four-wheel drive vehicles to transport large chunks of jade from the Kutcho Creek area to supply the Wheaton Creek gold operation. Part of this road network covers the Turnagain area. There is also a short runway on the site. A helicopter flight from Dease Lake to Turnagain takes about 20 minutes.

Turnagain Nickel-Cobalt Project – Deposit and Geology

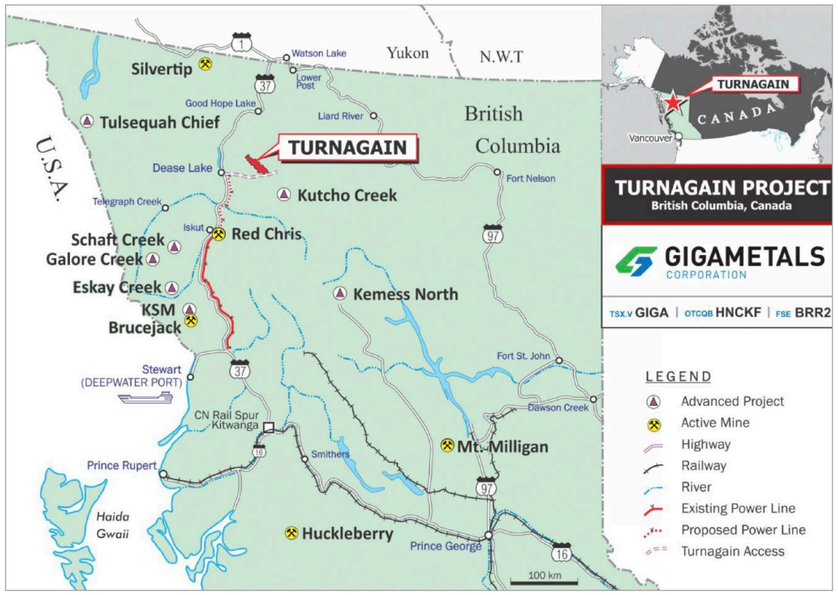
Giga Metals holds 100% of Turnagain, which hosts multiple zones of significant nickel, cobalt, copper, platinum and palladium anomalies. The majority of the known resource comes from the Horsetrail and Northwest zones, which cover an area of approximately 2.5 by 1.5 kilometres. The Attic Zone, approximately 3.5 kilometres to the northwest, shows higher concentrations of platinum and palladium, while a zone 2.5 kilometres to the northwest of Horsetrail shows elevated traces of copper. A resource estimate released in September 2019 produced a NI43-101 compliant resource that includes measured and indicated resources of 1.07 billion tonnes of rock containing 0.22% nickel and 0.013% cobalt (5.2 billion pounds of nickel and 312.4 million pounds of cobalt). In addition, inferred resources of 1.14 billion tonnes of rock containing 0.217% nickel and 0.013% cobalt, (5.47 billion pounds of nickel and 327.3 million pounds of cobalt) were reported. This represents an increase of 28.3% in the measured and indicated category and 27.2% in the inferred category compared to the 2011 nickel resource estimate. For cobalt, the Measured and Indicated category resources increased by 23.5% and the Inferred category by 16.9%. In total, only a fraction of the area with nickel indications has been drill tested to date. Particularly in the area north of the two main deposits Horsetrail and Northwest, additional nickel anomalies have been identified which could significantly increase the already huge resource.

Extensive metallurgical test work has also shown that closed-cycle flotation can reliably produce average concentrates containing 23% nickel. This is a concentrate that can be further processed into high-purity Class 1 nickel for use in lithium-ion batteries. The cobalt was originally only intended as a by-product but is now contributing to the long-term profitability of the project. The recovery rate in the above tests averaged 52%.

Turnagain Nickel-Cobalt Project – Economic Assessment

A positive Preliminary Economic Assessment (PEA) for Turnagain from 2011 already exists, which assessed the development of the Turnagain deposit in conventional open pit mining. It was assumed that the material would be processed with a conventional concentrator to produce an 18% nickel and 1% cobalt concentrate.

Based on a nickel price of US$8.50 per pound and a cobalt price of US$14.00 per pound, this resulted in cash costs of US$4.26 per pound of nickel, an after-tax discounted net present value (NPV) of US$724 million and an after-tax return on capital employed (IRR) of 13.5%. The initial cost of capital was estimated at US$1.357 billion and the expansion cost after 5 years at an additional US$492 million. The estimated payback period at that time was 7.3 years and the mine life 27.2 years. In total, a mill throughput of 15.8 million tons of rock per year was expected in the first 5 years, and 31.3 million tons per year from the sixth year onwards. The annual production was estimated at 23,912 tons of nickel and 1,280 tons of cobalt for the first 5 years. For the following years an annual production of 44,393 tons of nickel and 2,433 tons of cobalt was expected. It has to be said that this PEA is based on considerably fewer resources than are currently known and the current nickel price is well below the assumed US$8.50 per pound. The cobalt price assumed at that time seems realistic and could even be set higher. With the available figures, Turnagain would be one of the 10 largest nickel producers worldwide.



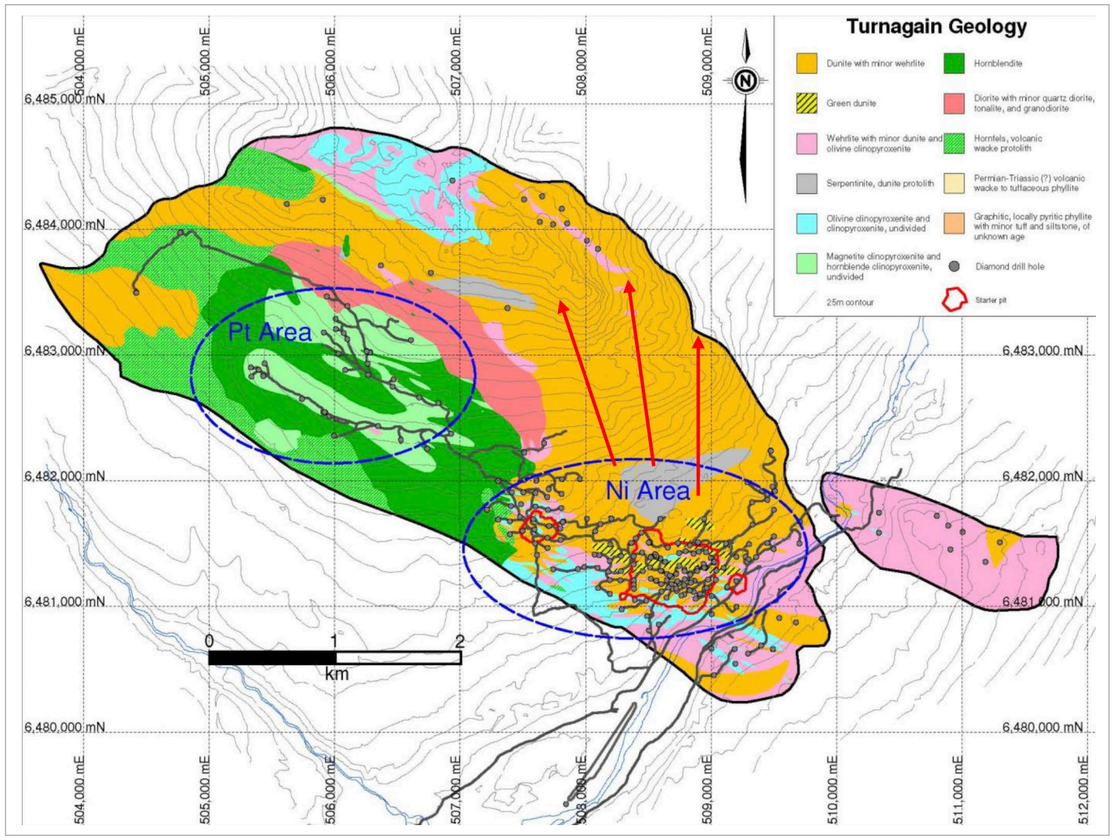
The Canadian province of British Columbia stands for a safe, mine-friendly jurisdiction (Source: Gigametals)

The company aims to complete a pre-feasibility study in the near future, which will focus on reducing the high cost of capital.

Turnagain Nickel-Cobalt Project – Recent drilling successes

In 2018, Giga Metals conducted an extensive drilling campaign that included a total of 40 holes with a total drill length of 10,835 metres. The primary focus was to upgrade inferred resources to the indicated category. Reported assay results showed remarkable continuity of mineralization in the Horsetrail and Northwest Zones and high platinum and palladium concentrations in the so-called Attic Zone, located approximately 3.5 kilometres northwest of the Horsetrail Zone.

Overall, Giga Metals has reported some very impressive, long intervals of significant nickel and cobalt mineralization. These include 447 metres grading 0.258% nickel and 0.013%



The known nickel deposit is still open to several sides, as is the parallel Platinum-palladium deposit. (Source: Gigametals)

cobalt, 444 metres grading 0.25% nickel and 0.013% cobalt, 388 metres grading 0.257% nickel and 0.015% cobalt, 370 metres grading 0.276% nickel and 0.013% cobalt, 327 metres grading 0.208% nickel and 0.012% cobalt, and 314 metres grading 0.214% nickel and 0.016% cobalt. All of these drill intercepts started almost directly from surface! From the platinum and palladium rich Attic Zone, up to 0.471% nickel, 0.13% cobalt, 367ppb platinum and 467ppb palladium were reported over 80 metres.

Royalty company on board

In July 2018, the Giga Metals management achieved a real coup. They were able to sign a net smelter agreement with Cobalt 27 Capital Corp. Under the terms of the agreement, Giga Metals sold a 2% net smelter royalty on future cobalt and nickel production at the Turnagain project to Cobalt 27 Capital for US$1 million in cash and 1,125,000 shares of Cobalt 27. The equivalent of US$10 million was higher than Giga Metals' market capitalization at the time of the announcement. The Company will use the funds for exploration of the Turnagain project and for advancing the project to pre-feasibility and beyond. In April 2019, Giga Metals was also able to appoint Anthony Milewski, Chairman and CEO of Cobalt 27 to the Giga Metals Board of Directors. Milewski has unparalleled knowledge of the institutional market and strategic players in battery metals.

GIGAMETALS
CORPORATION

New President brings further momentum

In November 2019 Martin Vydra was installed as the new president. His experience with Sherritt in marketing nickel and cobalt and the relationships he has built with end users should prove invaluable to the company. Vydra's commitment as President clearly indicates that Giga Metals is committed to bringing the Turnagain project to production.

Summary: Large lever on a winding nickel boom

Giga Metals strives to be a leading supplier of battery metals needed as the world moves forward into a clean energy future. To achieve this, the company is currently focusing on two of the most important metals used in the batteries of electric vehicles: nickel and cobalt.

The Turnagain project is one of the largest undeveloped nickel-cobalt sulphide deposits in the world, measured by total nickel. The growth in electric vehicles and energy storage is accelerating, so the development of the Turnagain project should move forward rapidly, especially after one of the world's major cobalt players, Cobalt 27, delivered a lot of confidence. The next important catalyst is the pre-feasibility study, which is expected to be published around mid-2020. Together with the new resource estimate, a situation should evolve that should allow corresponding majors and/or battery manufacturers to offer Giga Metals.

ISIN: CA37518K1021
WKN: A2DWUW
FRA: BRR2
TSXV: GIGA

Shares outstanding: 55.5 million
Options: 5.5 million
Warrants: 11.9 million
Fully diluted: 72.9 million

Contact:

Giga Metals Corporation
Suite 203, 700 West Pender Street
Vancouver, BC, V6C 1G8, Canada

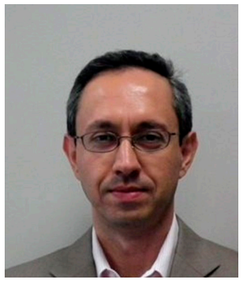
Phone: +1-604-681-2300

info@gigametals.com
www.gigametals.com

Giga Metals Corporation

Millennial Lithium

Excellent feasibility study completed, mine financing underway



Farhad Abasov, CEO

Millennial Lithium is a Canadian development company that focuses on lithium projects in Argentina. The company is in pole position, having already presented a completed feasibility study. A pilot production plant including extensive evaporation basins is currently under construction. Four out of five important mining licenses have already been granted.

Pastos Grandes Lithium Project – Location and acquisition

The flagship project is Pastos Grandes, a lithium project in the northwestern Argentinean province of Salta. Pastos Grandes is a salt lake that is part of a whole series of similar lakes that run like a string of pearls through the provinces of Salta and Catamarca.
Millennial Lithium‘s Pastos Grandes Project consists of several sub-sections, currently covering 8,664 hectares, which have been acquired in stages since approximately mid-2016. The Company initially completed geophysical work, a comprehensive drilling program, the preparation of a resource estimate, and the construction of evaporation ponds, a mini processing plant and camp. Furthermore, a hybrid solar system for power supply was put into operation.

Pastos Grandes Lithium Project – Very good connection to existing infrastructure

The biggest advantage is the relative proximity to the provincial capital Salta. While most competitors‘ projects are literally located in the pampas, Millennial Lithium‘s project has a direct connection to the city of Salta, which is about 235 kilometers away by road and has a population of about 350,000 and is also the capital of the province of the same name in northwest Argentina. At the same time, there is a direct, approximately 490-kilometer-long road connection to the Chilean port city of Antofagasta, which not only has a Pacific deep-sea port but is also one of the leading mining cities in South America. A 600-megawatt, 375 kilovolt high-voltage line connecting Salta and Mejillones in Chile runs 53 kilometers north of the project area. A natural gas pipeline also runs about 26 kilometers northwest of the project.

Pastos Grandes Lithium Project – Exploration and Development Successes

In autumn 2016, Millennial Lithium started its first own drilling campaign on Pastos Grandes. The first well (down to a depth of 192 metres) already encountered three water-bearing brine layers of different depths, with densities ranging from 1.19 g/cm3 to 1.22 g/cm3. The second well (down to a depth of 352 metres) even encountered eight intervals of about one metre each. These drilling successes led the company to drill a further, third well. In total, lithium contents of up to 471mg/L could be detected by means of these drillings.
In June 2017, Millennial Lithium encountered an average lithium content of 535mg/L over 381.5 metres by means of a further well.
A subsequent pump test in another well yielded average lithium contents of around 430mg/L over a period of 60 hours. The test also showed a slight reduction in lithium content from only 439 to 431mg/L over the entire test period.
In August 2017, Millennial Lithium was able to prove that the brine-bearing layer also continues outside the salar centre. Among other things, a near-surface layer of 33 meters with an average of 523mg/L and a deeper layer with 545mg/L over a length of 211.3 meters were found!
Additional drilling in 2018 returned up to 701mg/L lithium within a 545-metre interval. In November 2018, a 236-metre interval was also encountered, averaging 566mg/L lithium. Recent pumping tests have shown lithium grades between 482mg/L and 518mg/L over a 24-day period.

In January 2019, Millennial Lithium was able to confirm in the laboratory that brine from Pastos Grandes can be used to produce a battery-compatible lithium carbonate concentrate of 99.92%.

Pastos Grandes Lithium Project – Latest resource estimate 100% higher than before

In April 2019, Millennial Lithium released an updated resource estimate for Pastos Grandes based on the Canadian NI43-101 resource calculation standard. According to this, the project has 4,120,000 tonnes of lithium carbonate (Li_2CO_3) equivalent (LCE) and 15,342,000 tonnes of potash (KCl) equivalent in the categories measured and indicated, with an additional 798,000 tonnes of LCE and 2,973,000 tonnes of KCl in the category inferred. Compared to the December 22, 2017 resource estimates, the updated resources represent an almost 100% increase in measured and indicated LCE tonnage (2017 value of 2,131,000 tonnes LCE). This provides the Company with significant measured and indicated lithium resources that have the potential to be converted into reserves.

Pastos Grandes Lithium Project – Positive Feasibility Study and Permitting Process

Based on this resource estimate, Millennial Lithium published a positive feasibility study for Pastos Grandes in July 2019. The project has a net present value (NPV) of US$1.03 billion (discounted at 8%), assuming an average production of 24,000 tonnes of Battery Grade Lithium Carbonate per year (>99.5% LCE). Operating costs were estimated at a low US$3,388 per tonne of lithium carbonate over the mine‘s 40-year life. The initial capital cost is US$448.2 million. The payback period is 5.4 years. On this basis, the internal rate of return (IRR) is a very strong 24.2% after tax.
The cost of capital includes indirect costs and a buffer of around US$ 96.6 million in total, which may still be reduced.
In October 2019, Millennial Lithium announced that the National Mining Secretary of Argentina, part of the National Ministry of Work and Production, has signed and issued a Federal Fiscal Stability Certificate for the Company‘s Pastos Grandes Project. The Certificate describes the tax system and additional benefits to be provided to the Pastos Grandes Lithium Project in the province of Salta for the next 30 years.
Millennial Lithium was also able to announce in January 2020 that the Salta Mining Court granted Millennial‘s Argentinean subsidiary, Proyecto Pastos Grandes S.A., four of the five mining licenses that included the original REMSA properties. These four mining licenses cover approximately 97% of the REMSA property on the Pastos Grandes Project. Millennial expects the fifth license to be granted in the near future.

Cauchari East Lithium Project

In 2016 Millennial Lithium acquired another lithium project called Cauchari East. This covers 2,990 hectares and is located on the eastern side of the Cauchari-Olaroz Salar, adjacent to Orocobre‘s producing Salar de Olaroz and Lithium Americas Corp.‘s advanced Cauchari-Olaroz project. Millennial Lithium‘s new project has the same geological characteristics as the two producing and advanced projects of the adjacent competitors and has particularly high potential in the lower salar strata. Assays conducted by Orocobre on their own project suggest that the corresponding lithium brine resources extend into the eastern portion of the salar and hence into the Cauchari East Project. This has been confirmed by Millennial Lithium through geophysical studies.
In June 2017, Millennial Lithium was able to expand its Cauchari East project by a further 8,742 hectares.

MILLENNIAL LITHIUM

Top management for rapid project development

A top management team has been put together for the rapid development of the projects.
CEO Farhad Abasov's achievements during his career include Allana Potash leading to a $170 million acquisition by Israel Chemical Ltd. and Energy Metals leading to a $1.8 billion acquisition by Uranium One. He was also co-founder of Potash One, which was acquired by German K+S for $430 million in 2010.
Chairman Graham Harris was Senior Vice President and Director of the Canadian investment house Canaccord for five years. He raised more than $250 million of capital for listed and private companies. Harris is also the owner of Sunrise Drilling, which gives him a significant advantage in exploration.
Peter Ehren is a specialist for evaporation plants when it comes to the production of lithium. He has worked for several big names in the industry (SQM, BHP) and was jointly responsible for the design and construction of the evaporation ponds on Orocobres Salar de Olaroz project.

Summary: Full speed ahead towards production

Millennial Lithium has what other lithium developers can only dream of for the entire life of the company: A high-grade lithium resource, excellent drilling and pumping results, an extremely good infrastructure location (unlike many competitors) and a positive feasibility study. The next important step is the commissioning of the pilot test plant, which is imminent. In addition, the Company is working on engineering studies and the permitting process as well as on the financing of the planned mine. The Company remains in a strong financial position to ensure that all upcoming programs can be carried out without any problems. Millennial Lithium is a prime example of how the lithium sector can and should run.

Exclusive interview with Farhad Abasov, CEO of Millennial Lithium

What have you and your company achieved in the past 12 months?

Millennial (MLC) has had a productive year. Accomplishments and milestones included the update of a 43-101 compliant resource estimate showing a significant increase in lithium at Pastos Grandes (PG), the completion of a Feasibility Study which indicates robust economics for a 24,000 TPY battery grade lithium carbonate operation with an after-tax NPV(8) of $1.03B and IRR of 24.2%. Additional technical achievements include significant progress with our pilot ponds at PG and the construction of a 3 TPM lithium carbonate pilot plant. Operation of the plant will commence once concentrated brine in the ponds reaches plant grade of 3% Li.

On the corporate front, the past 12 months has been very active as well. Midyear Millennial submitted its Environmental Impact Assessment-Construction and Operation for its PG project and approval is expected in Q1, 2020. Millennial was also awarded a Fiscal Stability Agreement by the Argentine federal government securing the lower corporate tax rate of a maximum of 25% for 30 years. Finally, Millennial was granted the licenses for the majority of the REMSA licenses totalling 6,447 ha as the Company fulfilled its commitment to this government organization.

Millennial has also been active in the local Pastos Grandes community over the past year. Millennial, with partners Hidrotec and Eramet, constructed a modern fresh water well to provide clean water to the local residents of PG which experiences infant deaths annually due to polluted water. In addition, Millennial is completing a community centre in PG which will include a gymnasium, local business and training facilities as well as warehousing and a small office for Millennial to continue with its engagement with the community.

What are the most important company catalysts for the next 6 to 12 months?

The main technical catalysts for MLC in the next 6-12 months include concentrating the lithium-rich brine in the pilot ponds to plant grade (3%) and subsequent production of battery grade lithium carbonate from the Company's pilot plant. On the Corporate front, MLC will continue to advance its EIA application and engage with the government to ensure all permitting is in place for start-up construction on the project. Ongoing construction financing efforts continue and remain encouraging as most in the space see a turnaround of lithium prices in the next six months. We have advanced our talks with a number of potential strategic partners as well as offtakers. We expect to start finalizing some of these major initiatives in coming weeks and months.

How do you see the current situation on the market for battery metals?

Millennial remains bullish on the market for battery metals especially for lithium. Prices for LCE and LiOH seem to have bottomed as they approach the costs for LCE production from spodumene and conversion facilities. Continued strong demand for EV in Europe, the preservation of some EV incentives in China, the preference for Tesla to use LFP batteries in its Model 3 vehicles in China and production increase delays at some of the major brine producers all support strong increase in lithium prices in H2 2020 and beyond. Millennial is well positioned to become the next funded lithium brine project due to its advanced project, strong cash position and low-cost structure.

Millennial Lithium Corp.

ISIN: CA60040W1059
WKN: A2AMUE
FRA: A3N1
OTCQX: ATWGF
TSXV: ML

Shares outstanding: 82.6 million
Options/RSUs: 10.1 million
Warrants: 7.5 million
Fully diluted: 100.3 million

Contact:
Millennial Lithium Corp.
Suite 2000 - 1177 West Hastings Street
Vancouver, BC Canada V6E 2K3

Phone: +1 604-662-8184

info@millenniallithium.com
www.millenniallithium.com

Neo Lithium

First battery grade lithium carbonate obtained from the pilot plant! - Strategic partner within reach!

Waldo Perez, CEO

Neo Lithium is a Canadian mining development company that has secured one of the world's largest lithium deposits within the so-called „Lithium Triangle" in Argentina. The special thing about it: The lithium resource there is growing – day by day! The most recent resource estimate revealed an extremely high-grade resource, which is only just below the surface. A recently published pre-feasibility study impressively demonstrated the world-class status of the flagship Tres Quebradas project. In addition, the first battery grade lithium carbonate was recently extracted from the company's own, pilot plant.

3Q Project – Location and infrastructure

Neo Lithium's flagship project Tres Quebradas (3Q) is located in the Argentinean province of Catamarca, about 30 kilometers from the Chilean border. The nearest town is located about 100 kilometres to the east. The closest motorway to the project is the Ruta Nacional 60, which connects the capital Catamarca (San Fernando del Valle de Catamarca) with Copiapó and the port of Caldera via the Paso de San Francisco. The project can be reached by motorway over a 60 kilometre stretch in all weathers. By September 2018, over US$25 million had been invested in the 3Q project, including a 100-person camp. Discovered by the company's founders in December 2015, 3Q is already fully equipped, including a camp, weather station, geochemical analysis laboratory, solar and diesel power plants, and a sewage system free of wastewater.

3Q Project – The deposit grows every day

The 3Q Project covers approximately 350 square kilometres, with Neo Lithium holding a 100% interest. The project is located at approximately 4,000 meters above sea level and consists of a complex of three brine reservoirs and three salars. This is a brine lake, of which only one more is known worldwide. It is located in China and houses a lithium mine. What is special about it is that geothermal energy sources feed the northern part of the project. These contain high-quality lithium and feed the lakes and salars with about 3,000 tons of lithium carbonate equivalent per year. Isotope and mass balance studies show that the lithium mineral deposit is still in the process of being formed by evaporation from the lakes.

3Q Project – Great Resource, High Degrees

By means of over 10,000 metres of drilling and further geophysical investigations, the company has already been able to create a hydrostratigraphic model of the salar. In addition, a resource estimate was published in 2018, which impressively underlined the world-class character of the 3Q Project. The salar contains a total of at least 4,000,000 tonnes of lithium carbonate equivalent, with high average grades of 614mg/L in the measured and indicated category. The ratio of magnesium to lithium is very good, at a low 3.3, with an additional 3,000,000 tonnes of lithium carbonate equivalent in the inferred category. The average grade is 584mg/L, the ratio of magnesium to lithium is 4.5, with a cut-off grade of 400mg/L. An even higher-grade resource has also been identified in the northern part of the salar. This contains at least 746,000 tonnes of lithium carbonate equivalent at an average of 1,007mg/L in the measured and indicated categories and 186,000 tonnes of lithium carbonate equivalent at 1,240mg/L in the inferred category. The ratio of magnesium to lithium is only around 1.7, with a cut-off grade of 800mg/L. Reserves were reported in mid-2019 at 1,300,000 tonnes of lithium carbonate equivalent, averaging 794mg/L. The interesting thing about this is that while the southern area was drilled to a depth of 600 metres, the northern, higher grade area was only drilled to depths of around 100 metres. This means that there is still a high blue-sky potential below. More than 50% of the total resource is located in an area from the surface to a maximum depth of 100 meters. 33% are in deeper sediment layers and could not be completely delineated to date. 3Q is currently the fifth largest brine project in the world, and the only project with low critical impurities that is not in production. It is also the sixth highest grade project worldwide (based on a 400mg/L lithium cut-off), with the higher-grade area in the north of the salar having the second highest grades of all brine projects worldwide.

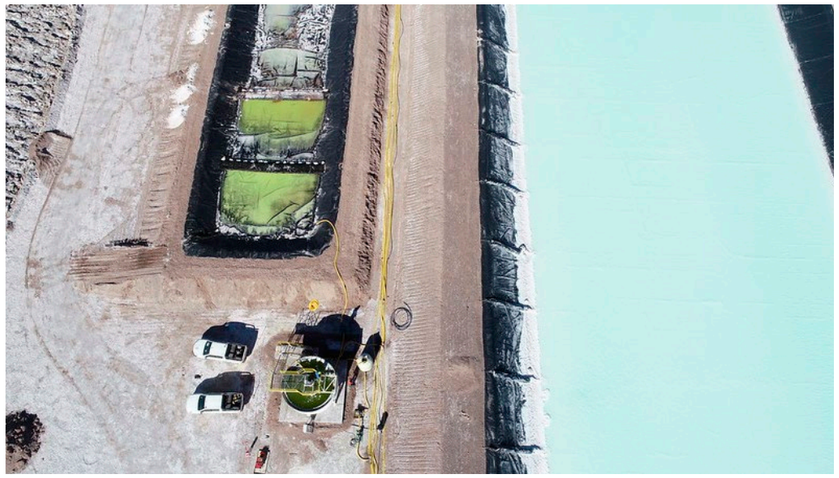
The company is currently focusing on expanding the high-grade resources in the northern part of the lake. (Source Neo Lithium)

In April 2019, Neo Lithium was able to investigate the high-grade resource below a depth of 100 meters for the first time. An average of 1,128mg/L lithium was discovered in a 137.6-metre-long section. The drill hole reached a depth of 160 meters. In addition, stable lithium production between 773 and 787mg/L was demonstrated during a 20-day pump test.

In June 2019, Neo Lithium intersected an average of 1,117 mg/L lithium and 11,319 mg/L potash in another well over 178 metres. The sensation: The hole is located on the eastern edge of Lake 3Q, an area where the reserve estimate assumed that the brine was only present to a depth of 10 meters, but the hole encountered the brine to a depth of 265 meters.

3Q Project – Pre-feasibility study + approval procedure

In March 2019, the Company was able to publish a pre-feasibility study (PFS). This study determined an after-tax net present value (NPV, discounted at 8%) of US$ 1.14 billion. The after-tax return on investment (IRR) is an excellent 49.9%. The cost of capital was estimated at US$ 318.9 million and the operating cash cost at US$ 2,914 per tonne of lithium carbonate equivalent. This would put 3Q in the range of the most cost-effective lithium mines in the world. Over a period of 35 years, 20,000 tons of lithium carbonate could be produced annually. According to this estimate, the payback period would be 1 year and 8 months. Compared to the first economic feasibility study, the main benefits were a reduction in capital costs and an increase in profitability from 27.9% to 49.9%.



3Q pilot plant from above.
(Source Neo Lithium)

3Q Project - Pilot Production, Pilot Plant

A complete pilot plant on a scale of 1:600 has been in operation for about two years. Neo Lithium was able to achieve a concentration of 3.8% lithium in the brine without the addition of additives. This makes 3Q the only project in the world that can achieve a lithium concentration of 3.8% without the addition of additives and only by natural evaporation. The existing brine is rich in calcium and calcium chloride naturally precipitates with 6 water molecules, which makes it possible to reduce the size of the ponds calculated in the PEA. In 2018 a pilot plant for the annual production of 50 tons of lithium carbonate was built and installed on the project site in February 2019. The plant, designed and built by the Instituto de Investigaciones Tecnologicas of the University of Concepcion, Chile, was previously successfully tested with synthetic brine in Chile and is now fed with brine from the 3Q project, which concentrates approximately 4% lithium from the 3Q project‘s evaporation ponds, to start pilot scale production of lithium carbonate at the plant. The pilot ponds currently have a planned annual capacity of over 500 tons of approximately 4% lithium brine per year, with the plant having a planned capacity of 50 tons of lithium carbonate per year.

In September 2019, Neo Lithium was able to report that the first batch from its pilot plant already achieved a lithium carbonate concentration of 99.1%. In March 2020, the company reported that battery grade lithium carbonate with a purity of 99.535% could be obtained (process in accordance with the pre-feasibility study). Using an improved extraction process, a purity of 99.599% was even achieved. This new process is also to be included in the definitive feasibility study; whereby further cost savings are hoped for.
The company also reported that the City of Fiambalá has approved the granting of a 610-hectare plot of land for the development of the Fiambalá Industrial Park. The permit covers 349 hectares of land that will be granted to Liex S.A., a wholly owned subsidiary of Neo Lithium in Argentina, for the future construction of the Company‘s large-scale lithium carbonate plant.

Top management team

Neo Lithium has a top management team from which President & CEO Waldo Perez again stands out.
Dr. Perez has 28 years of academic and industrial experience in mineral exploration in South America. He was the founder and technical director of the Cauchari Project acquired from Lithium Americas Corp. and served as its President and CEO from inception to the final feasibility study. Previously, he was CEO of Latin American Minerals Inc, Senior Geologist for Barrick Gold, IAMGOLD, Apex Geoscience and Opawica Exploration.

Stable shareholder structure, sufficient cash

Neo Lithium has a stable shareholder structure. About 35% of all outstanding shares are held by institutional investors such as BlackRock, Sprott, JPMorgan and Mackenzie. About 16% of the shares are held by insiders. Neo Lithium had approximately CA$30 million in cash and no debt at the end of September 2019.

Summary: Top project with seven-league boots towards production

The 3Q Project is an active lithium deposit that is still in the process of formation, with the grade and size of the deposit still increasing daily - almost unparalleled in the world.

The Company is also in negotiations with strategic groups to move the project forward. These negotiations have been ongoing for some time and should become even more intense with the completion of the pre-feasibility study, as this will remove further risks from the project and provide even better figures than the previous feasibility study. The pre-feasibility study could clearly confirm that the 3Q project is one of the best, highest-grade and most cost-effective lithium brine projects in the world. Neo Lithium plans to complete a definitive feasibility study in the first half of 2020, followed by the construction of the processing plants by 2021. The ramp-up phase is scheduled to start as early as the third quarter of 2020, so that the first production is expected by the end of 2021. In the past, the management has already proven that it can bring lithium brine projects into production within the self-imposed time schedule.

ISIN: CA64047A1084
WKN: A2AP37
FRA: NE2
TSXV: NLC

Shares outstanding: 117.5 million
Options/warrants: 11.3 million
Fully diluted: 128.8 million

Contact:

Neo Lithium Corp.
01 Bay Street, Suite 2702
Toronto, Ontario, M5H 2Y4, Canada

Phone: +1-416-962-3300

info@neolithium.ca
www.neolithium.ca

Neo Lithium Corp.

Plateau Energy Metals

Huge high-grade hard rock lithium project and economic feasibility study

Alex Holmes, CEO

Plateau Energy Metals is a Canadian mining development company focused on the exploration and development of the Falchani lithium project and the Macusani uranium project in southeastern Peru. The Company, which has 100% control of mineral concessions covering more than 93,000 hectares, has one of the world's largest hard rock lithium resources and has all the known uranium resources in Peru, which are close to well-developed infrastructure. In February 2020, Plateau Energy published a positive economic study for Falchani.

Flagship project Falchani – location and infrastructure

Plateau Energy Metals' entire contiguous project area is located in southeastern Peru, approximately 150 kilometers southeast of Cusco and 200 kilometers north of Lake Titicaca. Highway 34B runs through the project area. The San Gaban hydropower plant is located 20 kilometers northeast. In addition, there are several running mines within a radius of 50 kilometers. The town of Macusani, with a population of around 12,000, is only 8 kilometres away from Plateau Energy Metals' project area. There is direct access by road and later by rail to the Pacific deep-sea ports of Ilo, Mollendo and Matarani. The flagship Falchani lithium project is a small, relatively central part of the concession area.

Falchani flagship project – geology and drilling successes to date

Falchani is a large, high-grade hard-rock lithium deposit within a volcanically deposited solid brine. The finds confirmed to date all originate from depths of no more than 350 metres, with many drill intercepts containing significant lithium contents from the surface. Almost all of the grades determined were above 2,000 parts per million (ppm) lithium, which is exceptional for a hard-rock lithium deposit near the surface. One of the highlights to date has certainly been a 338-metre-long section averaging 2,895ppm lithium that started just below the surface.

Flagship Project Falchani – Resource

In March 2019, Plateau Energy Metals released an updated resource estimate that increased the previous resource by more than 90 percent. This included a total of 60.9 million tonnes of rock averaging 2,954ppm lithium for 0.96 million tonnes of Li_2CO_3 (lithium carbonate) equivalent in the category indicated and 260.1 million tonnes of rock averaging 2,706ppm lithium for 3.75 million tonnes of Li_2CO_3 equivalent in the category inferred. In the high-grade lithium-rich tuffs alone, 42.5 million tonnes of rock averaging 3,500ppm lithium for 0.79 million tonnes of Li_2CO_3 equivalent were in the category indicated and 123.6 million tonnes of rock averaging 3,243ppm lithium for 2.13 million tonnes of Li_2CO_3 equivalent were identified in the category Inferred. This means that Falchani currently hosts the sixth largest lithium resource in the world.

Flagship project Falchani – resource potential

Although Falchani already has a very high resource, only 30% of the project area has been explored for lithium to date. The current focus is on a 2.2- by 1.7-kilometre area that has already been mapped and sampled. While the entire Indicated resource is located east of a valley, an area known as Falchani East, a portion of the Inferred resource west of the valley is located in an area known as Falchani West. To date, no drilling has been conducted in the northwest portion of Falchani West, but drilling is planned to commence shortly. However, sampling has encountered extremely high lithium grades of up to 4,272ppm.

In addition, a further target area called Tres Hermanas was identified further west. There samples of up to 3,452ppm lithium were taken. Tres Hermanas is a total of three ridges of protruding lithium-rich tuff, which are interpreted to be inclined upright compared to relatively horizontal at Falchani. Each ridge is approximately 80 metres high and at least 750 metres long, with the ridges running in an east-west direction. Plateau Energy Metals is currently working on extensive trenching to determine the potential of Tres Hermanas.

During further work, another hot trail was found about 6 kilometres west of the Falchani occurrence. Sampling in the new Quelcaya target area revealed up to 2,986ppm lithium.

Falchani exploration is now focused on an area about 6 by 5 kilometers around Falchani, which is a former, now collapsed caldera. During additional discovery tours outside of this area, lithium-rich tuffs containing up to 5,100ppm lithium were encountered 20 kilometers west of the Falchani deposit.

Flagship project Falchani – top metallurgy + economic feasibility study

Plateau Energy Metals has already conducted extensive metallurgical testing of Falchani rock. These tests have shown a recovery rate of between 77% and 81% and a purity of 99.74% when tank leached. In the case of sulphation baking, a recovery rate of 72 to 82% and a purity of 99.82% could even be achieved. The company was thus able to demonstrate that a battery-compatible purity of over 99.50% can be achieved from Lithium from Falchani. From the management's point of view, an increase in purity would be possible through additional on-site refining. Furthermore, it was examined to what extent existing potassium sulphate (SOP) and additional metals could also be mined and processed. After all, Peru is a net importer of potash, which would provide a potential buyer directly on site. The extraction rate was 43% for potassium, 84% for cesium and 67% for rubidium.

In February 2020 Plateau Energy published a positive economic study for Falchani. The study showed that Falchani is a scalable, long-lasting mining lithium project. The calculations are based on an average production of 63,000 tons per year over 33 years of battery grade lithium carbonate, which increases to 85,000 tpa Li_2CO_3 at a steady state throughput of 6.0 million tpa. The underlying purchase price is US$12,000 per ton.

The net present value (NPV) after tax is US$1.55 billion, and the return on equity (IRR) is 19.7%. Operating costs are estimated at US$3,958 per tonne, which is in the low second quartile of the operating costs of all lithium mines worldwide. Initial capital costs were estimated at US$587 million. The payback period is 4.7 years.

Flagship project Falchani – Memorandum of Understanding with Ameropa

Plateau Energy Metals Inc. announced in March 2020 that it has entered into a non-binding letter of intent with Swiss-based Ameropa AG to cooperate in the potential production, marketing and future off-take of potassium sulphate (SOP) from the Falchani Project. Ameropa is one of the world's largest fertilizer trading companies with over 12 million tonnes traded and operations in 31 countries at over 100 sites.

Macusani uranium project

The Macusani Uranium Project is located northeast of Falchani and consists of two project areas. Macusani has a total of at least 10 individual near-surface uranium deposits. The current resource base consists of 52.9

million pounds of U3O8 in the measured and indicated category plus 72.1 million pounds of U3O8 in the inferred category. An economic analysis, which includes resources from only 5 out of 10 deposits and is based on annual production of 6 million pounds of U3O8, yields a net present value (NPV) of US$603 million at a uranium price of US$50 per pound of uranium. A total of 70 million pounds of U3O8 could be produced over the total mine life of 10 years. The post-tax return on investment (IRR) is a very good 40.6%. Operating costs were estimated at US$17.27 per pound of U3O8, with an initial capital cost of US$299.8 million. The payback period for this case is 1.76 years. The break-even was estimated at US$25.66 per pound of uranium, which is why Macusani could probably be mined easily at uranium prices around US$35. In this case, the NPV was calculated at US$ 235 million, and at a price of US$ 65 per pound of uranium this would rise to US$ 965 million.

In total, the Macusani Uranium Project has 47 targets that offer the potential for additional high-grade resources. With 85% of the project area were not yet drilled.

Summary:
Economic feasibility study and drilling results ahead

Plateau Energy Metals has one of the largest hard rock lithium deposits in the world with the Falchani Lithium Project. The project not only has extremely high-grade resources, but also has the advantage of being very close to the surface, which makes the deposit(s) potentially exploitable by open pit operation. Accordingly, the economic indicators in the profitability analysis were also positive.

In addition, the Macusani Uranium Project, which is already in pre-feasibility status and has very good economics in the event of a rising uranium price. Macusani, like Falchani, has great potential for additional resources. In the near future, drilling results should be a significant catalyst for the future. In April 2020, the Company commenced the implementation of a CA$1.4 million financing.

Exclusive interview with Alex Holmes, CEO of Plateau Energy Metals

What have you and your company achieved in the past 12 months?

We have nearly doubled our lithium resource, completed a two-phase metallurgical test work program and published a Preliminary Economic Assessment (PEA) on our Falchani Lithium Project, located in Peru. The PEA demonstrates Falchani is a low cost, long mine life battery quality lithium chemical project with a phased ramp-up in production to become one of the world's largest single asset producers of lithium chemicals.

More recently, we completed preliminary test work on the potential by-products at Falchani, which include a fertilizer (SOP) which is in high demand in Peru, as well as a high value Caesium chemical. By-products have the potential to considerably reduce the net operating costs of Falchani from its already low 2nd quartile benchmark. We have executed an MOU with one of the world's largest fertilizer traders, marketers and producers, Ameropa AG, which is a testament to the SOP potential of our project.

What are the most important company catalysts for the next 6 to 12 months?

Adapting to current global circumstances, we will tackle 2020 at a slower pace than previously intended, in an effort to preserve capital. Our objectives over the next 6 to 12 months will be to focus on strategic planning for both projects, readying them for a return to a more normalized world. We will continue discussions and introductions across the battery supply chain to raise the profile of Falchani and, for Macusani focus people's attention on the lack of low OPEX, 120-million-pound uranium deposits that can be built for US$300 million. Further, we continue to work with the Peruvian government with respect to the uranium regulations, previously targeted required for our Macusani Uranium Project, a low cost, high return uranium project situated approximately 25 kms away from our lithium project.

How do you see the current situation on the market for battery metals?

We believe 2020 is about bottoming in both price and sentiment, even in this global environment. In the past 4-6 months we've seen projects stalled, production curtailed, and expansion plans delayed – thus bringing forward the forecasted supply shortage by 2-3 years (what was 2025/26 is now 2023). We believe the negatives have now been priced in and we will start to see sentiment rebound into 2021. Further, we believe 2021 is a year of transition where the real demand market for lithium will start to take fold, significant flows of ESG related capital will enter the space and we will shift from a lithium hype market (2014-2017) to a longer term bull market leading into 2021+.

ISIN: CA72764B1004
WKN: A2JGKQ
FRA: QG1A
TSXV: PLU

Shares outstanding: 85.5 million
Options: 6.9 million
Warrants: 8.1 million
Fully diluted: 100.5 million

Contact:

Plateau Energy Metals
141 Adelaide St. W., Suite 340
Toronto, Ontario, M5H 3L5 Canada

Phone: +1-416-628-9600

IR@PlateauEnergyMetals.com
www.plateauenergymetals.com

Plateau Energy Metals

Sierra Metals

Future base metal supplier for lithium-ion batteries with profitable mines on growth course

Igor Gonzales, CEO

Sierra Metals is a Canadian raw material producer that operates three mines in Mexico and Peru. All three mines are highly profitable and have a balanced production ratio of silver, zinc, copper and lead/gold. This alone makes Sierra Metals an absolute low-cost junior. The company is also planning a further increase in production for the current year and sees itself primarily as a future supplier for the lithium-ion industry. Its greatest strength is its exploration potential, which appears almost gigantic. Recently, excellent production and financial figures were published.

Yauricocha Mine – Location and production

The Yauricocha Mine is located in Peru, covers about 18,000 hectares and is 82% owned by Sierra Metals and has been in continuous operation since 1948! The mine has a daily processing capacity of 3,150 tons and mines silver, gold, lead, zinc and copper from underground. In 2019, Sierra Metals has recovered a total of 1.799 million ounces of silver, 4,165 ounces of gold, 20.06 million pounds of copper, 34.55 million pounds of lead and 81.08 million pounds of zinc from the Yauricocha Mine. In October 2019 Sierra Metals released a new reserve and resource estimate. Yauricocha had reserves of 13.0 million ounces of silver, 210.0 million pounds of copper, 572.0 million pounds of zinc, 144.0 million pounds of lead and 136,000 ounces of gold. Yauricocha also had resources (including reserves) of 29.1 million ounces of silver, 573.2 million pounds of copper, 1.075 billion pounds of zinc, 328.5 million pounds of lead and 349,700 ounces of gold.

Yauricocha mine – exploration potential

The exploration potential is much higher, as only a fraction of the total project area has been drilled to date. Particular attention is being paid to the La Fortuna, Ipillo and Kilkasca zones. In the area of current mining activities, the company intends to close the gap between the Cachi-Cachi Mine and the Esperanza Zone in the coming months. In addition, both the Cachi-Cachi Mine, Esperanza and the Central Mine areas are still open at depth, and therefore have the potential for additional resources.

Yauricocha Mine – expansion plans

Due to the numerous new discoveries, the management decided to gradually expand the production capacity from 3,000tpd to 5,500tpd. A PEA published in June 2018 confirmed a return on investment of 486% for the company in the event of a corresponding expansion. Sierra Metals plans to implement the expansion by 2021.

Bolivar Mine – Location and production

The Bolivar Mine is located in the Mexican state of Chihuahua, covers approximately 15,217 hectares and is 100% owned by Sierra Metals. It has a daily processing capacity of 5,000 tons and mines silver, gold and copper from underground. In 2019 Sierra Metals was able to extract a total of 640,000 ounces of silver, 6,974 ounces of gold and 19.83 million pounds of copper from the Bolivar Mine. Bolivar had reserves of 3.2 million ounces of silver, 114.5 million pounds of copper and 53,500 ounces of gold at the end of March 2020. Indicated and inferred resources were 19.3 million ounces of silver, 703.6 million pounds of copper and 274,300 ounces of gold.

Bolivar Mine – exploration potential

Starting from the current El Gallo mining area, two vents run from the current mining area and move towards each other at depth. The Company believes the source of the copper mineralization is at the exact point where they meet. This is where a high-grade copper porphyry may be encountered. In addition, the concession area has 10 other areas that host or may host significant resources. These include the Bolivar West Zone, where Sierra Metals has already identified high grade copper areas. A 20,000-metre drill program at La Sidra included 3.5 metres at 9.22% copper equivalent and 9.7 metres at 10.63% copper equivalent. The Bolivar West Zone included 9.2 metres at 4.05% copper equivalent and 10.5 metres at 4.26% copper equivalent.

In September 2017, Sierra Metals announced assay results from the completed definition drilling program in the West Bolivar Zone. This zone is adjacent to the current workings at the Bolivar mine. The drill program returned excellent copper, zinc and silver grades. The average grade was 2.55% copper equivalent with an average true thickness of 9.1 metres.

Bolivar Mine – Expansion

From 2017 to 2020, the capacity of the Bolivar Mine was doubled from 2,500tpd to 5,000tpd. As a result, the all-in-sustaining costs were reduced to US$2.84 per pound of copper equivalent. For 2020 Sierra Metals plans to reduce AISC costs to only US$1.75 per pound.

Bolivar Mine – Letter of Intent with Mega Partner

In September 2017, Sierra Metals entered into a letter of intent with Jinchuan Group Co Ltd to develop their Bahuerachi Copper Project. This project is immediately adjacent to Sierra's Bolivar concessions. The Jinchuan Group is one of the world's largest base metal producers and also North China's largest copper producer. Both companies expect the cooperation to generate synergy effects for both projects.

Yauricocha Mine – in continuous operation since 1948 and still growing
(Source: Sierra Metals)

Cusi Mine – Location and production

The Cusi Mine is also located in the Mexican state of Chihuahua, covers approximately 11,671 hectares and is 100% owned by Sierra Metals. It has a daily processing capacity of 1,200 tons and mines silver, gold and lead from underground. Since 2017 the production has been successively expanded from 650 to 1,200 tpd and in a second step to 2,700 tpd by 2021.
In 2019, Sierra Metals was able to extract a total of 936,000 ounces of silver, 493 ounces of gold and 904,000 pounds of lead from the Cusi Mine. In February 2018 Sierra Metals was able to release a new resource estimate for Cusi. According to this the mine had 50 million ounces of silver equivalent at that time.

Cusi Mine – exploration potential

Sierra Metals announced in February 2017 the discovery of a new high-grade silver intercept in the Santa Rosa de Lima complex within the current production area at the Cusi

Mine. The discovery included 1.5 metres at 1,243g/t silver equivalent and 3.1 metres at 1,126g/t silver equivalent. The Santa Rosa de Lima complex is located within a regional structure that extends for approximately 64 kilometres. The portion of the complex occurring on the Cusi property is expected to be 12 kilometres long. Mineralization in the Santa Rosa de Lima structure is only 100 metres below surface and can occasionally be seen at the surface even at intersections of veins such as „Promontorio“ and „Santa Edwiges“.

In June 2017, the Company announced further results from a new high-grade zone. This zone has a minimum size of 1,700 meters by 400 meters. The average grades were 372g/t silver equivalent and the average thickness of the mineralization drilled was 3.8 metres.

Summary:
Production increase and world-class exploration potential

Sierra Metals has reported record production results month after month from 2016 on the flagship Yauricocha project. The discovery of several new zones in the area of all three mines not only proves that Sierra Metals has tremendous exploration potential, but also provides improved production results. With increased production that has been and is being implemented at all three mines, rising silver and base metal prices and falling production costs, Sierra Metals should see profits spurt up soon. This is particularly important in view of the fact that Sierra Metals wants to establish itself as a supplier for the booming lithium-ion industry. Sierra Metals‘ big plus is certainly the exploration potential in all three project areas, which should ensure a steady, positive news flow. Sierra Metals has announced to return a total of $30 million to shareholders in 2020.

Exclusive interview with Igor Gonzales, CEO of Sierra Metals

What have you and your company achieved in the past 12 months?

In 2019, the Company was successful in its expansion efforts at its Mexican operations, having completed a 40% production increase at the Bolivar Mine: growing to 4,200 TPD (from 3,000 TPD) and finishing the year well ahead of initial goals of 3,600 TPD. The Cusi Mine nearly doubled production, growing from 650 TPD to 1,200 TPD. These expansions will allow the Company to improve profitability and reduce unit costs going forward. Additionally, an updated 43-101 report was recently filed for reserves and resources at the Yauricocha Mine as well as the Bolivar Mine.

What are the most important company catalysts for the next 6 to 12 months?

Due to the global impact of the COVID -19 pandemic and the uncertainty of its overall impact on the Company’s operations and financial condition, the Company has implemented proactive and reactive mitigation measures to minimize any potential impact on our people, communities, operations, supply chain, and finances. This also includes preserving capital and deferring capital programs where appropriate, to improve liquidity.

Additionally, with the recent suspension of operations in both Peru and Mexico due to COVID-19, the Company will maintain an essential services crew at the Yauricocha and Bolivar Mine sites and the Cusi Mine site has be placed into care and maintenance during this period. Production can recommence to normal levels very quickly after these suspensions are lifted. The Company anticipates resuming normal production levels at the Mines after this period and has some operating flexibility at Bolivar to run the ore processing mill at higher levels, which should help recover lost ore tonnages from this suspension.
Once normal operations commence, Sierra Metals will continue on a path to reach a production level of 5,000 t/d at its Bolivar mine in Mexico. The Company is also hoping to receive permits to increase production by 20% to 3,600 t/d at Yauricocha. Engineering studies are also being completed in preparation for further expansions at both mines. We also expect to complete the 43-101 technical report at Cusi which is expected to provide a maiden reserve estimate.

Sierra Metals reported 2019 earnings per share of $0.03 and we hope to continue to report positive earnings in 2020 and beyond. Year after year we have been increasing production whilst reducing costs, and we will continue to endeavour to do so. Additionally, we have a strong opportunity to grow resources – Yauricocha and Bolivar have huge potential for both exploration and development.

How do you see the current situation on the market for battery metals?

With a positive outlook for the EV market in the coming years, we view the current battery metals markets in a positive light. While there may be lower demand in the near-term due to the effects of COVID-19, longer term we remain bullish. Current mines will look to expand, and new mines will enter production in order to support the demand for the commodities associated with rechargeable batteries.

Sierra Metals Inc.

ISIN: CA82639W1068
WKN: A1J9PT
FRA: DFXN
TSX: SMT
NYSE: SMTS

Shares outstanding: 162.1 million
Options: -
RSUs: 1.6 million
Fully diluted: 163.7 million

Contact:
79 Wellington Street West
TD Tower South, Suite 2100
Toronto, Ontario, Canada M5K 1H1

Phone +1 866 493 9646

info@sierrametals.com
www.sierrametals.com

Overview of **SRC's communication programs**

Social Media Network

Access to over **70.000 followers and likers**! •

facebook · twitter · LinkedIn · StockTwits · Pinterest · LIVEJOURNAL · YouTube · XING · FLIPBOARD

World wide Resource TV-Channels

Commodity-TV & Rohstoff-TV – more than **1 Mio views** p.a. •

You Tube Channel – more than **1.1 Mio views** p.a. •

Partnership with Dukascopy-TV – worldwide **7 Mio views** p.a. •

Commodity-TV · ROHSTOFF-TV · DUKASCOPY Swiss Financial Television · YouTube · CORE FINANCE

THE EXCLUSIVE MEDIA & COMMODITY CORPORATION

Stockhouse. Taking it to the Street.

+ 1.700 user

Commodity TV Mobile-App

SRC

SWISS resource capital ag

Your partner in Europe!

Press- Media- IR- and Roadshow-Services

• Professional **roadshows in Europe & Switzerland** in citys like: Zurich, Zug, Geneva, Lugano, St. Gallen, Vaduz, Milan, Munich, Frankfurt, Hamburg, Oslo, Stockholm, Monaco, Paris, Luxemburg, Vienna

• **Write-ups** through our editors & third party authors up to 200 different websites like Wallstreet-Online.de, Ariva.de, Finanzen.net

• Translation and dissemination via IRW-Press and Pressebox

articles, news releases and write-ups, advertorials

IRW PRESS · PRESSEBOX

In German: +2,000 press & news outlets and + 1,800 journalists in Germany, Switzerland, Austria and Liechtenstein

In English: +10,000 press & news outlets and +3,500 journalists in 170 countries worldwide

Swiss Resource Capital AG & Commodity-TV Fairs and Events

• **Deutsche Rohstoffnacht** – INVEST Stuttgart

• **Edelmetallmesse,** Munich

• **Mines and Money,** London

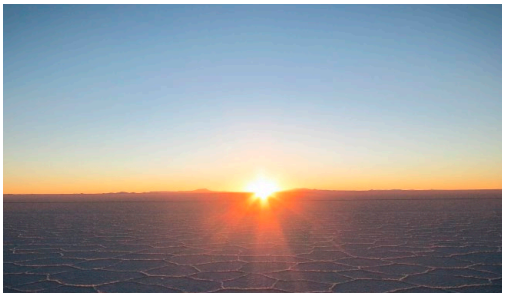
• **Precious Metals Summit,** Zurich ... and more

Invest – Leading trade fair and congress for finance and investment

Precious Metals Summit Conferences, LLC – Where the smart money goes prospecting® · DRN Deutsche Rohstoffnacht · Edelmetall & Rohstoffmesse · mines and money London





SRC SWISS resource capital ag