ASX Release
28 October 2019
ASX: KRX

Quarterly Activities Report

September 2019

Highlights

- Completion of acquisition of the **Vulcan Zero Carbon Lithium™ Project**
- Commencement of **Scoping Study**, appointment of **Hatch** as process engineering lead, Alex Grant as Lithium Technology Advisor
- Establishment of JORC Exploration Target[1]; potentially the largest lithium project in Europe and globally significant
- Confirmatory re-sampling of lithium-bearing brines commenced to establish maiden JORC resource
- Evaluation of dual European listing under way
- Ongoing exploration of Norwegian Projects.

During the Quarter, Koppar Resources Ltd. ("Koppar", "KRX", "the Company") completed the acquisition of the **Vulcan Zero Carbon Lithium™ Project** in Germany. As part of the acquisition, Dr Francis Wedin was appointed Managing Director and Mr Gavin Rezos appointed Chairman, greatly strengthening the experience and expertise of the Board, as the Company drives forward with this new and exciting project. The Company immediately commenced work to progress the **Vulcan Zero Carbon Lithium™ Project**. Following an initial geological study, the Company announced a substantial Exploration Target of 10.73 to 36.20 Mt of contained LCE (Lithium Carbonate Equivalent), making it potentially the largest lithium project in Europe, and globally significant. The Exploration Target's potential quantity and grade is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource, and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

The Company has commenced a confirmatory brine re-sampling programme from well-head sites within the brine field, with a view to establishing a maiden JORC resource. The results of this programme are expected within the coming weeks. The Company has also commenced a Scoping Study at the Vulcan Zero Carbon Lithium™ Project, and appointed Hatch Ltd. as process engineering lead. Hatch have unique experience in lithium and geothermal brine projects. Direct Lithium Extraction (DLE) expert Alex Grant was appointed as Lithium Technology Advisor. In line with its strategy of developing its European projects, KRX is also evaluating a potential dual listing on a European exchange.

Highlights

Large, lithium-rich geothermal brine field, in the Upper Rhine Valley of Germany.

Aiming to be the world's first **Zero Carbon Lithium™** producer.

Strategically located at the heart of the EU auto & Li-ion battery industry.

Fast-track development of project under way, targeting production of lithium hydroxide by 2023.

Corporate Directory

Managing Director
Dr Francis Wedin

Chairman
Gavin Rezos

In-Country Principal
Dr Horst Kreuter

Non-Executive Director
Patrick Burke

Non-Executive Director
Bill Oliver

Fast Facts

Issued Capital: 48,500,002
Market Cap (@14.0c): $6.8m

Contact

Suite 2, 1 Altona St,
West Perth
WA 6005 Australia
08 6559 1792
www.kopparresources.com
info@kopparresources.com
@kopparresources

[1] KRX ASX announcement 20/08/2019. All material assumptions and technical parameters underpinning the Exploration Target in the relevant announcement continue to apply and have not materially changed.

Vulcan Project Summary: Unique Zero-Carbon Lithium™ Production

World-first unique process to satisfy car manufacturers' stated desire for zero carbon Battery Electric Vehicle (BEV) raw materials supply chain

Potentially the Largest Lithium Project in EU & one of the Largest in the World

Recent JORC Exploration Target 10.73-36.20 Million Tonnes Contained Lithium Carbonate Equivalent (LCE)

Secure Domestic Lithium Supply for EU

Auto industry and governments determined to reduce key threat of security of supply and reliance on China

Only Lithium Brine Project in EU

Ultra-low impact, recent precedent for permitting wells in region with widespread social acceptance

Rapid Advancement Under Way

Scoping Study nearing completion with Hatch as project engineering lead

The **Vulcan Zero Carbon Lithium™ Project** is aiming to be Europe's and the **world's first Zero Carbon Lithium™ project**. It aims to do achieve this by producing **battery-quality lithium hydroxide** from hot, sub-surface geothermal brines pumped from wells, with a renewable energy by-product fulfilling all processing energy needs. The Vulcan Zero Carbon Lithium™ Project is strategically located, within a region well-serviced by local industrial activity, at the heart of the European auto and lithium-ion battery manufacturing industry, just 60km from Stuttgart. The burgeoning European battery manufacturing industry is forecast to be the world's second largest, with currently zero domestic supply of battery grade lithium products. The Company recently commenced a Scoping Study at the project and is targeting a maiden JORC resource during Q4 2019.

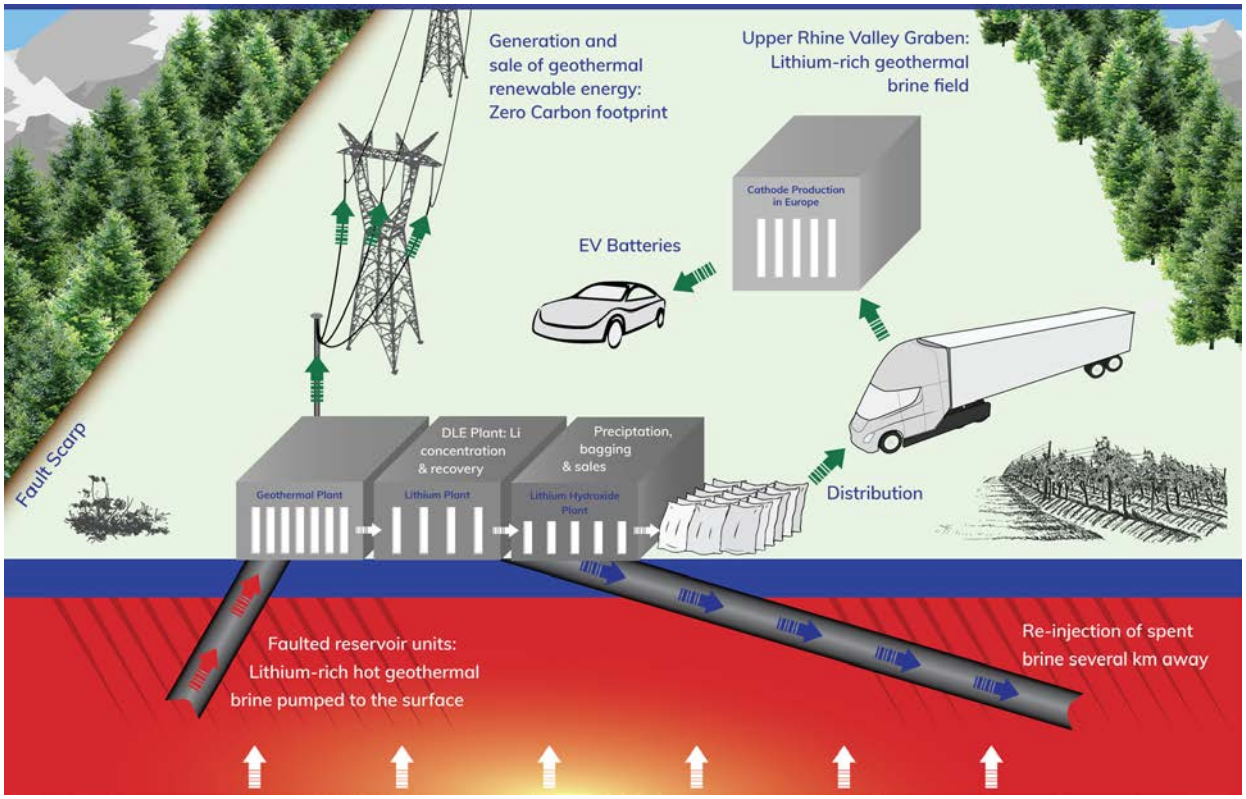


Figure 1: Schematic of the Zero Carbon Lithium project

Why Vulcan? Zero Carbon Supply Chains Required

BEV raw material supply chains have a carbon footprint problem, producing more CO_2 during production than Internal Combustion Engines (ICE). Car manufacturers are actively trying to reduce the carbon footprint of their battery supply chains to bolster the credibility of their BEV offerings. This will enable them to avoid financial emissions penalties and obtain premium pricing for lowest carbon footprint in production. Volkswagen, among others, is placing great importance on having a CO_2-neutral production supply chain for its very extensive new EV line-up, with a raw materials purchasing metric for sustainability put on par with price[2], and the goal of producing net zero carbon BEVs as delivered to the customer.

The European Commission is following suit, recently flagging that "CO_2 Passports" will be issued to BEVs detailing the full CO_2 footprint of each battery. The aim is to differentiate EU lithium-ion battery and BEV production, by producing uniquely low CO_2 products. High cost to offset CO_2 footprint of current lithium supply chain

Currently, there is no "zero carbon" lithium chemical product in the world, since all current extraction, processing and transport routes are very carbon intensive.

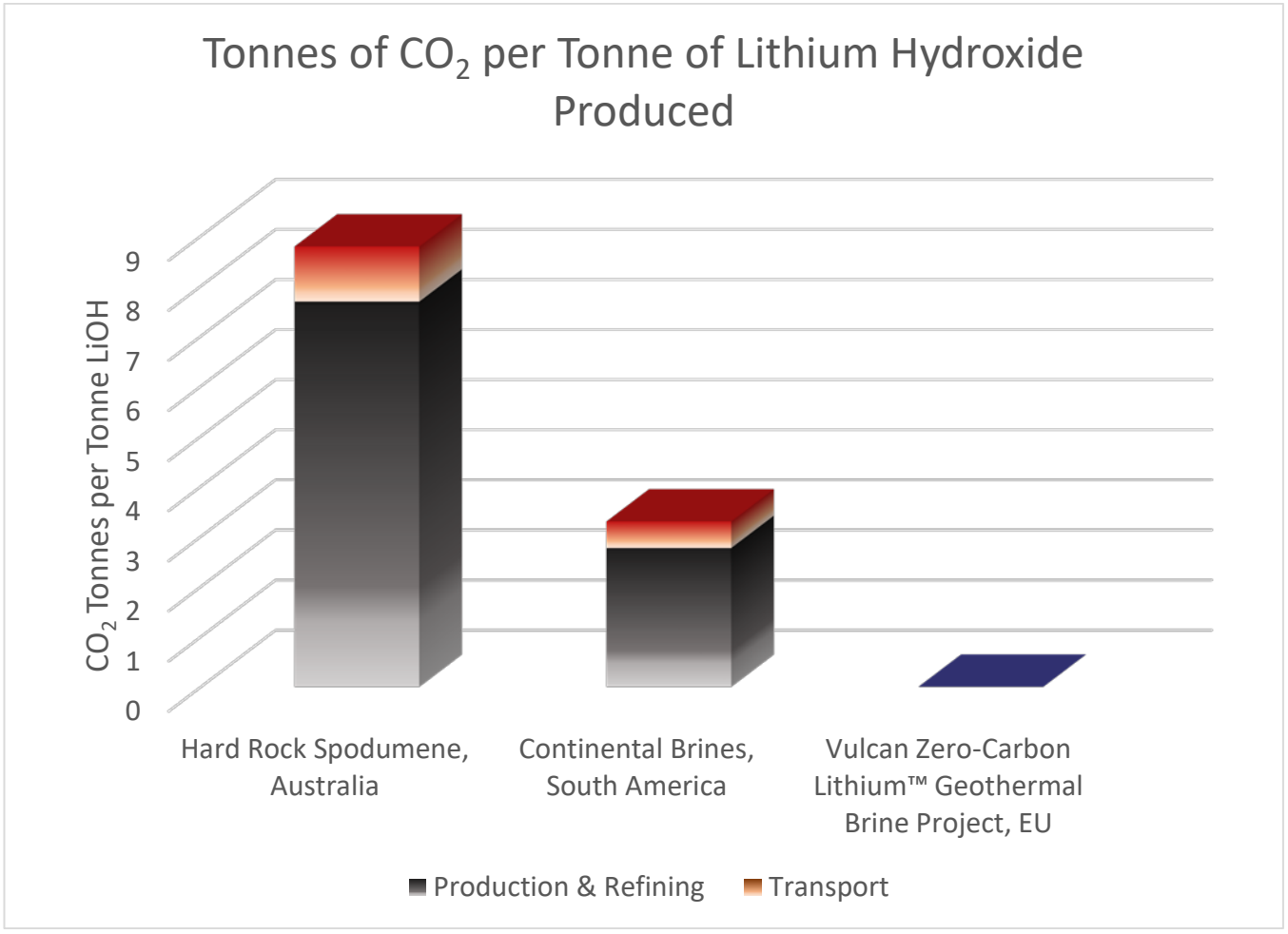


Figure 2: CO_2 footprint of lithium sources relative to Vulcan Zero Carbon Lithium™ Project[3]

[2] Volkswagen ID presentation, 2019
[3] See KRX Presentation 16/10/19

Why Vulcan? Lithium Supply Chain Problematic

Hard-rock lithium production has a high OPEX and high CO_2 footprint due to its inherent energy requirement for mining, crushing and processing to producing battery quality lithium chemicals, as well its transport distance to major global markets. A processing bottleneck has also developed for spodumene concentrate going through lithium refinery plants in China, creating downward pressure on concentrate prices.

South American lithium brine operations make up the balance of current production. Because of their distance to market, remoteness and substantial use of reagents from North America, there is a substantial CO_2 footprint inherent in these operations also. These operations can also be very slow and unreliable in terms of producing battery quality lithium chemicals, as the evaporation process makes them vulnerable to weather events. The evaporation can also cause stresses on local environment and communities.

In parallel with this, there is an unprecedented ramping up of lithium-ion and associated cathode production in Europe. Forecasts show that the European Union (EU) is set to require the equivalent of the entire current global battery quality lithium demand by the mid-2020s, with 2023 being the main inflection point. There is currently zero EU production of battery-quality lithium hydroxide, let alone a CO_2-neutral product. A severe battery-quality lithium chemical supply shortfall is thus developing in the EU.

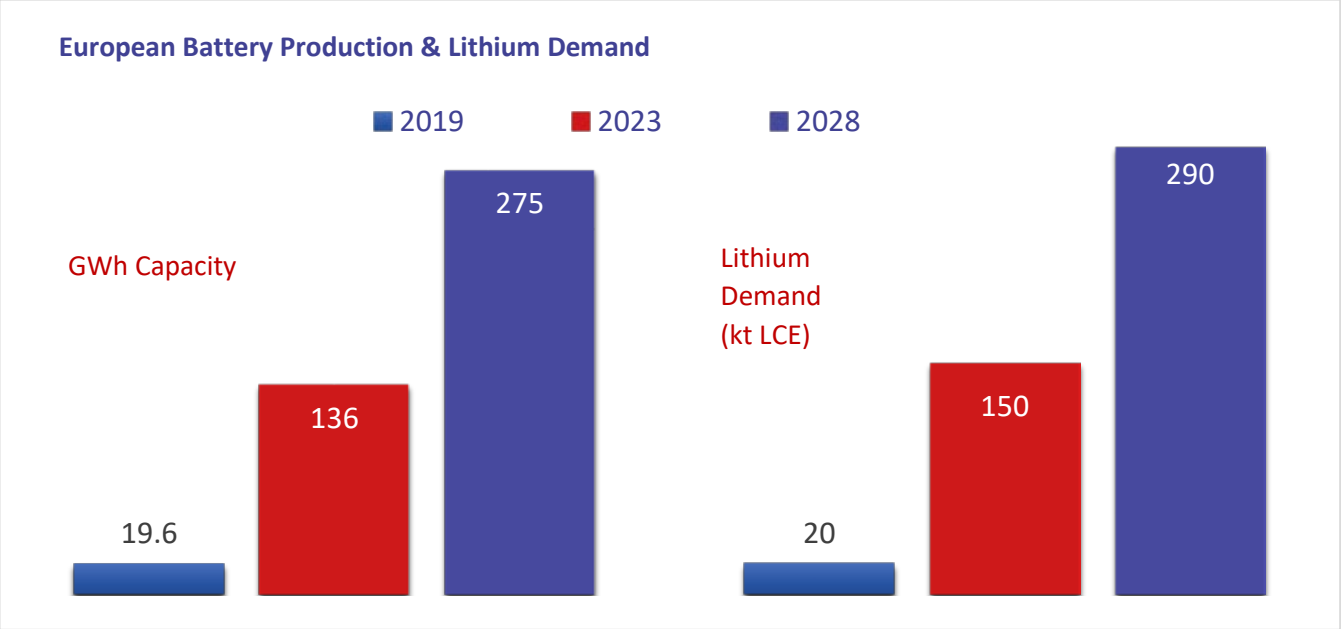


Figure 3: Forecast battery production in EU and associated lithium demand[4]

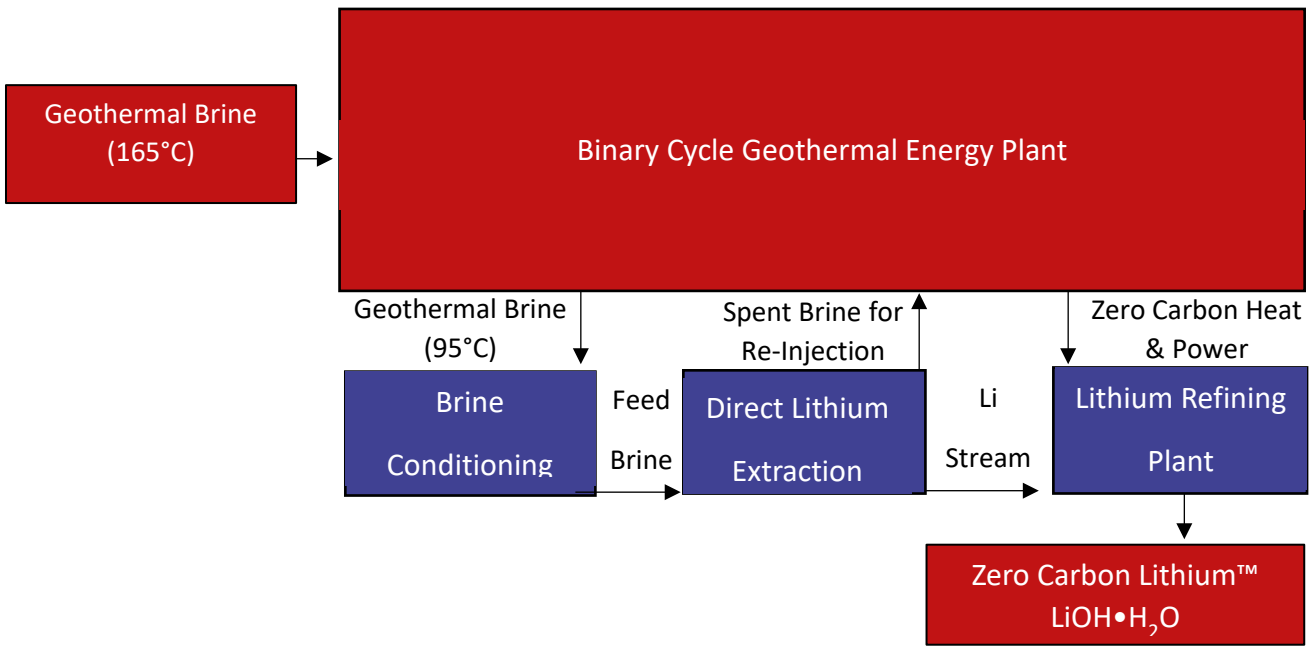
[4] See KRX Presentation 16/10/19

Premium, Peerless & Disruptive Solution: Zero-Carbon Lithium™: Vulcan Project, Germany

The Company believes that the solution lies in the **Vulcan Zero Carbon Lithium™ Project.** This comprises a very large, lithium-rich geothermal brine field in the Upper Rhine Valley of South-West Germany, in the heart of the EU's battery "giga-factory" production.

The Zero Carbon Lithium™ Production stems from a clever, unique process:

1. Standard geothermal production wells will be drilled into high flow rate, lithium-rich brine reservoir units, including the Buntsandstein unit. Geothermal energy wells have been successfully doing this for decades in the Upper Rhine Valley, so there is strong precedent. The heated brine is pumped up and produces geothermal energy via a binary cycle plant, which emits no CO_2.
2. Usually the spent brine would then be re-injected into the reservoir. In the Vulcan process, the spent brine gets diverted through a Direct Lithium Extraction (DLE) plant, where the vast majority of the lithium is extracted in less than an hour, while leaving other impurities. The brine is then re-injected into the reservoir minus the lithium. A new lithium stream of much higher concentration is formed for further processing and nothing is added to the brine. Livent has used a similar process to produce LiOH•H2O from Argentine brine for over 30 years. Importantly, such technologies have been successfully tested in California for the Salton Sea geothermal lithium field, which has similar brine characteristics to the Upper Rhine Valley brine, meaning a similar process can be used. Vulcan will fast-track project development through its relationships with the most successful groups in the DLE industry who have already de-risked the methods used.
3. A series of chemical operations convert the lithium stream into battery quality lithium hydroxide using conventional processes all previously demonstrated at commercial scale. Water is recycled, no toxic wastes are produced, and no gases are emitted. Heat and power from the geothermal plant are used, meaning no fossil fuels are burned, eliminating carbon emissions from lithium hydroxide processing. On top of being a zero-carbon product, it is expected that the Vulcan flowsheet will be a very low cost LiOH•H2O operation.



Vulcan Project, Germany: Location, Location, Location

The **Vulcan Zero Carbon Lithium™ Project** is situated within one of the most well-studied and well-explored sedimentary graben basins in the world. This means that the lithium-rich brine in the field is very well understood, and large amounts of seismic and geochemical data are readily available, reducing the need for exploration time and spend. Drilling data and existing wells are also available and can be used to shortcut project development. Based on historical data, the Upper Rhine Valley brines have been shown to have grades in the same order of magnitude as typical South American salars, in the hundreds of ppm Li, but with the advantage of readily available heat and power. Commonly, grades are >150mg/l Li in the Upper Rhine Valley at the depths targeted, with grades sometimes up to 210mg/l Li. The means that the Upper Rhine Valley brine field is one of the only geothermal brines in the world, the Salton Sea in California being the other main example, with both high flow rates and lithium grades within the brine reservoir. The Vulcan project represents a dominant license landholding within this brine field.

Importantly, as well as being European, the project is just 60km away from Stuttgart, the home of the German auto-industry. It is perfectly placed to reduce the transport footprint of lithium chemicals down to almost negligible amounts, both from a carbon cost and direct financial cost perspective. In addition, existing and recently permitted geothermal operations within the area are testament to the social and environmental acceptance of drilling geothermal wells within the region, in contrast with hard rock mining projects elsewhere in Europe. Indeed, one notable geothermal operation is surrounded by vineyards, showing the harmony of such operations with local communities.

Figure 4: Vulcan Zero Carbon Lithium™ Project Location

Activities During the Quarter

JORC Exploration Target

Following an initial geological study, the Company announced a substantial JORC Exploration Target of 10.73 to 36.20 Mt of contained LCE (Lithium Carbonate Equivalent), making it potentially the largest lithium project in Europe, and globally significant. The Exploration Target's potential quantity and grade is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource, and it is uncertain if further exploration will result in the estimation of a Mineral Resource. The Company intends to convert some of this Exploration Target to a maiden mineral resource estimate as soon as possible, by generating new geochemical data and evaluation of existing seismic and well data, and has commenced works to achieve this.

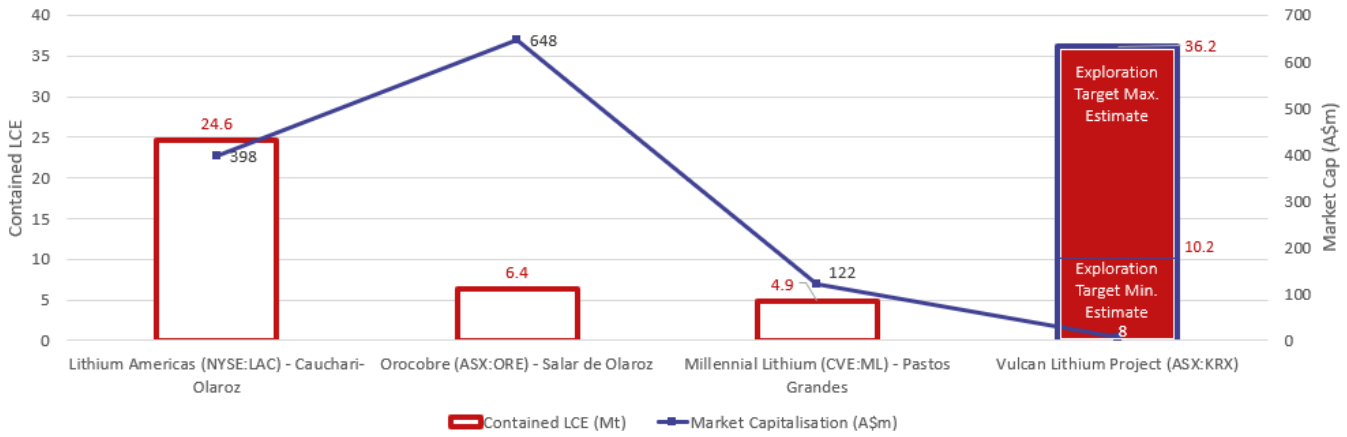


Figure 5: Size of Vulcan Zero Carbon Lithium Project relative to other global lithium brine projects. Chart compares resources from companies at different stages of development as detailed in Appendix 1, with Vulcan Lithium Project which is an Exploration Target expressed as a range of values as per KRX ASX announcement 20/08/2019. The Company is not aware of any new information or data that materially affects the information included in the announcement. All material assumptions and technical parameters underpinning the Exploration Target in the relevant announcement continue to apply and have not materially changed. The Exploration Target's potential quantity and grade is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource, and it is uncertain if further exploration will result in the estimation of a Mineral Resource. Market capitalisations converted to A$m as at 14 October 2019.

Commencement of Scoping Study, appointment of Hatch as process engineering lead, Jade Cove Partners as Lithium Technology Advisor

The Company commenced a Scoping Study at the Vulcan Zero Carbon Lithium™ Project, and appointed Hatch Ltd. as process engineering lead. Hatch have unique experience in lithium and geothermal brine projects. Direct Lithium Extraction (DLE) expert Alex Grant was appointed as Lithium Technology Advisor. Alex co-founded Lilac Solutions, one of the world's leading direct lithium extraction technology companies. He is now an independent advisor for multiple lithium projects around the world that seek to implement advanced technologies for production of battery quality lithium chemical products. The Scoping Study is already well advanced and progressing well.

Confirmatory Re-Sampling of Lithium-Bearing Brines Commenced to Establish Maiden JORC Resource

The Company has commenced a confirmatory brine re-sampling programme from well-head sites within the brine field, with a view to modelling, estimating and establishing a maiden JORC resource. The initial results of this programme are expected within the coming weeks.

Figure 6: Confirmatory sampling of wells in Upper Rhine Valley by Vulcan team, and measurement of on-site brine parameters

Completion of Acquisition & Management Changes

The Company successfully completed the acquisition of the **Vulcan Zero Carbon Lithium™** Project on 4 September 2019. The company has since lodged a trademark application for Zero Carbon Lithium.

Dr Francis Wedin, founder and major shareholder of Vulcan Energy Resources joined the board of Koppar as Managing Director. Dr Wedin previously discovered and defined two new JORC lithium resources, on two continents, in under a year, including Lynas Find, which was bought by Pilbara Minerals to become part of its very large Pilgangoora Lithium Project (ASX:PLS).

Francis has a PhD and BSc (Hons) in mineral exploration, is a Fellow of the Geological Society, London, and a member of the Australasian Institute of Mining and Metallurgy. He is bilingual in English and Turkish, with proficiencies in other languages. He is currently studying a part-time MBA. The terms of Dr Wedin's appointment were set out in the ASX Announcement of 10 July 2019.

Mr Gavin Rezos joined the board as Chairman. As a Principal of Viaticus Capital for almost 20 years, Gavin has helped start-up companies in the technology and resources sectors move to public listings on the ASX, NASDAQ, AIM and Frankfurt Exchanges. In that role, Gavin has held Executive Chairman or CEO positions of two companies that grew from start-ups to entry into the ASX 300.

Gavin has also held Director positions of public listed companies in the technology or resources sectors in Australia, the UK and the US. Gavin is currently Chairman of Resource and Energy Group (ASX:REZ) and a principal of Viaticus Capital.

The other director of Vulcan Energy Resources, **Dr Horst Kreuter**, has joined the Company as a Consultant. Dr Kreuter is an engineering geologist with a long career in geothermal energy. He is CEO of Geothermal Group Germany GmbH and GeoThermal Engineering GmbH (GeoT). He has been successful in geothermal project development and permitting in Germany and worldwide. Based in Karlsruhe, Dr Kreuter is local to Vulcan's project area in the Upper Rhine Valley and has a widespread political, investor and industry network in Germany and Europe.

Capital Raising

During the Quarter the Company raised A$1.1 million as part of the Vulcan transaction. The proceeds from the placement will be used to fund initial work at the Vulcan Lithium Project. Xcel Capital Pty Ltd acted as Lead Manager to the placement. Chairman Mr Gavin Rezos subscribed for $150,000 shares under the placement.

Update on Norwegian Projects

The Company continues to explore its extensive copper-zinc mineral exploration portfolio located in the Trøndelag region of Norway.

During the Quarter the Company conducted field programmes across the Undal and Nyberget Projects. These projects were highlighted in the technical review completed in late 2018 (refer ASX Announcements 20 December 2018 and 11 June 2019). Geological reconnaissance of the projects investigated known mineralisation occurrences and targets generated in the review.

In general outcrop at Undal and Nyberget is poor due to till cover however scattered outcrops enabled historical geological mapping to be ground-truthed and updated. A number of historical workings were visited with observations made and samples taken. In addition, a number of sulphide-bearing horizons were observed in outcrop/subcrop and again sampled. In general, these horizons seemed to be associated with the contact between lava flows and between lava flows and volcaniclastics, as well as with chert beds.

The highly prospective Tverfjellet Project was not able to be visited during this field programme due to the presence of snow cover. Samples collected have been sent for analysis, with results pending at the time of writing.

The aim of the above work programmes will be to delineate follow-up targets which will be ranked and prioritised for drill testing.

For and on behalf of the Board

Mauro Piccini

Company Secretary

For further information visit www.kopparresources.com

Competent Persons Statement

The information in this report that relates to the Exploration Targets are based on, and fairly reflects, information compiled by Mr. Roy Eccles P. Geol. and Mr. Steven Nicholls MAIG, who are both full time employees of APEX Geoscience Ltd. and deemed to be both a 'Competent Person'. Both Mr. Eccles and Mr. Nicholls have sufficient experience relevant to the style of mineralization and type of deposit under consideration and to the activity which they are undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australian Code for the Reporting of Exploration Results, Mineral Resources, and Ore Reserves (JORC Code). Mr. Eccles has reported to the scientific community, and as a geological consultant on exploration and resource related lithium-brine work, since 2010, specializing in confined, subsurface lithium-brine deposits in the Western Canada Sedimentary Basin, and the southern United States. Mr. Eccles and Mr. Nicholls consent to the disclosure of information in this report in the form and context in which it appears. The Exploration Target's potential quantity and grade is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource, and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Disclaimer

Some of the statements appearing in this announcement may be in the nature of forward-looking statements. You should be aware that such statements are only predictions and are subject to inherent risks and uncertainties. Those risks and uncertainties include factors and risks specific to the industries in which Koppar operates and proposes to operate as well as general economic conditions, prevailing exchange rates and interest rates and conditions in the financial markets, among other things. Actual events or results may differ materially from the events or results expressed or implied in any forward-looking statement. No forward-looking statement is a guarantee or representation as to future performance or any other future matters, which will be influenced by a number of factors and subject to various uncertainties and contingencies, many of which will be outside Koppar's control.

Koppar does not undertake any obligation to update publicly or release any revisions to these forward-looking statements to reflect events or circumstances after today's date or to reflect the occurrence of unanticipated events. No representation or warranty, express or implied, is made as to the fairness, accuracy, completeness or correctness of the information, opinions or conclusions contained in this announcement. To the maximum extent permitted by law, none of Koppar, its Directors, employees, advisors or agents, nor any other person, accepts any liability for any loss arising from the use of the information contained in this announcement. You are cautioned not to place undue reliance on any forward-looking statement. The forward-looking statements in this announcement reflect views held only as at the date of this announcement.

This announcement is not an offer, invitation or recommendation to subscribe for, or purchase securities by Koppar. Nor does this announcement constitute investment or financial product advice (nor tax, accounting or legal advice) and is not intended to be used for the basis of making an investment decision. Investors should obtain their own advice before making any investment decision.

Appendix One: Vulcan Zero Carbon Lithium™ Project License Summary

Name	Area (ha)	Status	Date Granted / Applied for	Ownership
Ortenau	37,360	Granted	03/2019	100%
Mannheim	14,427	Granted	06/2019	100%
Taro	3,268	Application	03/2019	Earn in to 80%
Ludwig	17,716	Application	04/2019	Earn in to 80%
Rheinaue	5,848	Application	04/2019	Earn in to 80%

Appendix Two: Norwegian Projects License Summary

Name	Area (km2)	Status	Date Granted	Permit Type	Ownership
Nygruva	9.14	Granted	7/07/2017	Exploration	100%
Grimsdalen	9.86	Granted	7/07/2017	Exploration	100%
Tverrfjellet	9.99	Granted	7/07/2017	Exploration	100%
Undal 101	10.0	Granted	5/07/2018	Exploration	100%
Undal 102	10.0	Granted	5/07/2018	Exploration	100%
Nyberget 101	10.0	Granted	5/07/2018	Exploration	100%
Nyberget 102	10.0	Granted	5/07/2018	Exploration	100%
Innerdalen 101	10.0	Granted	5/07/2018	Exploration	100%
Innerdalen 102	10.0	Granted	5/07/2018	Exploration	100%
Innerdalen 103	10.0	Granted	5/07/2018	Exploration	100%
Innerdalen 104	10.0	Granted	5/07/2018	Exploration	100%
Vangrofta 101	10.0	Granted	27/08/2018	Exploration	100%
Vangrofta 102	9.8	Granted	27/08/2018	Exploration	100%
Tverrfjellet 101	9.4	Granted	27/08/2018	Exploration	100%
Tverrfjellet 102	10.0	Granted	27/08/2018	Exploration	100%
Tverrfjellet 103	9.02	Granted	23/01/2019	Exploration	100%
Grimsdalen 101	9.0	Granted	5/03/2019	Exploration	100%
Grimsdalen 102	10.0	Granted	7/09/2018	Exploration	100%
Grimsdalen 103	8.8	Granted	7/09/2018	Exploration	100%
Grimsdalen 104	8.8	Granted	7/09/2018	Exploration	100%
Grimsdalen 105	10.0	Granted	7/09/2018	Exploration	100%
Grimsdalen 106	8.0	Granted	7/09/2018	Exploration	100%
Grimsdalen 107	10.0	Granted	7/09/2018	Exploration	100%
Grimsdalen 108	9.0	Granted	7/09/2018	Exploration	100%
Grimsdalen 109	9.0	Granted	7/09/2018	Exploration	100%