

RESOURCES

VULCAN ENERGY

Zero Carbon Lithium™

Corporate Presentation Oct-Nov 2019

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Competent Person 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.

Summary



Unique Zero-Carbon Lithium™ Production

World-first unique process to satisfy OEMs' 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 Target¹ 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

¹Refer KRX 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.

Vulcan Board & Management



Dr Francis Wedin, Managing Director

- Previously Executive Director of successful ASX-listed Exore Resources Ltd (ASX:ERX). Management experience in resources sector on four continents; bilingual; EU & Australian dual nationality
- Discovered & defined 2 new JORC lithium resources, on two continents, in under a year, including Lynas Find, now part of Pilbara Minerals' Pilgangoora Project in production (ASX:PLS). PhD & BSc (Hons) in mineral exploration, completing MBA in renewables



Gavin Rezos, Chair

- Executive Chair/CEO positions of two companies that grew from start-ups to the ASX 300. Extensive international investment banking experience; investment banking Director of HSBC with senior multi-regional roles in investment banking, legal and compliance functions
- Currently Chair of Resource and Energy Group and principal of Viaticus Capital. Previously Non-Executive Director of Iluka Resources, Alexium International Group and Rowing Australia



Dr Horst Kreuter, In-Country Principal

- CEO of Geothermal Group Germany GmbH and GeoThermal Engineering GmbH (GeoT)
- Successful geothermal project development & permitting in Germany and worldwide. Widespread political, investor and industry network in Germany and Europe. Based in Karlsruhe, local to the project area in the Upper Rhine Valley



Patrick Burke, Non-Executive Director

- Extensive legal and corporate advisory experience and over the last 10 years has acted as a director for a large number of ASX, NASDAQ and AIM listed companies.
- Legal expertise in corporate, commercial and securities law in particular capital raisings and mergers and acquisitions



Bill Oliver, Non-Executive Director

- Geologist with extensive executive experience in the resources sector
- Currently Managing Director of Vanadium Resources, non-executive director of Minbos Resources and Celsius Resources



Technical Team & Key Consultants



Alex Grant, Jade Cove Partners – Lithium Technology Advisor

- Co-founded Lilac Solutions, one of the world's leading direct lithium extraction technology companies
- Independent advisor for multiple lithium projects around the world that seek to implement advanced technologies for production of battery quality lithium chemical products from unconventional resources



GeoThermal Engineering GmbH – Geothermal

- Independent planning and consultancy company for geothermal energy projects worldwide
- Local to Vulcan's project area, located in Karlsruhe



APEX Geoscience Ltd. – Mineral Resource Modelling

- Over 20 years of diverse geological consulting experience, including modelling of lithium-rich geothermal brines
- 3D geological modelling, resource estimation and National Instrument 43-101, JORC and SAMREC compliant Technical Reporting



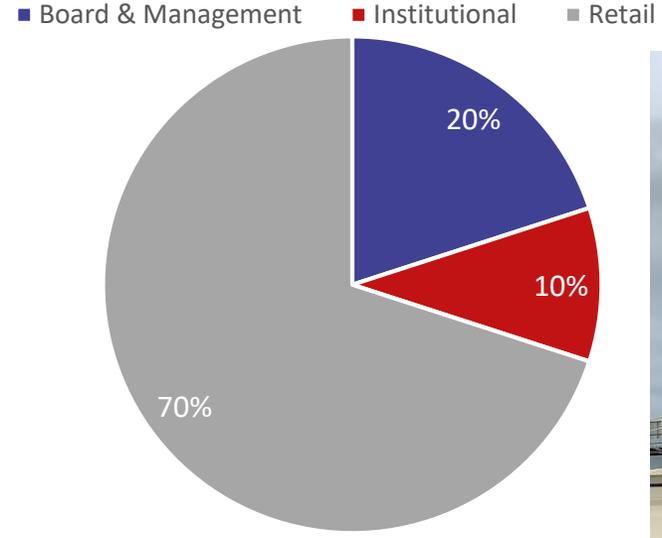
Hatch Ltd. – Consultant, Scoping Study Geothermal & Lithium Process Engineering

- Global industry leading lithium and geothermal power expertise from over 9,000 staff in 70+ offices
- Unique experience with integrated lithium & geothermal projects



Capital Structure

ASX : KRX	
Shares on Issue	48,500,002
Options (28.5c, expiry Dec-20)	12,687,512
Performance Milestone Shares*	13,200,000
Performance Rights**	6,350,000
Market Cap @ 16c (undiluted)	~\$8m
Enterprise Value @ 16c (undiluted)	~\$4.2M
Cash Position	~\$3.8M
Top 20 Shareholders	~45%
Management (undiluted)	~20%



*Vendor Performance Milestone payments to be made on:
 Class A: completion of Scoping Study (4.4M Shares) within 12 months
 Class B: completion of Pre-Feasibility Study (4.4M Shares) within 24 months
 Class C: securing an offtake or downstream JV partner (4.4M Shares) within 36 months

** 3,750,000 Performance Rights to Viaticus Capital comprising Class D, E and F rights (1.25m each), which vest on the same conditions as above.
 2,600,000 Performance Rights comprising 800,000 Class A, 800,000 Class B and 1,000,000 Class C which vest at KRX share price of \$0.40, \$0.75 and \$1.10 respectively.
 Refer ASX Announcement 10 July 2019 for further details

Why Vulcan? **Zero Carbon** Supply Chains Required



- BEV raw material supply chains have a carbon footprint problem
- OEMs actively trying to reduce the carbon footprint of their battery supply chains to bolster the credibility of their BEV offerings and obtain premium pricing for lowest carbon footprint in production.
- Volkswagen placing great importance on having a CO₂-neutral production supply chain for its new EV line-up, with sustainability metric for suppliers on par with price¹
- European Commission have flagged that “CO₂ Passports” will be issued to BEVs detailing full CO₂ footprint
- High cost to offset CO₂ footprint of current lithium supply chain

Our vision is 100% CO₂-neutral E-mobility
Decarbonisation concept

Volkswagen’s delivery promise



Sustainability as selection criteria on par with quality or price

- Cathode production and sub-supply chain (raw material production) expected to be CO₂ hot-spot



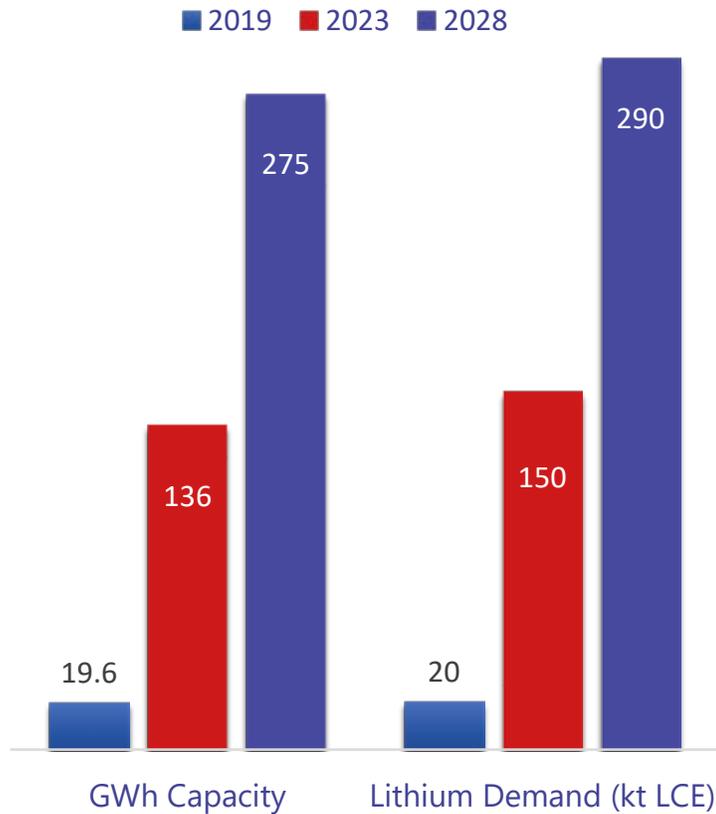
Impossible to CO₂ neutral BEVs through conventional lithium production. Risk to the BEV revolution.

¹Volkswagen Presentation, ID. Insights, Sustainable Mobility, 2019

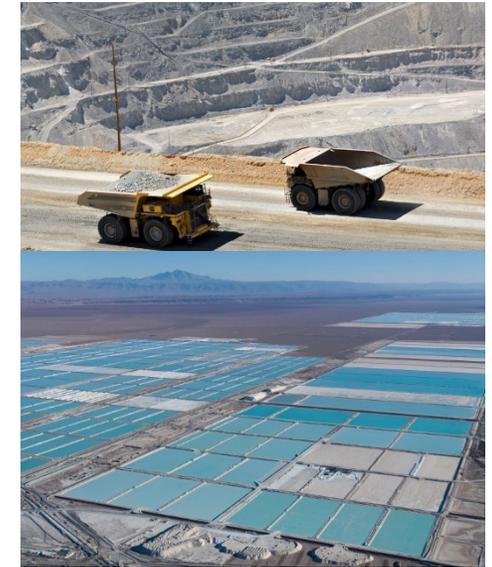
Why Vulcan? Lithium Supply Chain Problematic



European Battery Production & Lithium Demand



- Hard-rock Li: **high OPEX and high CO₂ footprint** due to energy requirement, distance to market
- Hard-rock Li: processing **bottleneck** through **China**
- South American brine operations **thousands of kilometers away** from Europe - high CO₂ intensity shipping product & processing reagents
- South American evaporation process **high CAPEX**, up to **18 months** to produce product, vulnerable to **weather events**, challenging to provide **reliability of product**
- **Zero** EU production of battery quality lithium hydroxide. **Severe** battery-quality lithium supply **shortfall** in Europe with slated battery and EV manufacturing.
- EU pushing for integrated local lithium-ion battery supply chain. **Unprecedented push** from battery/cathode makers and OEMs to ramp up lithium-ion production
- 150kt LCE demand in EU for battery production, by 2023, **290kt by 2028¹**



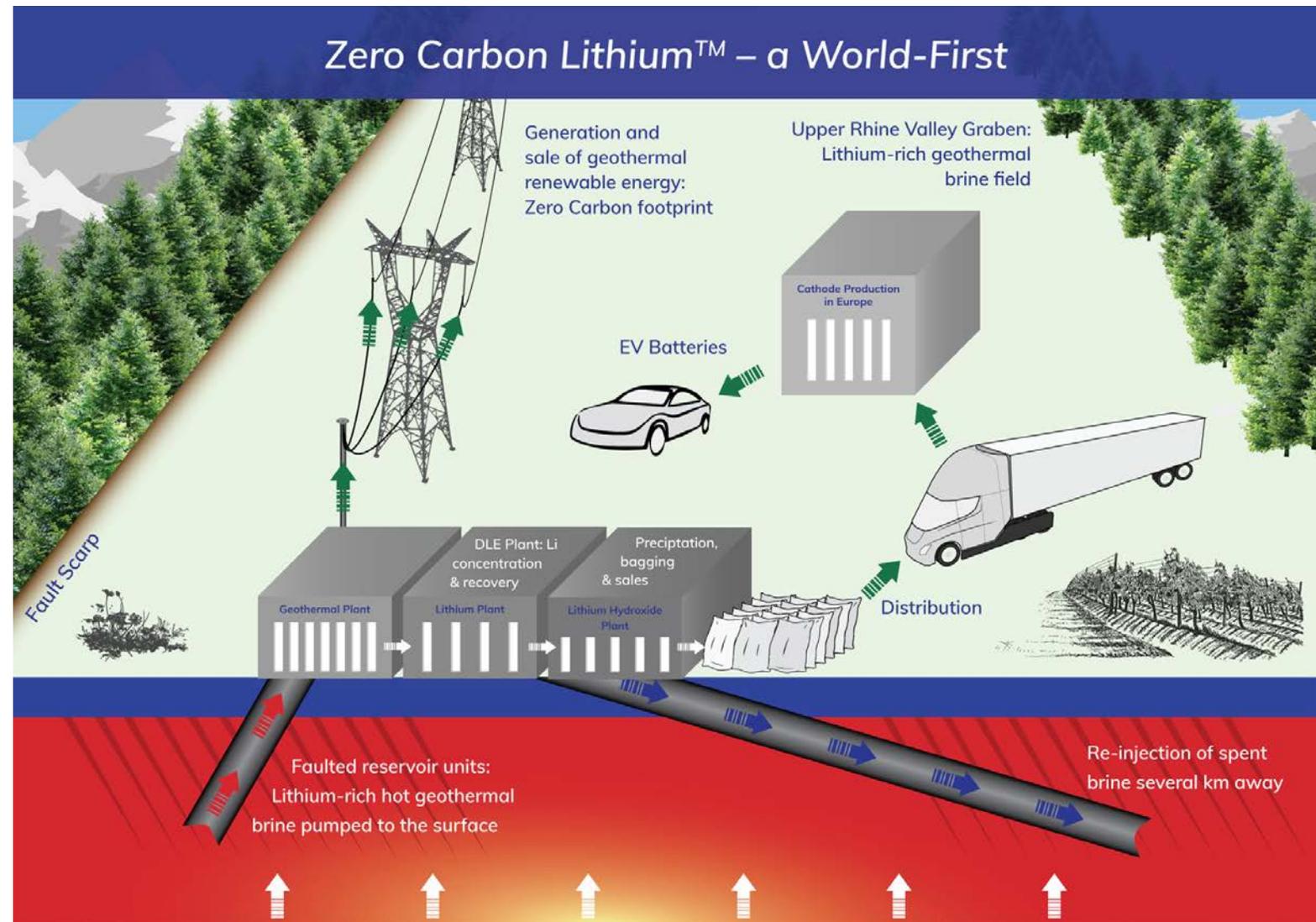
Supply Deficit Looming. High CO₂ Products. The market is ripe for disruption.

¹refer ASX Announcement 10 July 2019

Solution: **Zero-Carbon Lithium™**: Vulcan Project, Germany



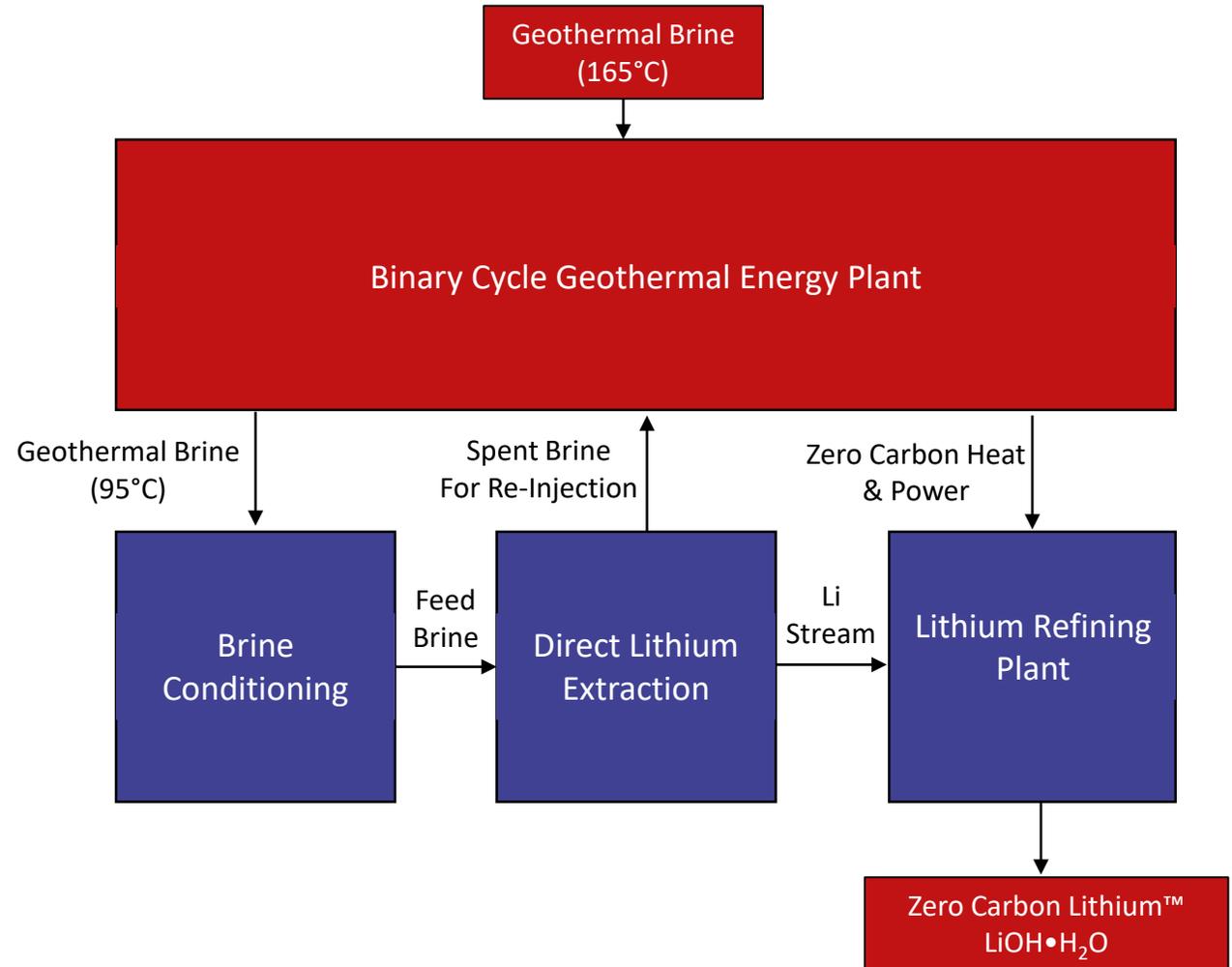
- Very large, Li-rich geothermal brine field in Upper Rhine Valley of Germany, in the heart of the EU's battery "giga-factories"
- Production wells to be drilled into high flow rate, lithium-rich brine reservoir units, including Buntsandstein (2,500m depth)
- Unique Vulcan flowsheet, combines:
 - geothermal energy production, with;
 - world-class, de-risked Direct Lithium Extraction (DLE) process to produce LiOH from the brine
 - Zero carbon electricity generated and used to produce premium, **Zero Carbon Lithium™** with no gas input
- Spent brine re-injected into reservoir – no evaporation losses



Zero-Carbon Lithium™: Unique Flowsheet



- DLE from geothermal brines thoroughly de-risked
- Processing time hours instead of months, not dependent on weather
- Ready for deployment to produce consistent, battery quality $\text{LiOH}\cdot\text{H}_2\text{O}$ products
- Unique flowsheet developed by Vulcan, making use of binary cycle geothermal electricity & heat to create **Zero Carbon Lithium™** product
- Electricity grid credit from excess energy produced: highly attractive Feed-in-Tariff (FiT) of €0.25/kWh

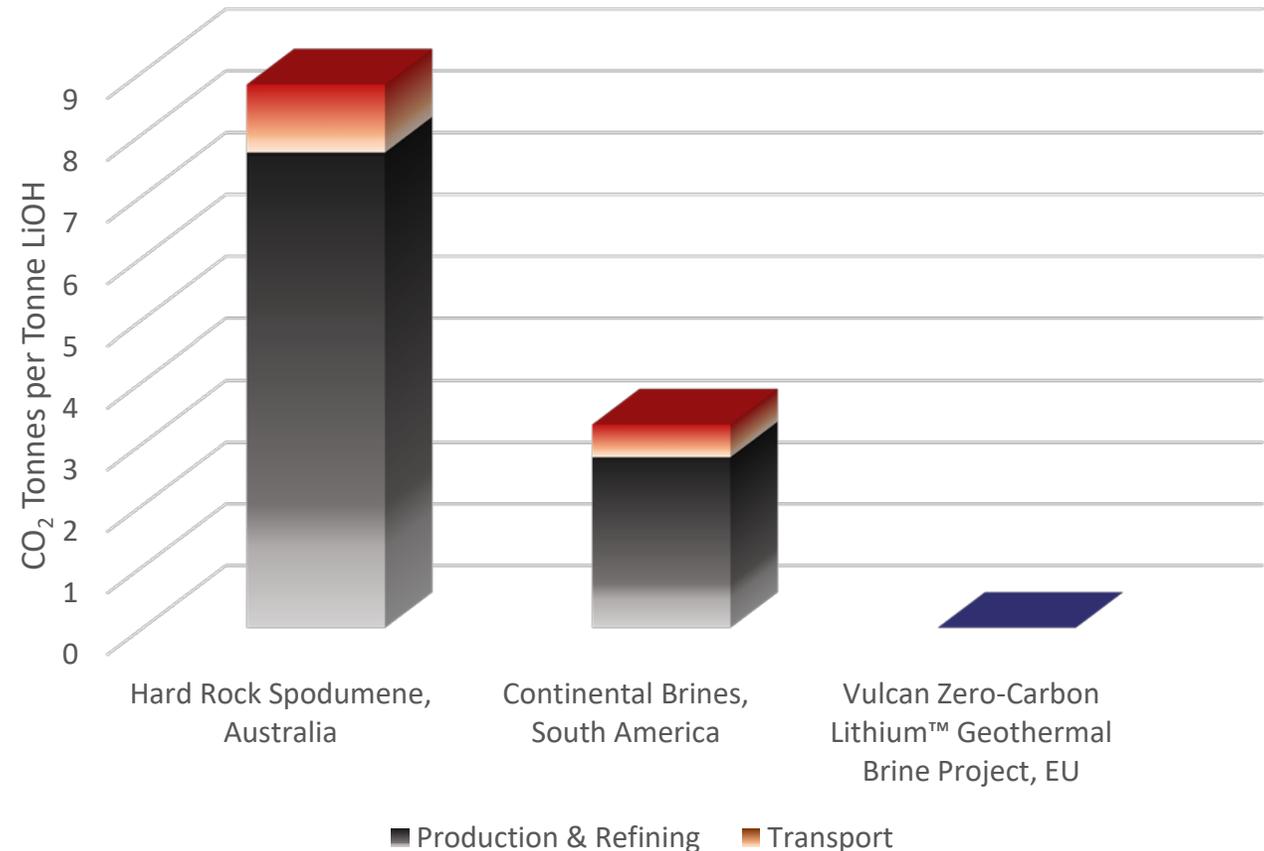


Zero-Carbon Lithium™: Premium, Peerless & Disruptive



- Current European lithium supply options have very high carbon intensity during production¹
- Significant carbon footprint also through global transport from far-away operations
- CO₂ from current production of European BEV offerings will negate positive environmental impacts of electrification
- Current technologies in use are outdated and not fit for purpose in 21st Century economies targeting low or zero carbon
- Vulcan's unique flowsheet seeks to solve this problem for the EU automotive industry
- No need to purchase carbon offsets
- Vulcan's **Zero Carbon Lithium™** will be premium, peerless & disruptive branded product in the European market.

Tonnes of CO₂ per Tonne of Lithium Hydroxide Produced



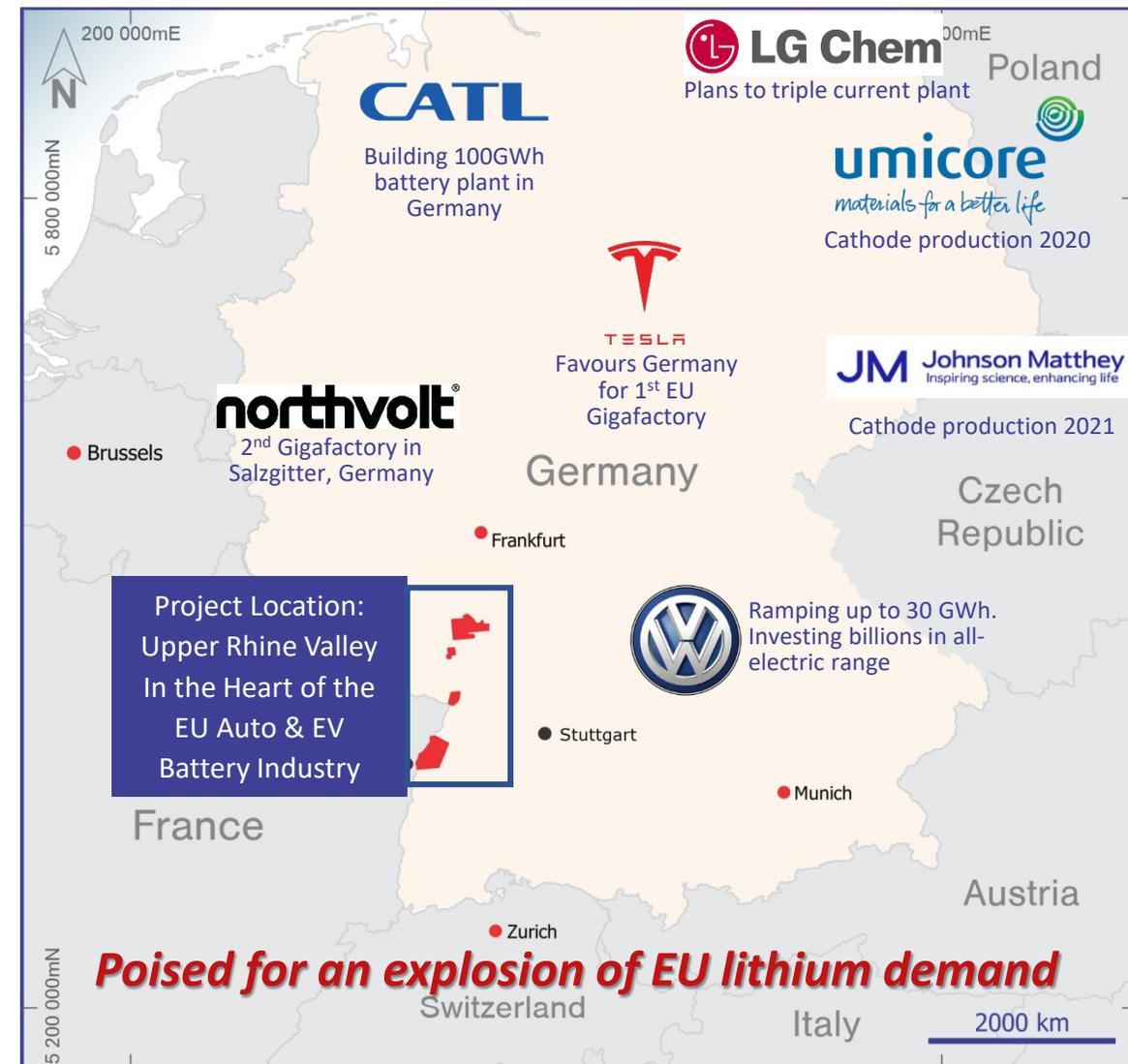
Solving Lithium's Carbon Problem

¹Based on internal study of global lithium operation averages

Vulcan Project, Germany: Location, Location, Location



- Very well-understood brine field; large amounts of existing seismic & drilling data to **shortcut development**
- **Dominant** license landholding in lithium-rich brine field
- Geothermal brine production socially & environmentally accepted in region – vineyards next to existing operations
- Very short distance to EU markets; only project in the world that can claim Zero Carbon Lithium™ production & transport
- **Strategic, secure** domestic supply for EU OEMs at a time of global trade insecurity



Exceptionally Large Lithium Brine

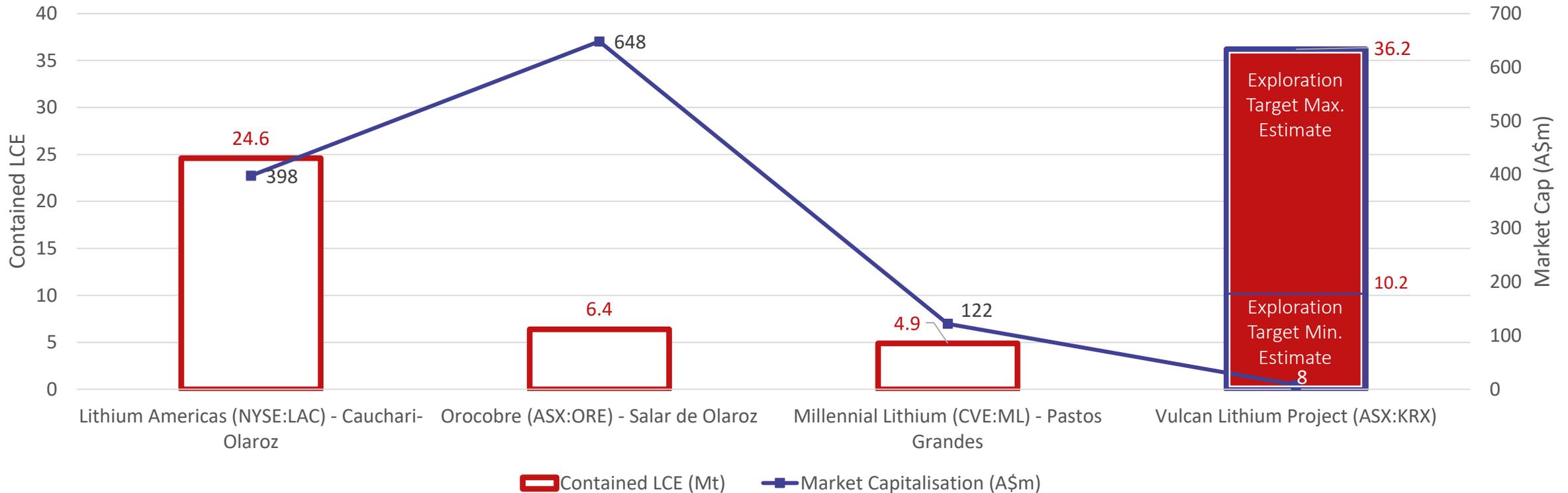
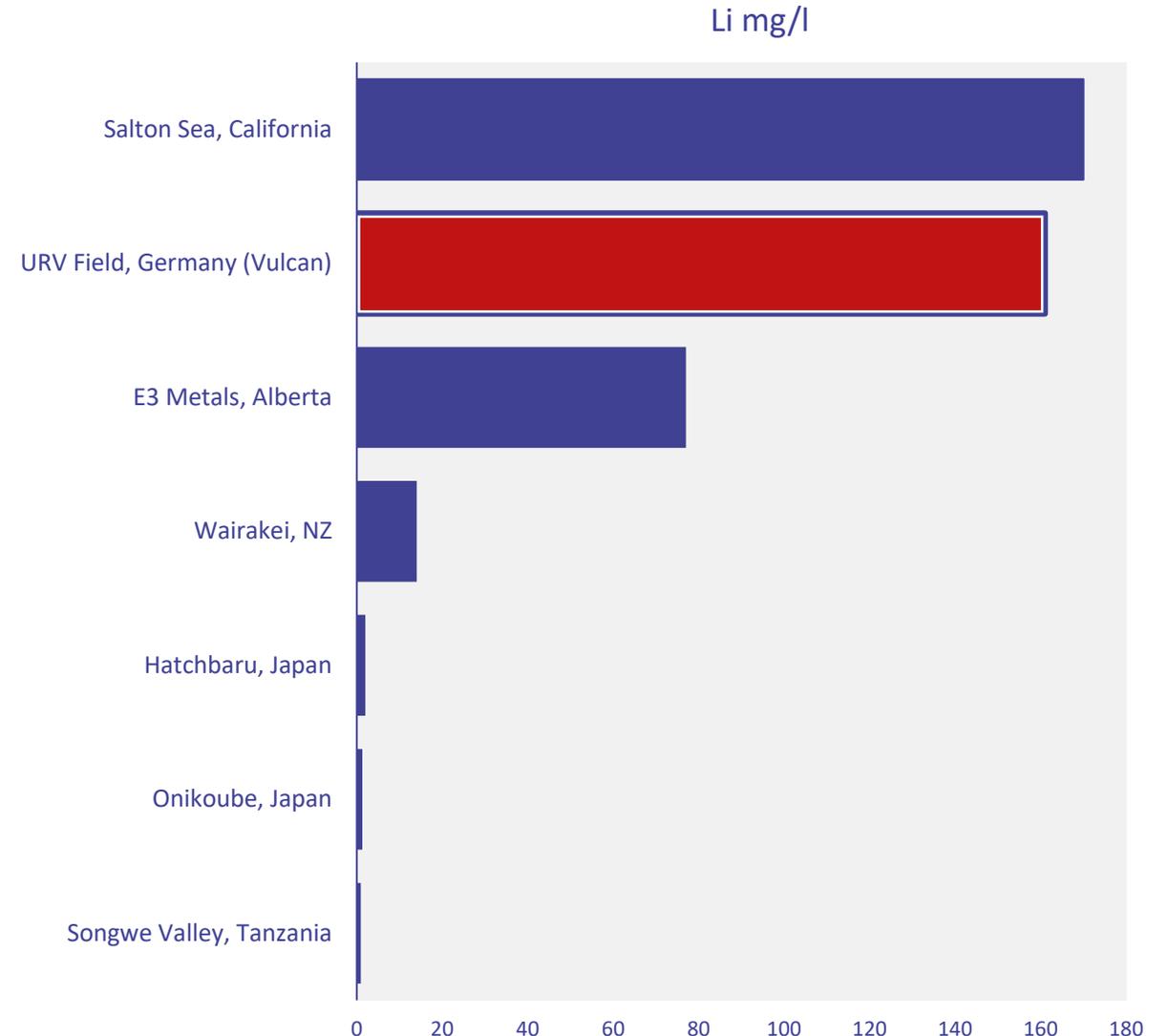


Chart compares resources from companies at different stages of development as detailed in Appendix 1, with Vulcan Lithium Project which is an Exploration Target expressed as a range of values as per KRX ASX announcement 20/08/2019. The Company is not aware of any new information or data that materially 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.

Uniquely **High** Lithium **Grades** & Flow Rate

- Upper Rhine Valley (URV) geothermal brine field exhibits Li values one to two orders of magnitude greater than typical geothermal brines¹: up to 210 mg/l Li, commonly >150 mg/l Li
- Typical geothermal brine fields have Li values in the order of 1-10 mg/l Li¹
- Areas with heated brines are common, but the fluids are rarely both lithium rich & high flow rate
- Only other known geothermal field with similar lithium grades & flow rate is Salton Sea, California¹
- **Same order of magnitude of Li grade** as South American Li salar brines, but with processing advantage of readily available heat & power



¹refer Appendix 2 for sources of information, also ASX Announcement 10 July 2019

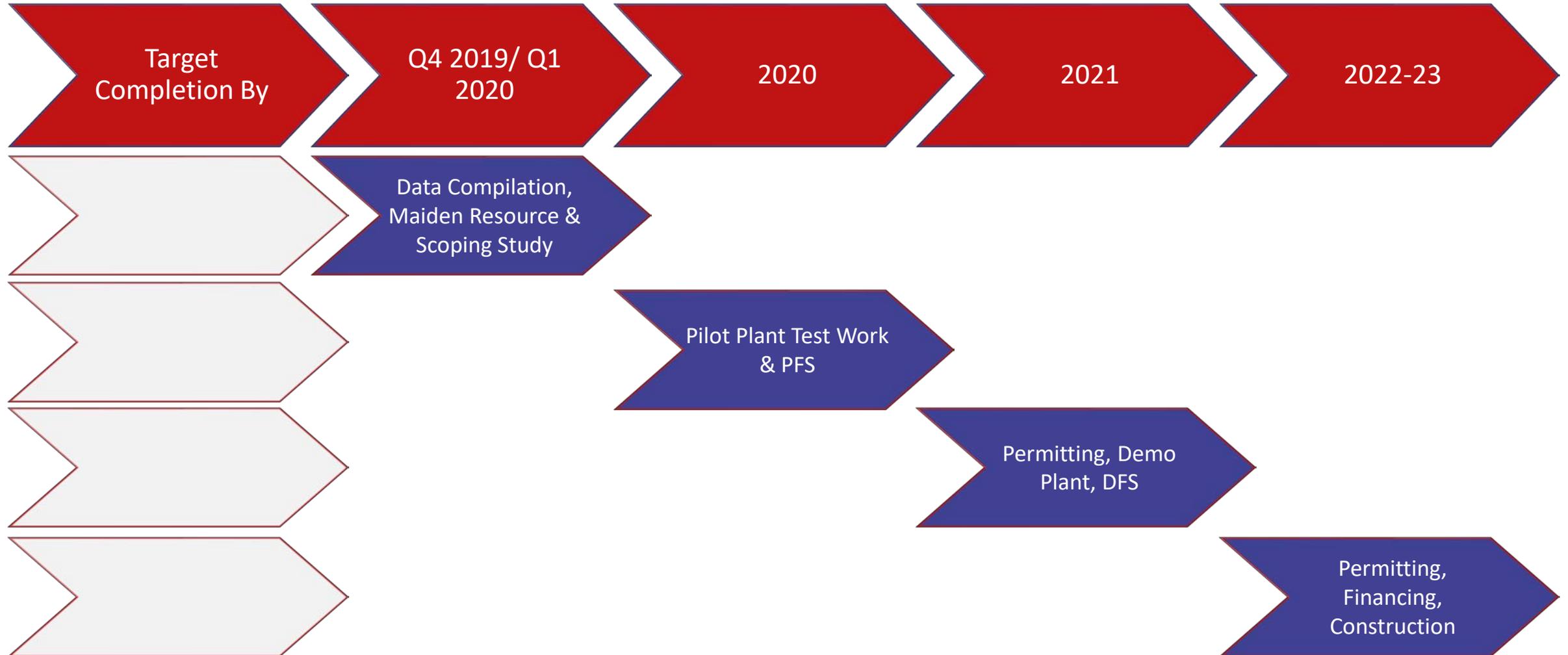
Direct Lithium Extraction: Widespread Adoption Under Way



- DLE used at Livent's Hombre Muerto operation in Argentina for **25 years producing consistent product**
- **Livent**, one of the world's largest lithium producers, recently invested US\$5.5m in E3 Metals, which is using DLE to produce $\text{LiOH}\cdot\text{H}_2\text{O}$ from a petrobrine with grades of just 77.4 mg/L (less than half Upper Rhine Valley grades)
- Controlled Thermal Resources (CTR), (Salton Sea, USA), advancing to battery-grade lithium production using DLE in a location with similar Li grades to Vulcan's brine field
- Simbol (Salton Sea, USA), was reportedly valued at US\$2.5B and rejected **takeover offer of US\$325m** from Tesla¹ based on using DLE on geothermal brines
- **Berkshire Hathaway Energy**, with \$91B in assets (Salton Sea), also seeking to produce battery-grade lithium¹ from geothermal brines using DLE

¹refer ASX Announcement 10 July 2019

Planned Project Timeline



Rapid Project Advancement Under Way. Targeting 2023 Production of Zero-Carbon Lithium™.

Key Associations & Memberships



Appendix 1: Information for Slide 13



Company	Code	Project	Stage	Resource Category	Brine M ³	Resource Grade (mg/l Li)	Contained LCE Tonnes	Information Source
Orocobre	ASX:ORE	Salar de Olaroz	Production	Measured & Indicated	1.8 x 10 ⁹	690	6.4	Company Presentation 5 May 2014
Lithium Americas	NYSE:LAC	Cauchari-Olaroz, Chile (50% ownership. Thacker Pass not included)	DFS Complete, Construction Underway	Measured, Indicated & Inferred	7.8 x 10 ⁹	592	24.6	Resource Statement 7 May 2019
Millennial Lithium	CVE:ML	Pastos Grandes, Argentina	FS Complete	Measured, Indicated & Inferred	2.2 x 10 ⁹	428	4.9	Resource Statement 31 May 2019

Appendix 2: Information Sources for Slide 14



- Elders, W., Cohen, L., (1983) *The Salton Sea Geothermal Field, California*, Technical Report. Institute of Geophysics and Planetary Physics, University of California
- GeORG (2013) Projektteam Geopotenziale des tieferen Untergrundes im Oberrheingraben Fachlich-Technischer Abschlussbericht des INTERREG-Projekts GeORG. Teil 2: Geologische Ergebnisse und Nutzungsmöglichkeiten
- Pauwels, H., Fouillac, C., Brach M. (1989) *Secondary production from geothermal fluids processes for Lithium recovery 2nd progress report*. Bureau de Recherches Geologiques et Minieres Service Geologique National
- Pauwels, H. and Fouillac, C. (1993) *Chemistry and isotopes of deep geothermal saline fluids in the Upper Rhine Graben: Origin of compounds and water-rock interactions*. *Geochimica et Cosmochimica Acta* Vol. 57, pp. 2737-2749
- Sanjuan, B., Millot, R., Innocent, C., Dezayes, C., Scheiber, J., Brach, M., (2016) *Major geochemical characteristics of geothermal brines from the Upper Rhine Graben granitic basement with constraints on temperature and circulation*. *Chemical Geology* 428 (2016) 27–47

The Competent Person is not aware of any new information or data that materially affects the information contained in the above sources or the data contained in this announcement

Thank you

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