Zero Carbon Lithium®

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

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COMPETENT PERSON STATEMENT

The information in this report that relates to Mineral Resources is extracted from the ASX announcement made by Vulcan on the 12 November 2020, which is available on www.v-er.com. The information in this presentation that relates to the Scoping Study for the Vulcan Lithium Project is extracted from the ASX announcement "Positive Scoping Study – Vulcan Zero Carbon Lithium Project", released on the 21st of February 2020 which is available on www.v-er.com. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcements.

Vulcan – Zero Carbon Lithium®

High Carbon Footprint Of Existing Supply Chain

China Dominates Supply Chain
Zero Production in EU

ZERO CARBON FOOTPRINT

World-first Zero Carbon Lithium® Project

DLE & Geothermal in Germany

Dual Revenue
Lithium & Green Energy

In The Heart Of The Fastest Growing Lithium Market In The World

Largest Lithium Resource In Europe

Rapidly Advancing Lithium Project

Agreement with German Geothermal Operator

Team of World Leading Experts

Project Financially Supported by the EU

Why Vulcan?

I.ENVIRONMENTAL IMPACT

We exist to decarbonize the currently high carbon production footprint of lithium-ion batteries used in electric vehicles by producing a world-first **Zero Carbon Lithium®** hydroxide product from our geothermal lithium brine project in the Upper Rhine Valley, Germany.

Lithium is a critical resource for batteries and electric vehicles.

To fully electrify our cars with lithium-ion batteries, we need lithium.

Using the current main source of producing and refining lithium, from hard-rock mines, will emit approximately 1.05 billion tonnes* of CO_2 to fully electrify the world's passenger vehicles.

CO_2

1.05 Billion Tonnes

Approximate emissions from producing and refining lithium from hard-rock mines

=

That's equivalent to the **annual emissions** of the **UK**, **France** and **Italy combined**

**See Appendices for calculations*

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Zero Carbon Lithium®

Environmental concerns

I.ENVIRONMENTAL IMPACT

Lithium extraction in South America **evaporates** large quantities of water in one of the driest places on earth. This stresses the environment and local communities.

Hard rock mines for lithium are unpopular.
Once you mine it, the rock has to be **roasted with fossil fuels** to produce lithium hydroxide. This is very CO2-intensive.

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Europe: fastest growing lithium market

II. EUROPE

More investment into EV in **Europe** than in China.

Europe is fastest growing **lithium-ion battery** production center in the **world** the fastest growing market for **lithium hydroxide.**

It has **ZERO local supply** of lithium hydroxide to feed this demand.

80% of global supply is controlled by **China**.

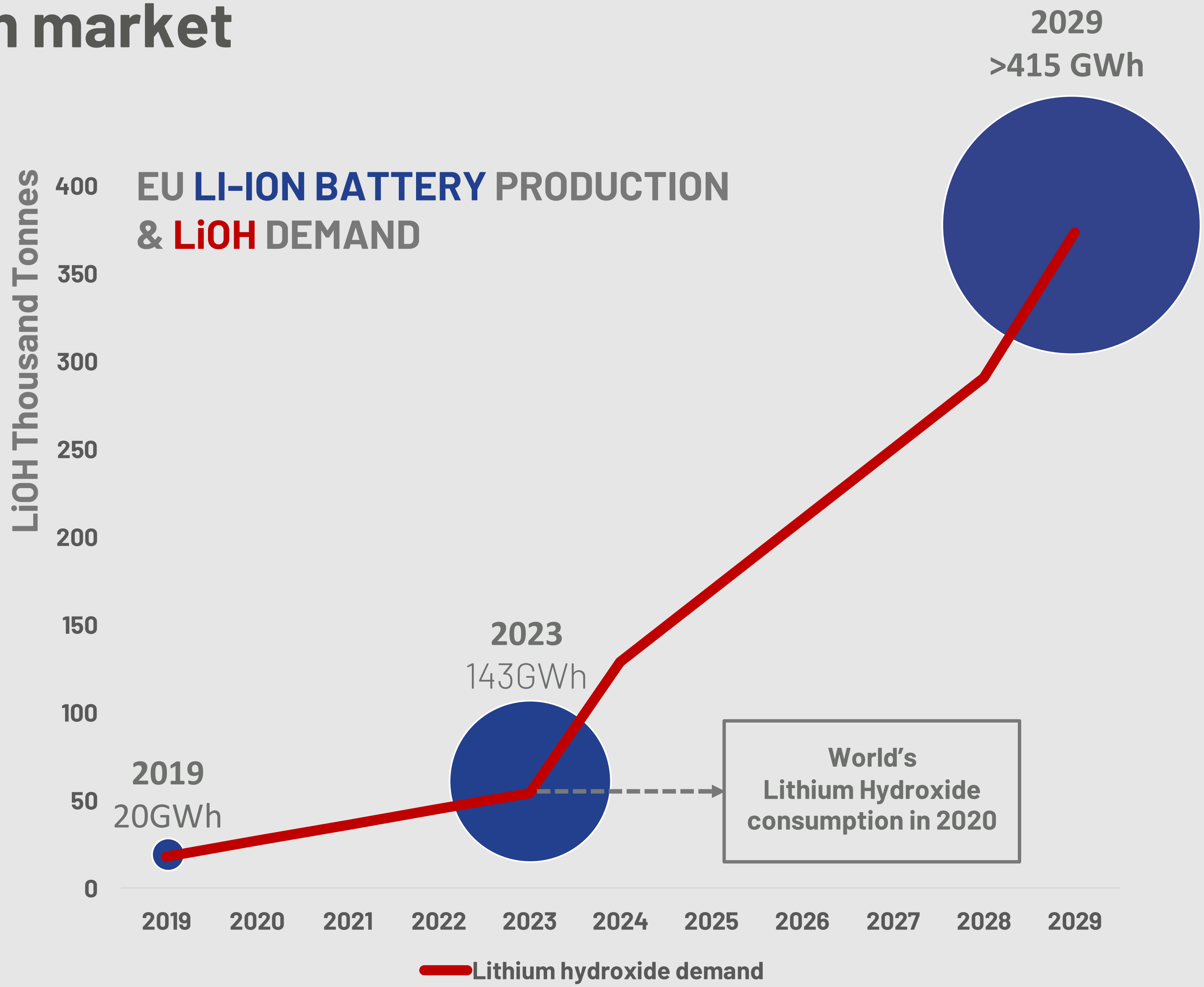
Linked to **two main concerns**:

- Supply chain risk
- Environmental impact

go TO zero

"Volkswagen's delivery promise:
CO_2-neutral production including supply chain"

Volkswagen Presentation, ID Insights, Sustainable Mobility, 2019



Compiled industry data based on cell and cathode production forecasts

Benchmark Mineral Intelligence

We scoured the globe to find the right project

III. OUR PROJECT

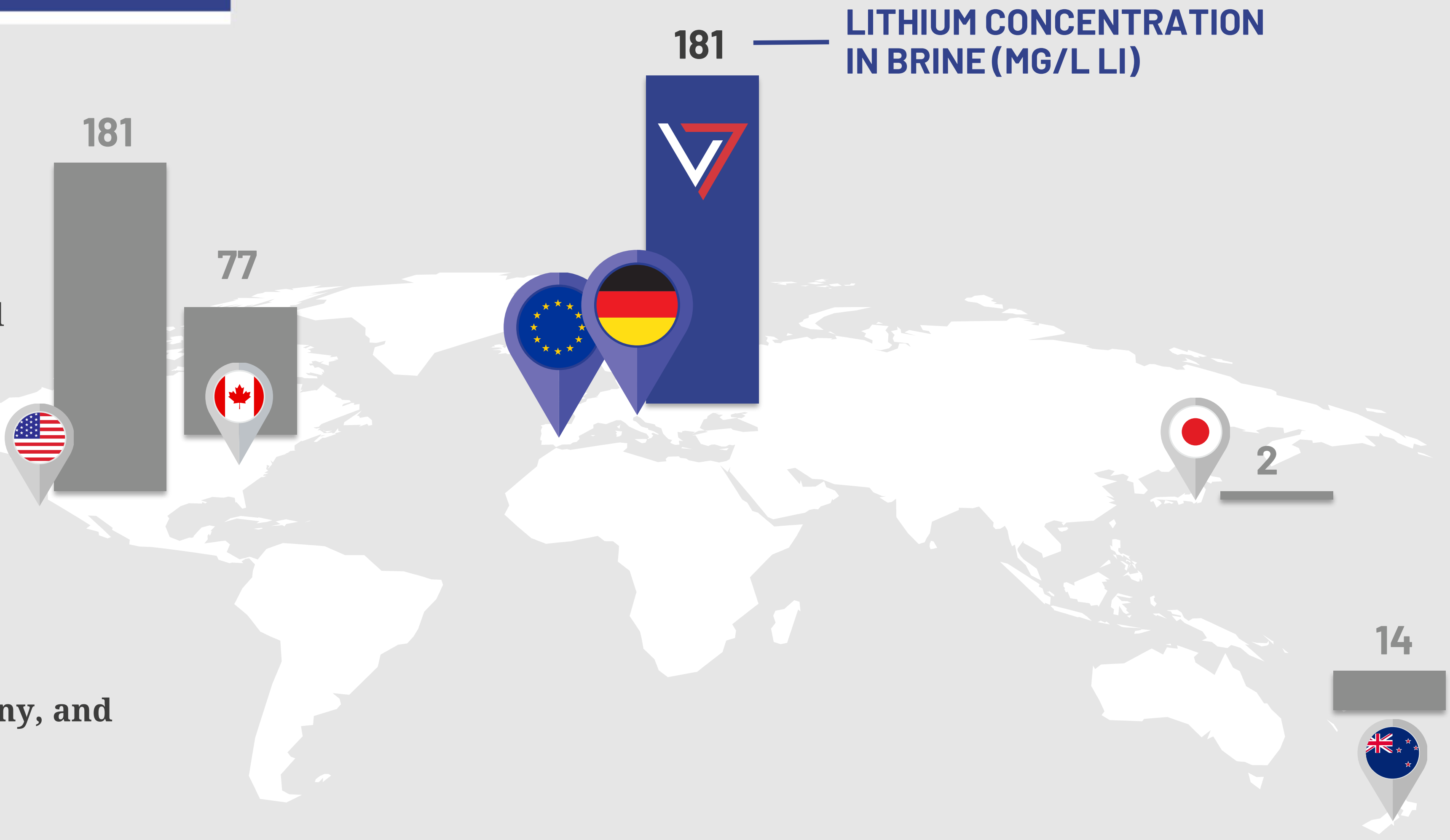
We had the lithium expertise to know that Zero Carbon Lithium® production was possible using modern extraction methods, provided a deep geothermal brine reservoir could be found that had the following geological conditions:

1. **Renewable heat;**
2. **High lithium grades;**
3. **High brine flow rate.**

Our research showed that
this could be done in just two places:

1. **The Upper Rhine Valley in Germany, and**
2. **The Salton Sea in California**

We chose Germany and Europe.



For details on lithium grades, see Appendices

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Largest in Europe

III. OUR PROJECT

We used our geological expertise to pick out the best areas in the Upper Rhine Valley for sub-surface lithium grade and potential flow rate. We secured exclusive rights to these areas:

- Very large license package >800km²
- 6 licenses: 3 exploration permits granted
- Largest lithium resource in Europe: 16.19Mt LCE

CONTAINED LITHIUM (JORC RESOURCE, MT LCE)

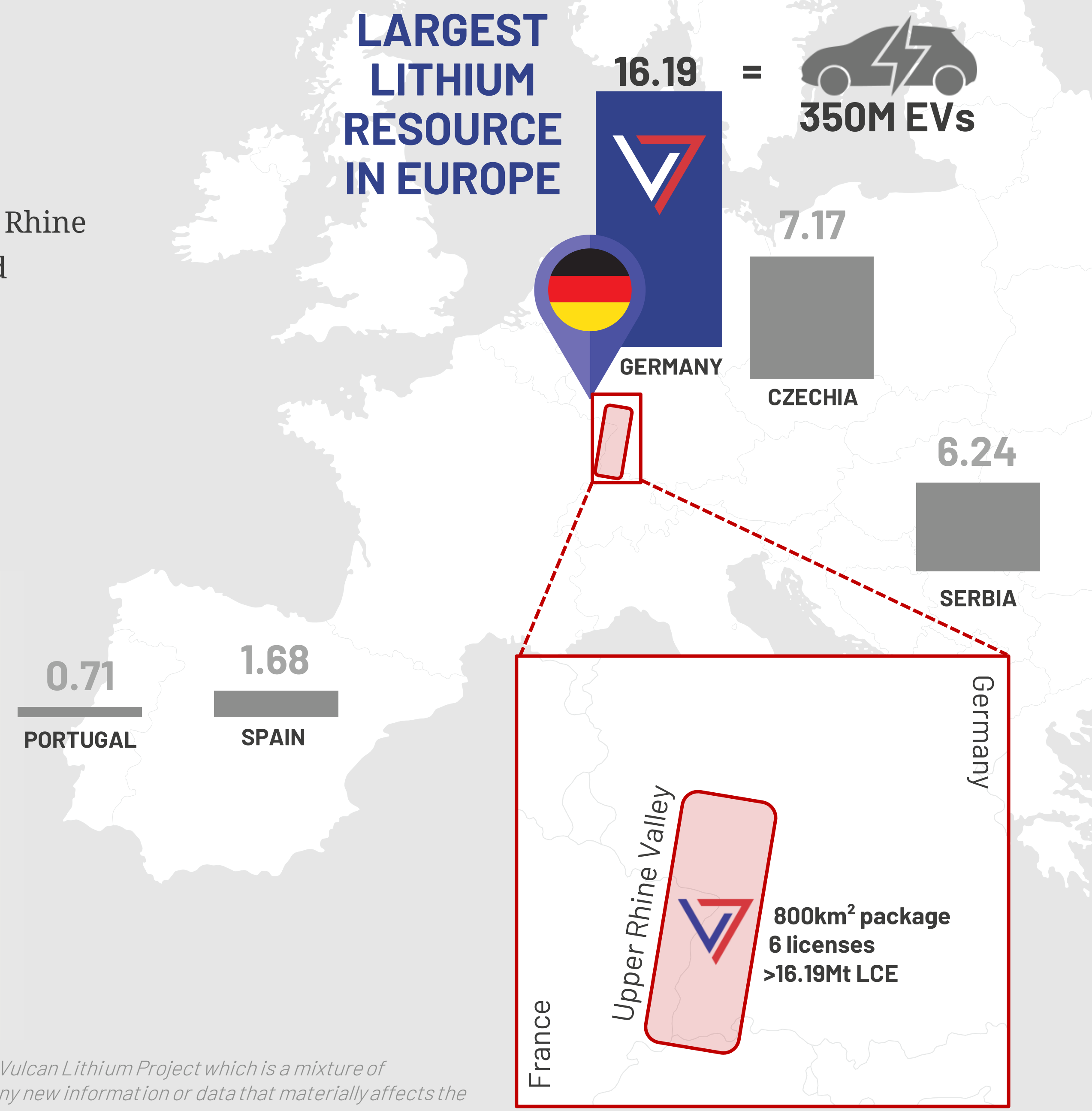


Image shows resources collated from companies at different stages of development as detailed in Appendix 2, with Vulcan Lithium Project which is a mixture of Indicated and Inferred Mineral Resources as per VUL ASX announcement 12/11/2020. The Company is not aware of any new information or data that materially affects the information included in the announcement.
All material assumptions and technical parameters underpinning the Mineral Resource in the relevant announcement continue to apply and have not materially changed.

NOVEMBER NEWS IN THE EU LI-ION BATTERY SUPPLY CHAIN

VOLKSWAGEN sets aside €35 billion for e-mobility

PANASONIC, EQUINOR, HYDRO consider battery production in Norway

SVOLT to build 24GWh battery factory in Germany

BMW puts 400 million euros into Munich plant

DAIMLER green sourcing for lithium and cobalt

VULCAN increases further its lithium resource

EU to push new standards for ‘greenest’ car batteries on earth

EU’s Sefcovic: we must be ‘much more strategic’ on raw materials

GERMANY marks record electric car sales

UK plans to bring forward ban on fossil fuel vehicles to 2030

At the center of fastest growing lithium market

Brandenburg, 2021
At least 20GWh

Salzgitter, 2024
16 GWh, LATER 24 GWh

Erfurt, 2022
14 GWh LATER 100 GWh

Sunderland, 2010
2.5 GWh

Willstät, 2020
1 GWh

Germany & France, 2022
16 GWh, LATER 48 GWh

Uberherrn, 2023
24 GWh

Germany, 202X
4 GWh, LATER 8 GWh

Schwarzheide, 2022
CATHODE MATERIALS

Bratislava, 2024
10GWh

St Athan Wales, 2023
10GWh, later 35Gwh

>500GWh Capacity Planned by 2030

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Skellefteå, 2021
32 GWh LATER 40 GWh

Brandenburg, 2021
RAMP UP TO 8-12 GWh

Bitterfeld, 2022
16 GWh

Wroclaw, 2018
6 GWh, LATER 70 GWh

Konin, 2021
CATHODE MATERIALS

Nysa 2020
CATHODE MATERIALS

Komaron 1 + 2, 2020
7.5 GWh, LATER 23.5 GWh

Göd, 2018
3 GWh, LATER 15 GWh

Mo I Rana, 2023
32+2GWh

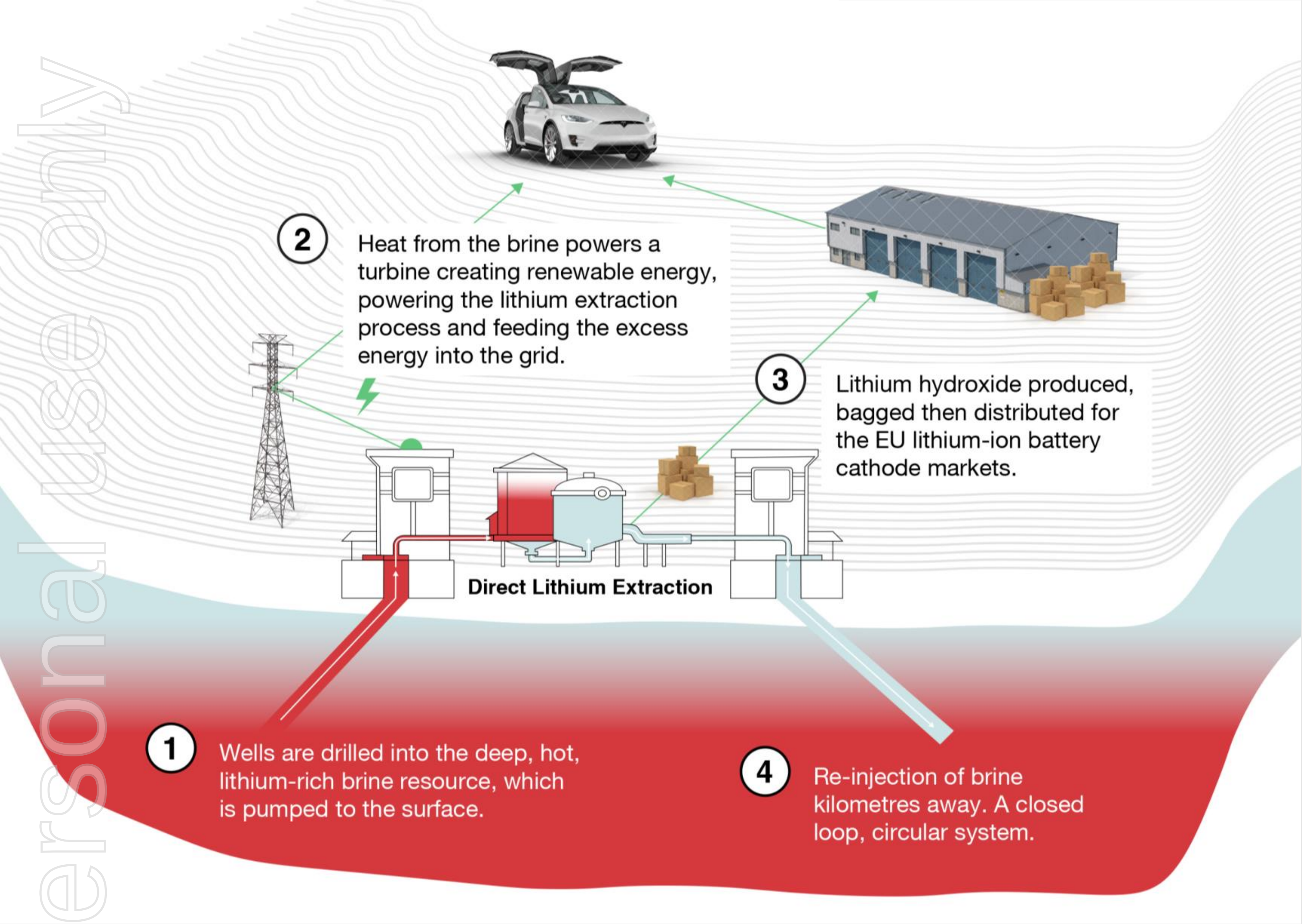
Agder, 2024
8GWh, later 32GWh

Norway, TBC
Unknown

Europe, TBC
Unknown

A dual revenue renewable project

III. OUR PROJECT



A PERFECT FIT

	Market Demands in EU & Germany	Vulcan value propositions & revenue streams
Core Market	Zero Carbon Lithium™	VULCAN ENERGY RESOURCES Zero Carbon Lithium®
Secondary Market	Zero Carbon Heating	VULCAN ENERGY RESOURCES Zero Carbon Lithium®
	Zero Carbon Electricity	VULCAN ENERGY RESOURCES Zero Carbon Lithium®

Commercially mature technologies combined

III. OUR PROJECT

Our process replicates existing operations taking place commercially across the world. What is unique about us is the combination of those different steps.

1 Binary Cycle Geothermal Plant ✓

- **Hundreds** of geothermal energy plants running **globally.**
- **37** deep geothermal energy plants in operation in **Germany.**
- **Upper Rhine Valley** well-known area for successful geothermal operations.
- Team of **leading experts** in developing and permitting geothermal plants.

2 Direct Lithium Extraction Plant ✓

- Direct Lithium Extraction commercially **used for decades.**
- Now operating in **China & Argentina** – accounting for >**10% of global lithium** production.
- Adsorbent-type DLE technologies **commercially available** from several suppliers.
- We've achieved >**90% lithium recoveries** from initial test work.

3 Lithium Refining Plant ✓

- Conversion of lithium chloride to lithium hydroxide is an **industry-standard route.**
- There are operational plants worldwide doing this.

Livent

Our Zero Carbon Lithium® process

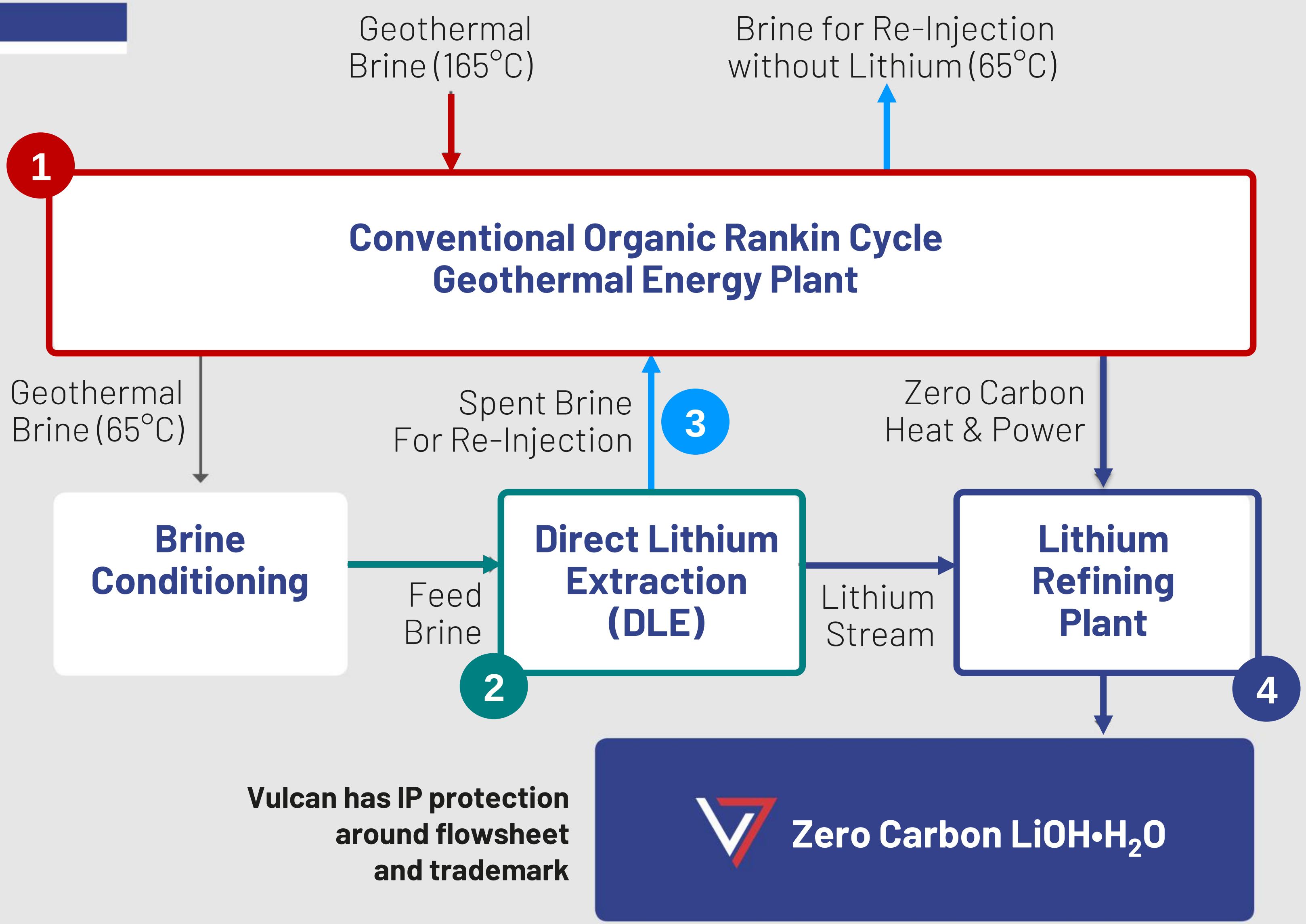
III. OUR PROJECT

1
- Hot brine is extracted from the ground and generates steam that powers turbines and produces renewable electricity.
- They are standard geothermal production wells successfully implemented for decades.

2
- We divert the brine flow and extract lithium from the solution with a Direct Lithium Extraction (DLE) process.
- Commercially used for decades (Argentina) & successfully tested in the US and elsewhere.

3
- Once the lithium has been extracted, the brine is reinjected in the ground.
- No evaporation losses, only takes a few hours, not dependent on weather.

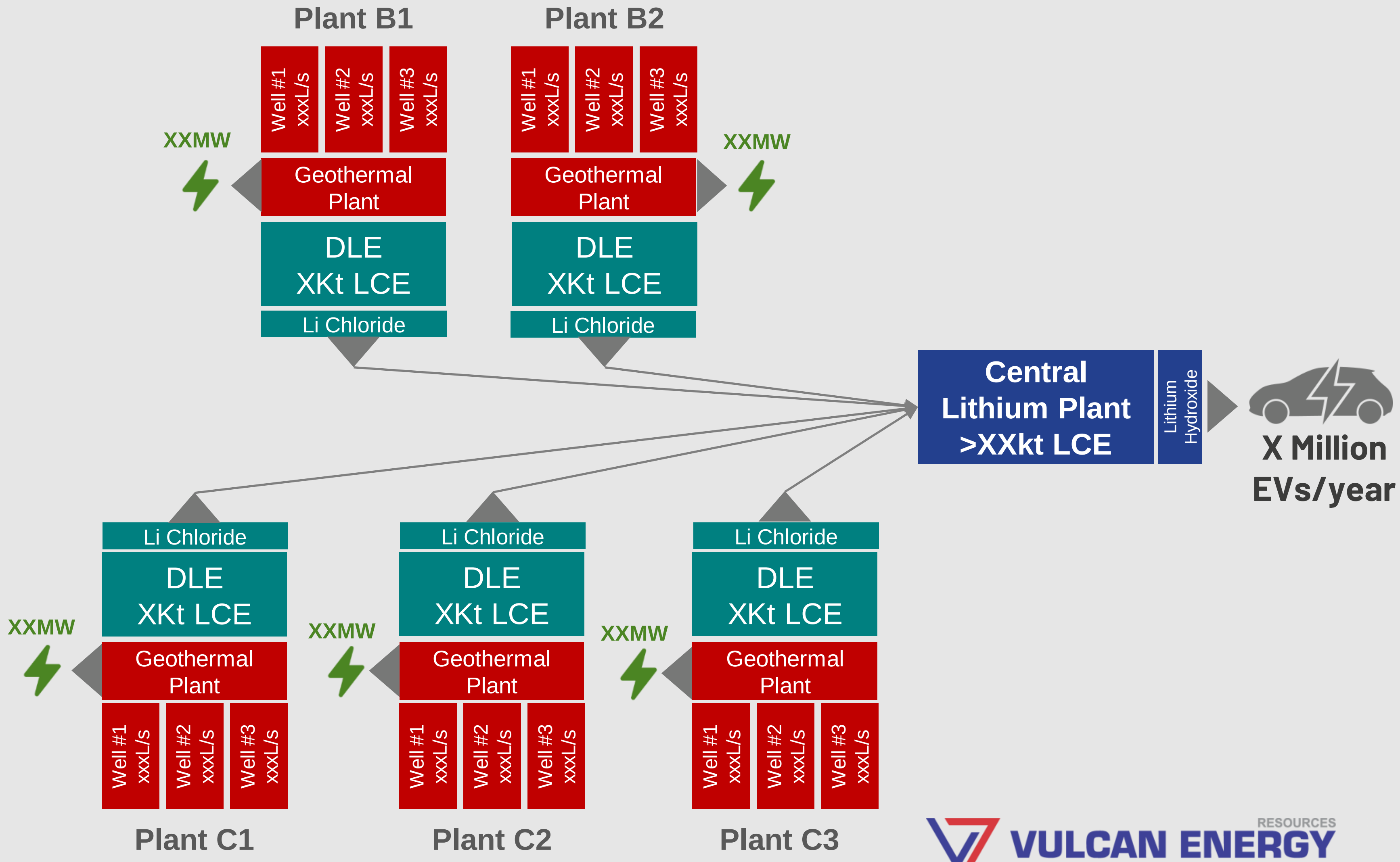
4
- Lithium chloride is sent to the lithium refining plant which will be converted LiCl to battery quality LiOH.
- Water is recycled, no toxic wastes, no gases are emitted, heat and power from the geothermal plant, no fossil fuels are burned.
- Expected to have a very low Opex.



Project structure

III. OUR PROJECT

1. **Binary Cycle Geothermal Plant** ✓
2. **Direct Lithium Extraction Plant** ✓
3. **Lithium Refining Plant** ✓



Note: figures are estimates that will be further refined for the PFS

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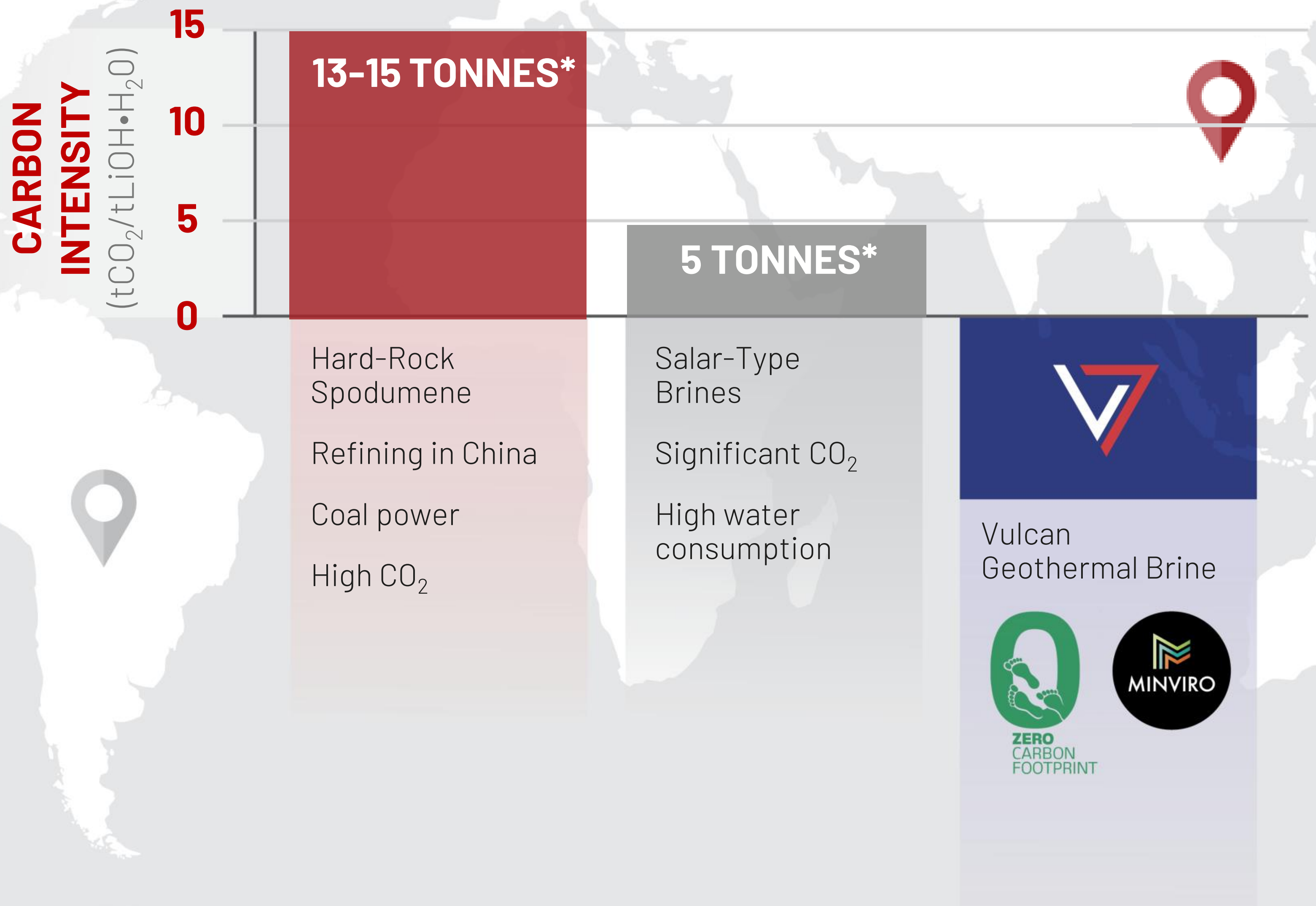
Zero Carbon Lithium®

Carbon intensity

Roskill Approachable. Independent. Expert.

“CO2 emissions from lithium production set to triple by 2025”



*See Minviro LCA Study, The CO_2 Impact of the 2020s Battery Quality Lithium Hydroxide Supply Chain

Vulcan to offset CO2 penalties for automakers

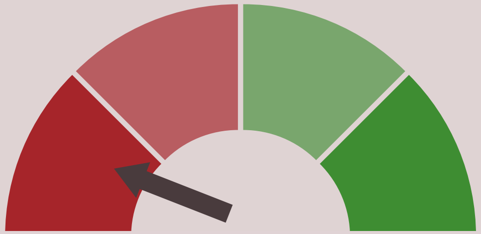
CO_2 Emissions Linked to Lithium Production

Hard Rock Mining

675kg CO_2 per EV
From Lithium Production

VW's target: **28M EVs** by 2028

19M tons of CO_2
From Lithium Production



Carbon Footprint

Penalties currently only target vehicles' emissions but not their supply chain.

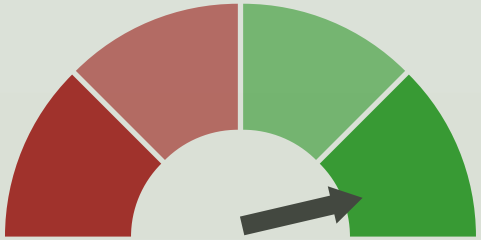
This is likely to change shortly with new EU legislation and lead to **heavy penalties** if carmakers are not sourcing greener raw materials.

Vulcan Zero Carbon

-238kg CO_2 per EV
From Lithium Production

VW's target: **28M EVs** by 2028

-7M tons of CO_2
From Lithium Production



Carbon Footprint

Vulcan's Zero Carbon Lithium® offers a **negative carbon footprint** that will help automakers to reach their sustainability targets by **offsetting CO_2** generated by the rest of their supply chain.

Average Battery Pack: 50KWh, Average LCE per KWh: 0.9kg, Average LCE consumption per EV: 45kg, Vulcan: -5.3t of CO2 per ton of LiOH, Average Hard Rock operation with Chinese Converter: 15t of CO2 per ton of LiOH

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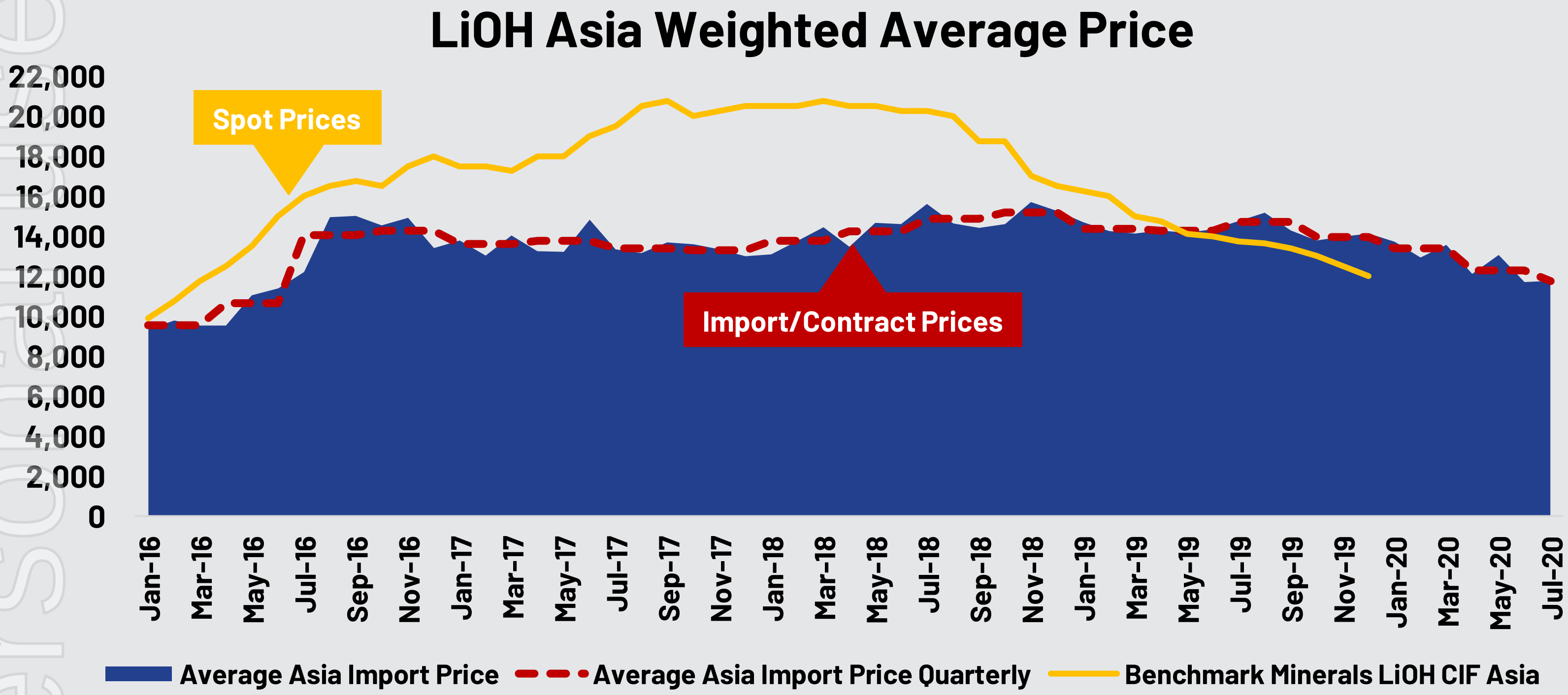
Cost advantage of geothermal lithium brines

IV. OUR ZERO CARBON ADVANTAGE

If you’re producing battery-quality lithium hydroxide chemicals, the price environment is strong. Lithium hydroxide is currently selling for around US$11-14,000/t. It is widely tipped to rise even from here due to looming deficits.

LiOH Asia Weighted Average Price



Source: trade statistics compiled from Global Trade Atlas®

Brine projects are the lowest cost method of lithium hydroxide production, typically around US$5-7,000/t. *(Source: Canaccord).*

Our added advantages:

- **Free heat** to drive our process
- **Low reagents** consumption
- **Short distance** to market
- **Premium** product
- We also **sell energy**

Germany has a **fixed price** of €0.25c/kWh for the renewable electricity we can produce.

We plan to have **two revenue streams**: lithium and energy.

They de-risk and complement each other.

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Zero Carbon Lithium®

The Vulcan Zero Carbon Lithium® team: board

V. TEAM & TIMELINE

Lithium, Renewable Energy & Project Finance Experience

Dr. Francis Wedin

MANAGING DIRECTOR & FOUNDER-CEO

- Founder of Vulcan Zero Carbon Lithium™ Project. Lithium industry executive since 2014. Previously Executive Director of ASX-listed Exore Resources Ltd.
- Three discoveries of JORC Lithium Resources on two continents including Lynas Find, now part of Pilbara Minerals' Pilgangoora Project in production (ASX:PLS).
- Management & Executive experience in resources sector on four continents; bilingual; dual Swedish & Australian nationality.
- PhD & BSc (Hons) in Exploration Geology & MBA in Renewable Energy.

Dr. Horst Kreuter

CO-FOUNDER & EXECUTIVE DIRECTOR – GEOTHERMAL EXPERT

- CEO of Geothermal Group Germany GmbH and GeoThermal Engineering GmbH (GeoT). Co- Founder of Vulcan Zero Carbon Lithium™ Project.
- 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.

Gavin Rezos

CHAIR – INVESTMENT BANKING EXPERT

- 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.

Ranya Alkadamani

NON-EXECUTIVE DIRECTOR – COMMUNICATIONS EXPERT

- Founder of Impact Group International. A communications strategist, focused on amplifying the work of companies that have a positive social or environmental impact.
- Experience in working across media markets and for high profile people, including one of Australia's leading philanthropists, Andrew Forrest and Australia's then Foreign Minister and former Prime Minister, Kevin Rudd.
- Was personally behind the global launches of the Walk Free Global Slavery Index, which reached more than 1 billion people.

Rob Ierace

CFO / COMPANY SECRETARY

- Chartered Accountant and Chartered Secretary with +20 years experience.
- Experience in financial and commercial management including in corporate governance, debt and capital raising, tax planning, risk management, treasury management, insurance, corporate acquisitions and divestment and farm in/farm out transactions.
- BComm degree from Curtin University, a Grad Dip in Applied Corporate Governance from the Governance Institute of Australia and a Grad Cert of Applied Finance and Investment from the Securities Institute of Australia

Management, technical team & consultants

V. TEAM & TIMELINE

World-Renowned Geological, Chemical & Engineering Expertise

Dr Katharina Gerber

LITHIUM PROJECT MANAGER

- Awarded her PhD on lithium chemistry magna cum laude (with great distinction) at the University of Bonn.
- Most recently focused on lithium extraction from geothermal brine at the California Energy Commission (CEC). Participates in "California Lithium Valley" initiative.
- Prior to joining the CEC, she conducted research developing and characterizing new electrode materials for lithium-ion batteries.
- Unique combination of expertise in lithium chemistry and lithium extraction from geothermal brine.

Dr. Thomas Aicher

LITHIUM CHEMICAL ENGINEERING LEAD

- Chemical engineering expert part of Vulcan's team in Karlsruhe. 25 years' experience in chemical process innovation and industrial scale-up across a range of industries.
- Awarded a PhD and MSc in Chemical Engineering from the world-renowned Karlsruhe Institute of Technology (KIT), Dr. Aicher was also a visiting scientist at the Massachusetts Institute of Technology (MIT).
- Dr. Aicher was Head of Group at Fraunhofer Institute, one of the most prestigious organizations of applied sciences in Europe, and Process Engineer at Fortune 500 engineering company Fluor Inc.

Vincent Ledoux Pedailles

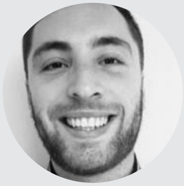
VICE PRESIDENT – BUSINESS DEVELOPMENT

- Previously Executive Director at Infinity Lithium, where Vincent led the project to become the first to secure EU funding. Vincent was also appointed as a Lithium Expert by the European Commission.
- Previously worked at IHS Markit where he led the lithium and battery materials research team covering the entire industry's supply chain from raw materials to E-mobility.
- Earlier in his career, he worked for Talison Lithium located in Perth, Australia. He also worked for Roskill, an international metals & minerals research and consulting company
- Mr Ledoux-Pedailles is a regular speaker at various industry events across the world

Jochen Rudat

ELECTROMIBILITY EXPERT

- Ex-direct report to Elon Musk
- 10 years' experience at Tesla
- Ex-Telsa Director for Central Europe
- Launched Tesla S, 3, X and Roadster
- Ex-Automobili Pininfarina Chief Sales Officer; Launched Electric Hyper-car
- Experience in the Auto industry including BMW, Porsche and Kia



Alex Grant

DLE TECHNOLOGY EXPERT

- Co-founded Lilac Solutions, one of the world's leading direct lithium extraction technology companies, which raised $20M from Bill Gates's Breakthrough Energy Ventures.

Thorsten Weimann

GEOTHERMAL PLANT ENGINEERING EXPERT

- Expert in geothermal and drilling technology, with more than 25 years of professional experience.

Elke Zimmermann **GEOLOGIST**
Dr. Dirk Adelmann **SENIOR GEOLOGIST**

Dr. Michael Kraml **SENIOR GEOCHEMIST**
Dr. Jens Grimmer **SENIOR GEOLOGIST**
Tobias Hochschild **SENIOR GEOLOGIST**
Prof. Dr. Gerald Ziegenbalg **CHEMICAL PROCESSING EXPERT**

gec-co HATCH APEX Geoscience Ltd. GeoThermal ENGINEERING

Vulcan financially supported by the EU

V. TEAM & TIMELINE

May '20: Agreement signed with EU-backed body to launch Vulcan Zero Carbon Lithium® Project.

InnoEnergy
Knowledge Innovation Community

European Commission

European Investment Bank

EIT InnoEnergy will marshal its ecosystem and significant EU-wide resources to launch the Zero Carbon Lithium™ Project forward:

- **Securing project funding**, including the use of applicable **EU, national or regional grant schemes**, and liaising with EU project finance and development banks.
- Driving relationships with European lithium offtakers, aimed at entering into of binding offtake agreements.
- **Obtaining and fast-tracking necessary licenses.**
- All services are entirely success-based, with no upfront cost to Vulcan.

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Zero Carbon Lithium®

Where to from here?

V. TEAM & TIMELINE

SCOPING STUDY

We completed our Scoping Study in just six months, using our in-house team and world-renowned consultants.
It was **highly positive.**

2019-20

PRE-FEASIBILITY STUDY

We have commenced our Pre-Feasibility Study (PFS). We've successfully **completed bench-scale** processing test work as part of this.

2020

DEFINITIVE FEASIBILITY STUDY

In 2021 we want to complete our **Definitive Feasibility Study (DFS)**. We can take that to the bank.

Pursuing **offtake** agreements with key partners

2021

SCALE-UP

We are then planning a **stepwise scale-up to full commercial production** capacity.

2023-24

GROWTH WITH MARKET

We plan to grow with the European Electric Vehicle market in the 2020s.
We have a very large resource.
If we want to produce more lithium, we can drill more wells.

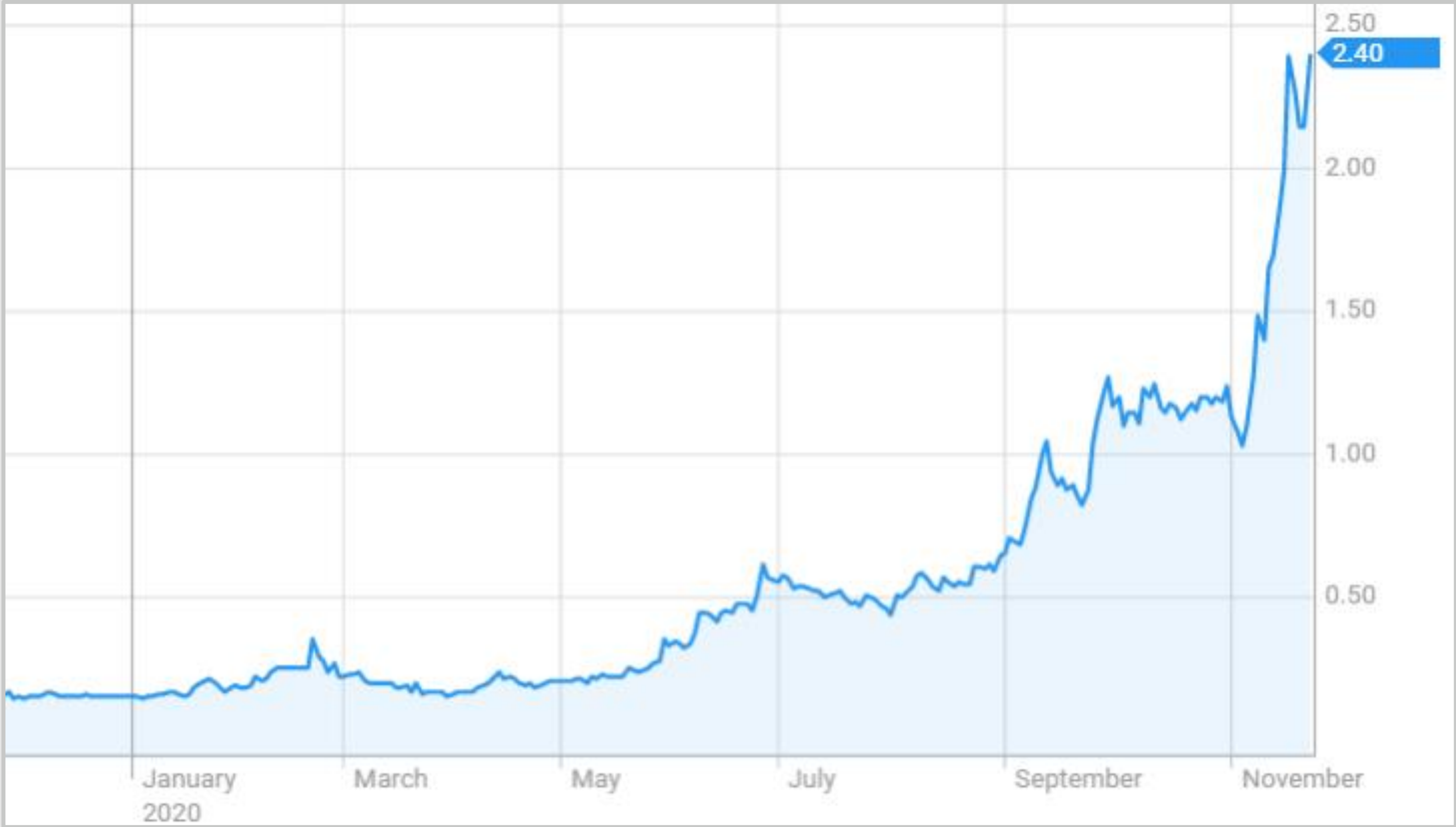
Share price & capital structure

V. TEAM & TIMELINE

ASX : VUL

Shares on Issue	**76,424,345**
Options (28.5c expiring in January 2021)	**5,765,783**
Performance Milestone Shares*	**8,800,000**
Performance Rights*	**12,500,000**
Market Capitalization at $2.38 (undiluted)	**~$181.9M**
Enterprise Value at $2.38 (undiluted)	**~$176.8M**
Cash Position	**~$5.1M**
Top 20 Shareholders	**~51%**
Management (undiluted)	**~21%**

Frankfurt: 6KO



**Refer ASX Announcement 10 July 2019 for further details.*

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Vulcan summary: best-in-class for the 2020s

1 WORLD'S 1ST & ONLY ZERO-CARBON LITHIUM® PROCESS

- **Purpose-built** process to be **uniquely Zero Carbon.**
- Co-generation of geothermal energy from production wells will power lithium extraction.
- **Negative CO_2/t** LiOH H_2O, **decarbonising** the grid while producing lithium, compared with **~15 tonnes CO_2 for hard-rock**.

2 POSITIVE SCOPING STUDY: DUAL REVENUE POTENTIAL

- First of its kind study completed with international team of independent experts.
- Principal revenue potential from selling **battery-quality LiOH H_2O** chemicals into the European market.
- Secondary revenue potential from planned **renewable** geothermal power generation, benefits from Feed-in-Tariff.

3 EU BACKING FOR PROJECTS

- Agreement signed in May '20 with EU-backed **EIT InnoEnergy**
- EIT InnoEnergy will marshal its ecosystem and significant EU-wide resources to launch the Zero Carbon Lithium® Project forward
- Assistance with **securing funding** and streamlining project permitting.

4 SIZE & QUALITY: EUROPE'S LARGEST LITHIUM RESOURCE

- JORC Mineral Resource Estimate **16.19 Million Tonnes** LCE Indicated & Inferred.
- **One of the largest lithium resources in the world.**
- High Li grades for geothermal brine which has readily available heat & power.
- Large enough to be **Europe's primary source** of **battery-quality lithium hydroxide.**

5 LOCATION CENTRE OF FASTEST GROWING MARKET

- EU **fastest growing lithium market** in the world. Unprecedented demand forecast from growth in EVs.
- Located in Germany, in **the centre of the industry**.
- Zero local supply of battery quality lithium hydroxide.
- **Removes dependence on China** for this designated Critical

6 LOCAL PARTNERS & INFRASTRUCTURE ACCESS

- MoU with German **geothermal operator**
- Allows for **access to producing wells** to advance pilot processing.
- Potential for fast-track to production from existing

7 THE RIGHT TEAM FOR THE JOB

- Expert multi-disciplinary team local to project area in Germany.
- **Decades of experience** in developing & permitting geothermal brine projects.
- International project finance, lithium market & direct lithium extraction processing expertise

8 RAPIDLY ADVANCING LITHIUM PROJECT

- Maiden Resource & Scoping Study completed in **just five months.**
- **Pre-Feasibility Study Under Way.**
- **Targeting short-term production start**, in line with lithium supply-demand inflection point.

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Thank you

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V-er.com

info@v-er.com

ASX:VUL

FRA:6KO

APPENDIX

Appendix 1: proud members of a leading-edge industry

CRMAlliance
Critical Raw Materials

Bundesverband
Geothermie

KLiB
Kompetenznetzwerk
Lithium Ionen Batterien

RUGGERO BERTANI
European Geothermal
Innovation Award 2020
ENDORSED
NOMINATION

EUROPEAN
BATTERY
ALLIANCE
EBA250
The industrial workstream of
the European Battery Alliance

EGEC
GEOTHERMAL

Appendix 2: information for slide 8

Company	Code	Project	Stage	Resource Category	Brine M3/Resource Tonnes	Resource Grade	Contained LCE Tonnes	Information Source
Lithium Americas	NYSE:LAC	Cauchari-Olaroz, Chile (50% ownership. Thacker Pass not Included)	Construction	Measured, Indicated & Inferred	7.8 x 109 M3	592 mg/l Li	24.6	Resource Statement 7 May 2019
AVZ Minerals Ltd.	ASX:AVZ	Manobo (60% ownership)	Development	Measured, Indicated & Inferred	400 Mt	1.65% Li20	16.3	Company Presentation "Australia 2020"
Galaxy Resources Ltd.	ASX:GXY	Sal de Vida (Mt Cattlin not included)	Development	Measured, Indicated & Inferred	18.1 x 108 M3	753mg/l Li	7.2	Feasibility Study Report August 2016
Pilbara Minerals Ltd.	ASX:PLS	Pilgangoora	Production	Measured, Indicated & Inferred	223.2 Mt	1.27% Li20	6.97	Resource Statement 30 June 2019
Orocobre Ltd.	ASX:ORE	Salar de Olaroz	Production	Measured & Indicated	1.8 x 109 M3	690 mg/l Li	6.4	Company Presentation 5 May 2014

Company	Code	Project	Stage	Resource Category	Brine M3/Resource Tonnes	Resource Grade (Li20)	Contained LCE Tonnes	Information Source
European Metals	ASX:EMH	Cinovec	PFS Complete	Indicated & Inferred	695.9	0.42	7.17	Corporate Presentation Released 20 November 2018
Rio Tinto	ASX:RIO	Jadar	PFS Underway	Indicated & Inferred	135.7	1.86	6.24	Corporate Presentation Released 21 March 2018
Infinity Lithium	ASX:INF	San Jose	PFS Complete	Indicated & Inferred	111.3	0.61	1.68	ASX Announcement Released 21 March 2018
Savannah Resources	AIM: SAV	Barroso	DFS Underway	Measured, Indicated & Inferred	27.0	1.00	0.71	Corporate Presentation Released May 2019
European Lithium	ASX:EUR	Wolfsburg	PFS Complete	Measured, Indicated & Inferred	10.98	1.00	0.27	Corporate Presentation Released May 2019

The Company 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

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Appendix 3: decarbonisation potential calculations

Decarbonisation potential for Zero Carbon Lithium process: Based on 50 kWh average lithium-ion battery size, with average of 0.9 kg LCE/kWh across different cathode chemistries. Total 1.4B vehicles in use worldwide (carsguide.com.au), 308m vehicles in Europe (acea.be), and 415 GWh of lithium-ion battery cell production in Europe, mostly for EVs, by 2029 (Benchmark Mineral Intelligence). Carbon footprint per tonne of LiOH production from hard-rock mining calculated as 15t CO_2 per tonne LiOH (The CO_2 Impact of the 2020s Battery Quality Lithium Hydroxide Supply Chain, Minviro Ltd.)

CO_2

6 million tonnes

For EU lithium annual demand by 2028 – potential footprint of lithium production

Equivalent to annual emissions of Cyprus

CO_2

231 million tonnes

Full electrification of EU cars – potential footprint of lithium production

Equivalent to annual emissions of Spain

CO_2

1.05 billion tonnes

Full electrification of world cars – potential footprint of lithium production

Equivalent to annual emissions of France, Italy, UK combined.

Appendix 4: The fossil-nuclear era in Europe coming to an end

2020 | 2030 | 2040 | 2050

Europe is aiming for carbon neutrality, but the EU's energy transition is far from being complete:

Renewable Energy (RE)

- 30.7% RE in Power
- 19.5% RE in Heat
- 7.6% RE in Transport

Oil
- Combustion engine bans in France, Belgium, Ireland and the Netherlands.
- Diesel bans and low emission zones in over 260 cities in more than 20 member states.
- Combustion engine phase-out in UK

Nuclear
- Nuclear phase-out in Germany, Spain and Belgium, reduction of nuclear capacities in France.

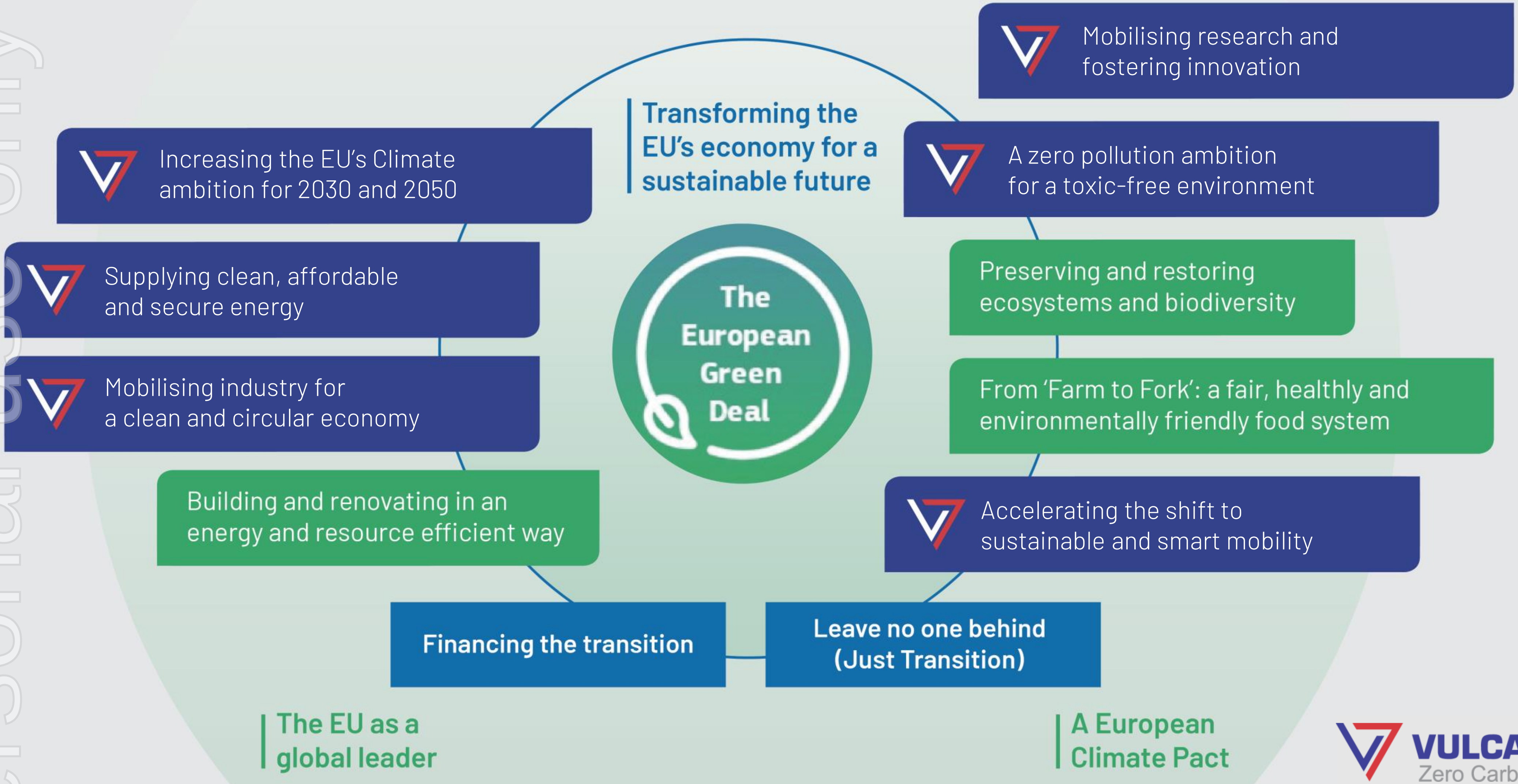
Coal
- Coal phase-out by 75% of European member states, among them Spain, France, UK and Italy.
- Coal phase-out in Germany

Gas
- Bans for fossil heating systems + incentive schemes for low carbon heating across EU Member States.

Demand for low-carbon solutions in transport sector → **EVs and Lithium-Ion Batteries**

Demand for low-carbon dispatchable generation capacity
Demand for low-carbon heat → **Geothermal Energy**

Appendix 5: A perfect fit for the European Green Deal



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Appendix 6: DLE Geothermal: a better way

Atacama Desert in Chile, the world's second driest desert.

DLE technologies paired with geothermal brines have a number of major advantages compared to South American brines, including:

1. Extraction rate and efficiency **does not depend on weather.**

2. Up to **90% lithium extraction** compared to 30-50% for evaporation pond systems.

3. Lead time to production is hours or days instead of months for brine ponds.

4. The concentration of **Mg, Ca, and SO4** in the brine matters less than for evaporative processes.

5. Ability to produce **consistent chemical product** for battery industry.

6. Loss of water from brine **is eliminated.**

7. No need for natural gas, solution is already hot and heat & power from geothermal plant.

8. Minimal footprint required for processing compared to evaporation ponds so brine remains in its undisturbed natural state.

> **Lithium exploitation is drying out the world's driest desert**
>
> The Atacama Desert in Chile, the world's driest desert, is gradually losing its last water resources. Indigenous communities have been sounding the alarm for several years and are now being strengthened by scientific research and environmental organisations. Cause of this dehydration? Lithium mining.

https://catapa.be/en/lithium-exploitation-is-drying-out-the-worlds-driest-desert/

Appendix 7: aligned with UN Sustainable Development Goals

- Gender equality
- Affordable and clean energy
- Decent work and economic growth
- Industry, innovation and infrastructure
- Sustainable cities and communities
- Responsible consumption and production
- Climate action

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Thank you

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