



**VULCAN ENERGY**

**ZERO CARBON LITHIUM™**

**Zero  
Carbon Energy** ⚡



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To achieve the outcomes of Vulcan's Pre-Feasibility Study, initial funding in the order of €700m (including contingency) will be required, and a further €1,138m will be required for Phase 2. It should be noted that, as with any project at this stage, the ability to develop the project may depend on the future availability of funding, and while the Company believes it has reasonable basis to assume that future funding will be available and securable, this is not guaranteed. Industry best practice exploration for deep geothermal brine occurs using 2D and 3D-seismic data acquisition, analysis and interpretation, which Vulcan has completed. As stated in the text of this announcement, in deep geothermal brine projects, the first well drilled is also the first production well, so it follows that financing for the production well drilling is expected to occur first, after a definitive feasibility study is completed. Vulcan Executive Director Dr. Horst Kreuter is an expert in developing deep geothermal projects in Germany and worldwide, including having started the first geothermal development company in Germany, therefore Vulcan's Board has direct experience and has been involved in examples of how the funding process works in this type of project. There are numerous examples of projects financed in this way, prior to drilling, within the same area as Vulcan in the Upper Rhine Valley. Over the past 16 months, the Company has significantly advanced discussions with traditional debt and equity financiers in Europe, including some of the largest European-Union backed, state-owned and private development banks in Europe. This has resulted in written support already being provided by some of these institutions for the provision of senior debt for the project, based on the project progress to date. The Project further benefits from being one of only two lithium projects financially and administratively supported by EU-backed group EIT InnoEnergy, which is the founder and steward of the European Battery Alliance, that counts among its members the most significant financiers of battery metals, battery and electric vehicle projects in Europe including the European Investment Bank. InnoEnergy has placed Vulcan on its Business Investment Platform, through which it is further assisting Vulcan with conversations with European financiers. The size and location of the deposit, together with other strong project fundamentals, in the middle of large end users associated with European electric vehicles that is driving lithium demand makes the project a strategic asset as evidenced by the large interest shown in the Project by public/private banks, financiers, end users and large lithium specialist companies to-date. An improvement in market conditions since work commenced and a perceived high growth outlook for the global lithium market enhance the Company's view of the fundability of the Project. Based on this, the Board is confident the Company will be able to finance the Project through a combination of syndicated senior debt, export credits, industry related hybrid debt, equity and forward sales at the Project level. The size of the Project will necessitate a syndicate of banks and in the current low interest rate European market the Project represents a higher yield opportunity. The Company is also considering the bond market in view of the increasing market and availability of ESG bonds seeking opportunities which meet ESG criteria and have longer term yields. The Board has relevant experience in funding large scale projects with Mr Rezos, the Chairman, having been involved in funding large scale mining projects and energy projects as a former Investment Banking Director of HSBC Holdings with direct project finance, syndicated debt, export credits, bond and equity experience in multiple jurisdictions, including Europe. Mr Rezos was also a non-executive director of Iluka Resources Limited at the time of funding and developing the large-scale Jacinta Ambrosia and Murray Basin projects. Dr Horst Kreuter, has been involved in developing and funding a number of geothermal projects in Germany. For the reasons outlined above, the Board believes that there is a "reasonable basis" to assume that future funding will be available and securable.

## COMPETENT PERSON STATEMENT

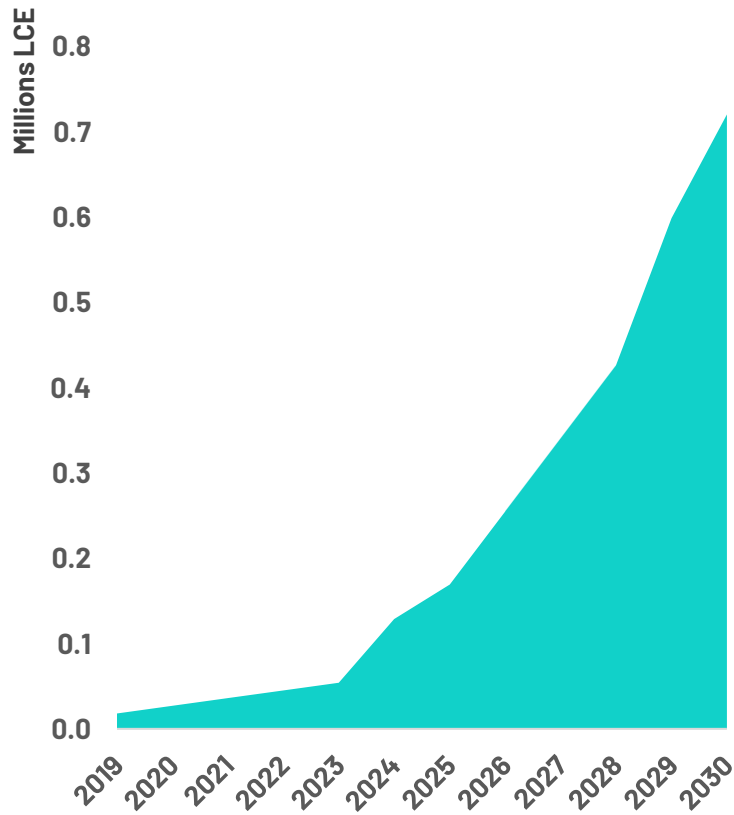
The information in this report that relates to Mineral Resources is extracted from the ASX announcement made by Vulcan on the 15 December 2020, which is available on [www.v-er.com](http://www.v-er.com). The information in this presentation that relates to the Pre-Feasibility Study for the Vulcan Lithium Project and Maiden JORC Ore Reserve is extracted from the ASX announcement "Positive PFS & Maiden JORC Ore Reserve: Zero Carbon Lithium Project", released on 15 January 2021 which is available on [www.v-er.com](http://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.

# How to Support 30 Million EVs by 2030 in the EU?

## 800GWH LITHIUM-ION BATTERY CAPACITY BY 2030

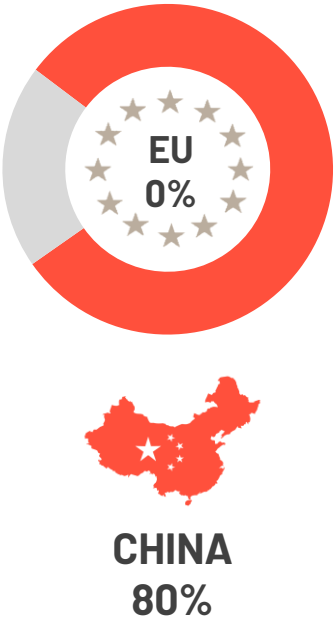


## EU: FASTEST GROWING LITHIUM MARKET IN THE WORLD



Source: Benchmark Minerals

## ZERO LOCAL SUPPLY OF LITHIUM HYDROXIDE



Source: Benchmark Minerals

# High Environmental Footprint of Existing Supply Chain

Lithium is a critical resource for batteries and electric vehicles. To fully electrify our cars with lithium-ion batteries, we need lithium.



Lithium  
mining



CO<sub>2</sub>

1 Billion  
Tonnes

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



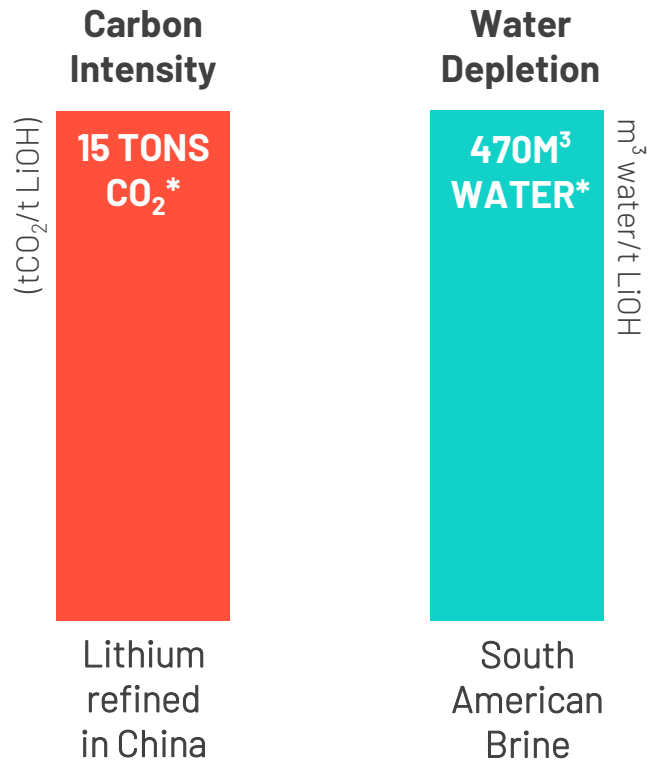
That's  
equivalent to the  
annual emissions  
of the UK,  
France and Italy  
combined

Using the current main source of producing and refining lithium, from hard-rock mines, will emit approximately 1 billion tonnes\* of CO<sub>2</sub> to fully electrify the world's passenger vehicles.

\*Based on 50 kWh average lithium-ion battery size, with average of 0.9 kg LCE/kWh across different cathode chemistries. Total 1.4 billion vehicles in use worldwide (carsguide.com.au). Carbon footprint per ton of LiOH production from hard-rock mining calculated as 15t CO<sub>2</sub> per ton LiOH (The CO<sub>2</sub> Impact of the 2020 Battery Quality Lithium Hydroxide Supply Chain, Minviro Ltd.)

# High Environmental Footprint of Existing Supply Chain

## LITHIUM PRODUCTION EMITS MORE CO<sub>2</sub> THAN NICKEL AND COBALT



Source: Minviro

## AUTOMAKERS COMMITTING TO CARBON NEURALITY



Volkswagen promises:  
*"CO<sub>2</sub>-neutral production including supply chain"*

DAIMLER

Daimler promises to:  
*"make our fleet of new cars CO<sub>2</sub>-neutral"*



BMW promises to:  
*"Reduce carbon emissions across the entire life cycle of its products – including the supply chain"*

# The EU Stepping in to Support and Regulate the Industry

## GREEN SUPPLY CHAIN



New EU Battery Regulation



Carbon Border Adjustment Mechanism



Battery passport



ISO/TC 333  
Lithium

## LOCAL SUPPLY CHAIN



European Battery Alliance



EIB new energy lending policy



Critical Raw Materials List



European Raw Materials Alliance



**Thierry Breton - EU commissioner:** *"We are 100% dependent on lithium imports. The EU, if finding the right environmental approach, will be self-sufficient in a few years, using its resources".*

# Vulcan – Zero Carbon Lithium™



**World-first Zero Carbon  
Lithium Project**



**Geothermal & DLE  
in Germany**



**Dual revenue  
Green energy & lithium**



**In the heart of the  
fastest growing lithium  
market in the world**



**Largest JORC lithium  
Resource in Europe**



**Potential for very low  
OPEX operation**



**Strong cash position,  
fully funded to FID**



**Team of world leading  
experts**



**Project financially  
supported by the EU**

**ENERGY BUSINESS**  
**74MW**  
**Renewable Electricity**

**LITHIUM BUSINESS**  
**40,000 tons per year**  
**Lithium hydroxide**

# We Scoured the Globe to Find the Right Project

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

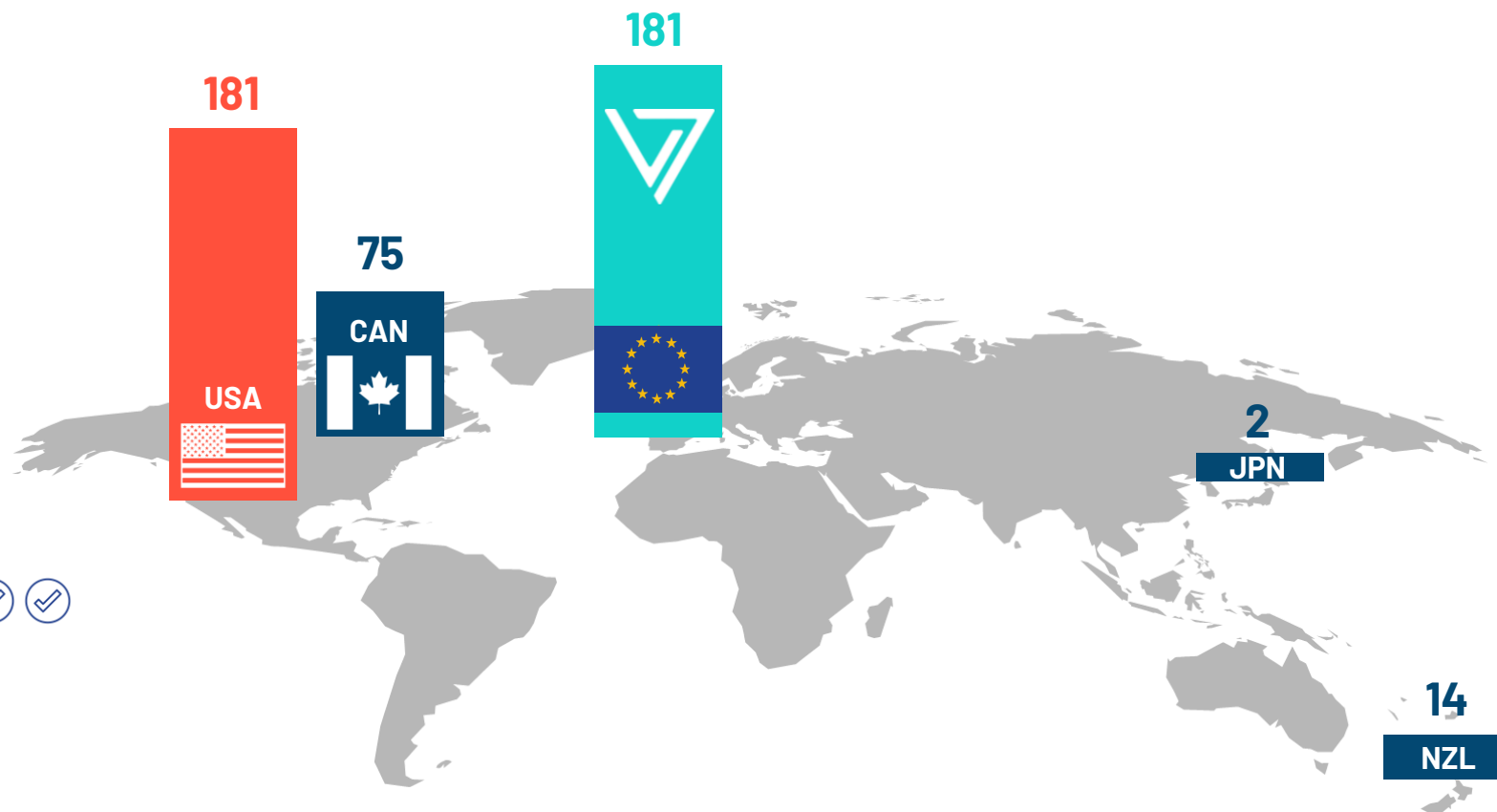
- 1 Renewable heat
- 2 High lithium grades
- 3 High brine flow rate

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

- 1 The Upper Rhine Valley in Germany ✓ ✓ ✓
- 2 The Salton Sea in California

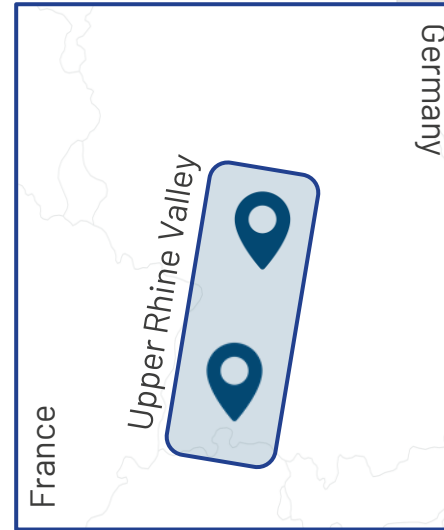
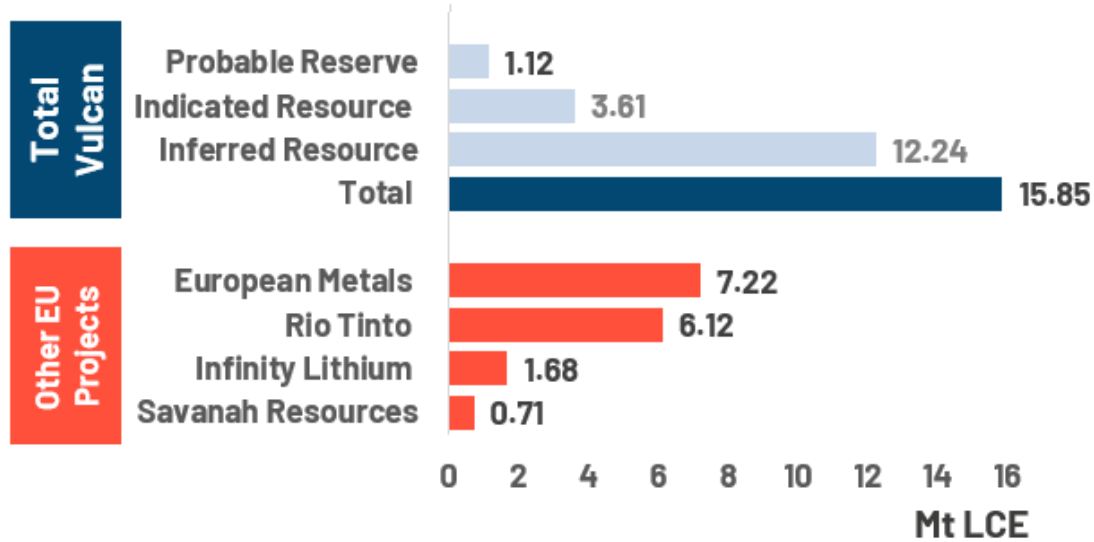
We chose Germany and Europe.

## LITHIUM CONCENTRATION IN BRINE (MG/L LITHIUM)





# Largest Lithium Resource in Europe

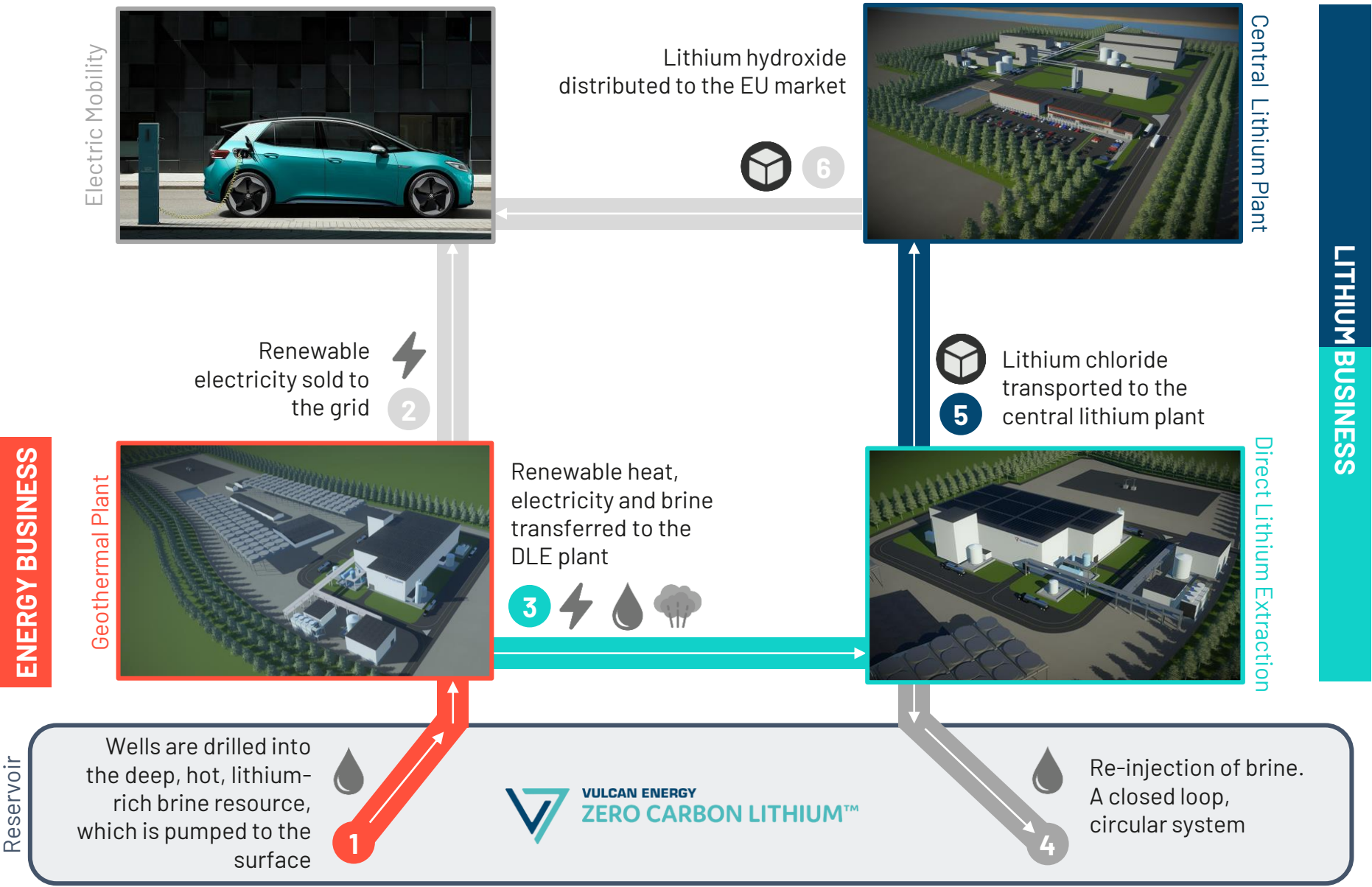


- Very large license package >1,000km<sup>2</sup>
- 3 exploration permits granted and several applications
- Largest lithium resource in Europe: 15.85Mt LCE

SUFFICIENT TO SUPPLY  
>400 MILLION ELECTRIC  
VEHICLES

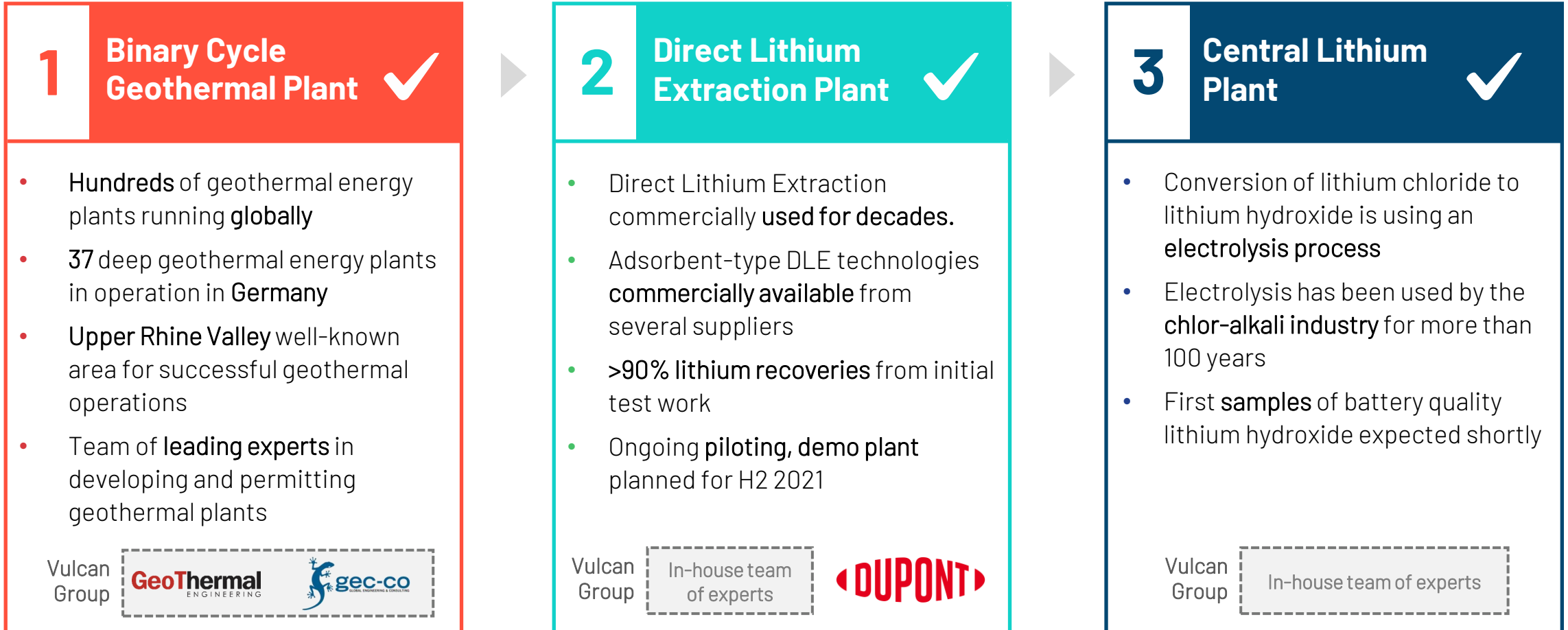


# Vulcan's Renewable Energy & Lithium Chemicals Project



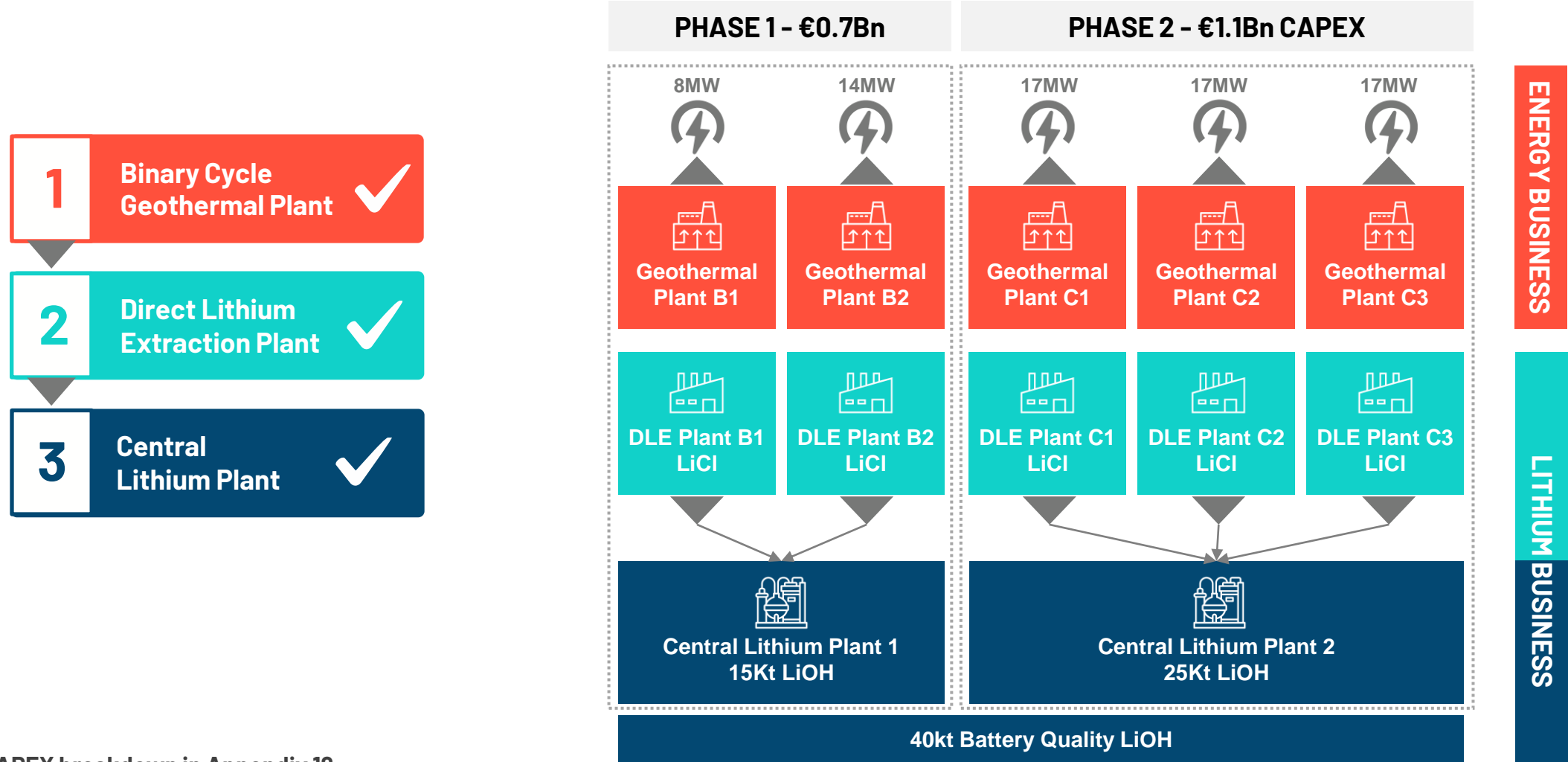
# Commercially Mature Technologies Combined

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



# Dual Purpose Renewable Project

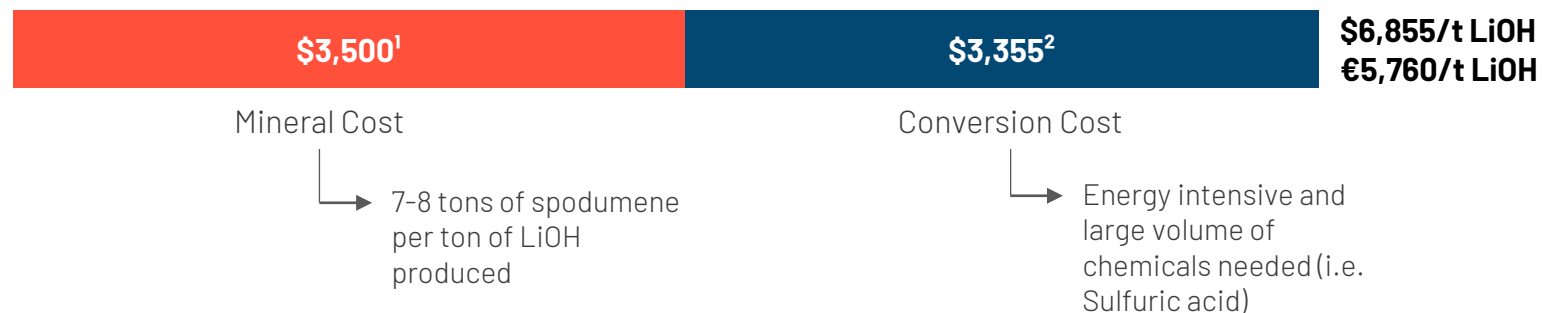
Energy Business, Lithium Business: Zero Carbon Lithium™



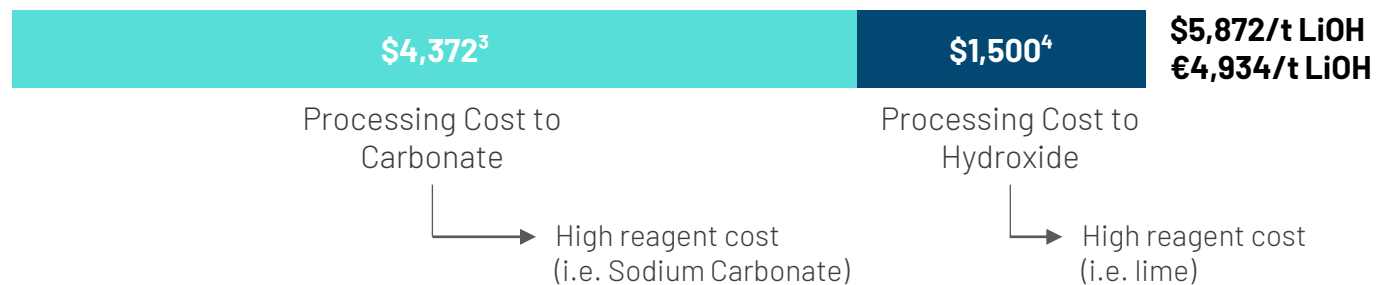
# Potential for Very Low OPEX Operation

Low-cost South American brine and Australian/Chinese mineral conversion vs Vulcan's process

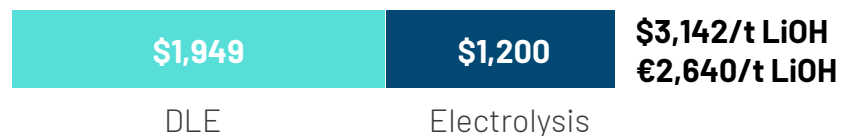
## LiOH via hard-rock processing



## LiOH via brine processing



## Vulcan's process



<sup>1</sup> Galaxy Resources Annual Report FY 2020, \$502/dmt spodumene FY 2019

<sup>2</sup> Kidman Resources PFS announcement, October 2018, contingency on Refinery OPEX of 15%. Cash operating cost including royalties.

<sup>3</sup> Cash operating costs lithium carbonate, Orocobre 2020 Annual report

<sup>4</sup> Orocobre 2020 Corporate Presentation – Naraha Lithium Hydroxide plant, Japan



## Feedstock

Vulcan's "feedstock" is low cost and has dual purpose: lithium extraction and energy production in the form of renewable electricity.

## Processing

Vulcan uses DLE to isolate lithium as opposed to using large volumes of chemicals such as sulfuric acid to dissolve a rock feedstock or soda ash for brine. Vulcan also uses low-cost energy coming from its geothermal operation.

## Upgrading

Vulcan uses electrolysis to upgrade chloride into a high purity hydroxide using renewable energy. No heavy reagent usage such as sodium hydroxide or lime.

# Peerless Environmental Credentials

## Environmental footprint of lithium production routes

 **Hard rock mining**  
60% of world lithium production

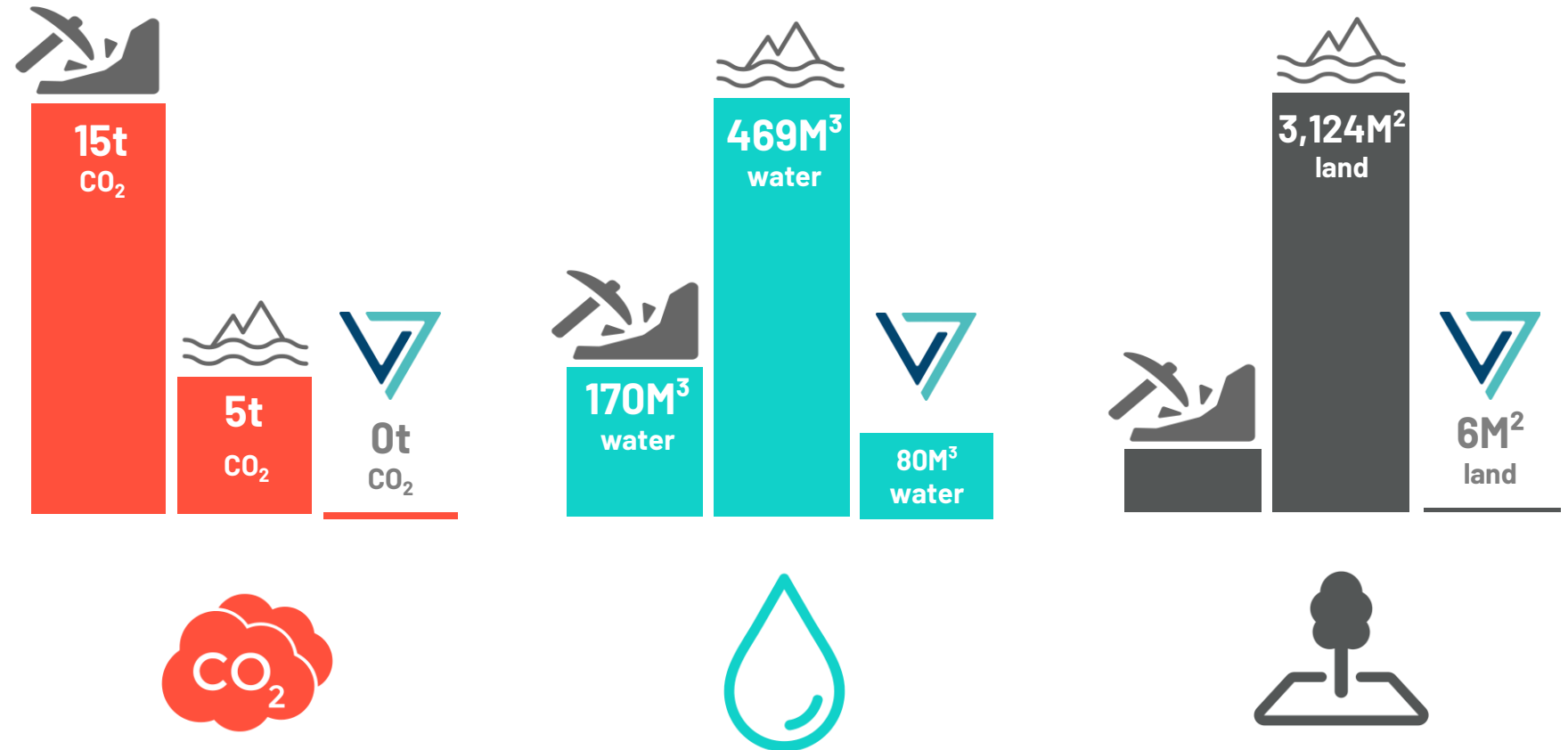
 **Evaporation ponds**  
40% of world lithium production

 **Zero Carbon Lithium™**

Vulcan draws on naturally occurring, renewable geothermal energy to power the lithium extraction process and create a renewable energy by-product. This uses no fossil fuels, requires very little water and has a tiny land footprint.

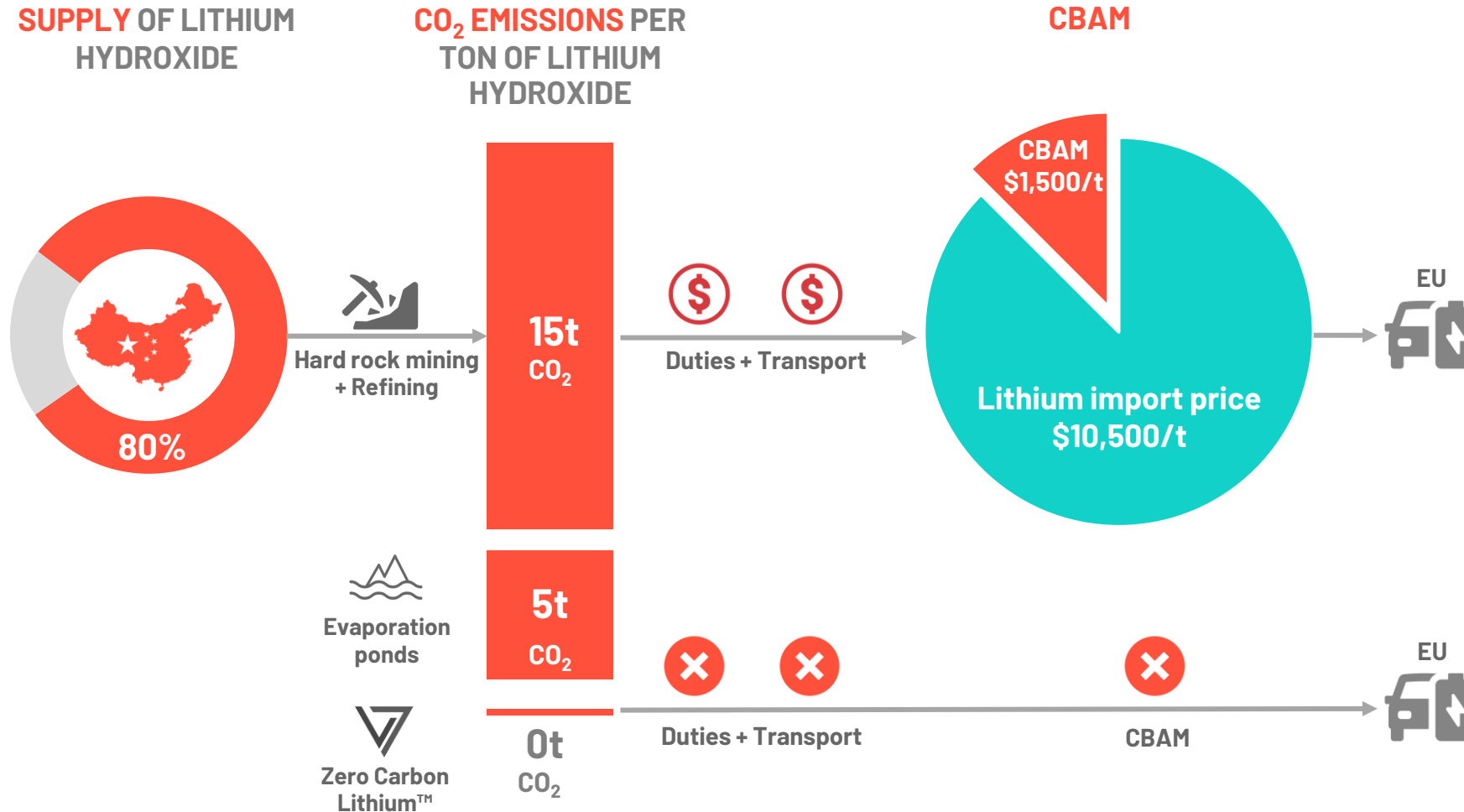
Source: Minviro Life Cycle Analysis 2020 & Vulcan Energy's Pre-Feasibility Study

## PER TON OF LITHIUM HYDROXIDE



# Cost Impact of Regulation on Lithium import prices

The example of the proposed Carbon Border Adjustment Mechanism (CBAM)



## Assumptions for CBAM

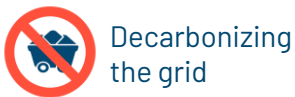
- EU Buyer imports 1 ton of lithium from China in 2025
- Chinese producer emits 15 tons of CO<sub>2</sub> per ton of LiOH (Minviro)
- CBAM in place with strict CO<sub>2</sub> neutrality targets
- Carbon price is at \$100 per ton (Bank of England)
- Lithium hydroxide price: \$10,500 per ton (February 2021 - Fastmarkets)

This results in a CBAM of \$1,500 per ton of lithium hydroxide or a **14% price premium**.

On top of that the buyer will have to account for duties and transport.

# Dual Revenues: Energy and Lithium

## ENERGY BUSINESS



Decarbonizing  
the grid

Grid



Coal phase-out  
in Germany

Industries



Bans for  
fossil heating  
systems

Cities



Zero Carbon Electricity: Geothermal  
energy in the form of electricity is sold to  
the grid

**Feed-in Tariff**  
**€25.2c**  
**/KWh**

**Guaranteed**  
**for**  
**20 years**

Zero Carbon Heat: Energy in the form  
of heat can be sold to several public  
and private customers via pipes,  
proximity is a requirement

## LITHIUM BUSINESS

### LiOH Prices – Historical and Forecast

\$/t

22,000  
20,000  
18,000  
16,000  
14,000  
12,000  
10,000  
8,000  
6,000  
4,000  
2,000  
0

Jan-16 Nov-16 Sep-17 Jul-18 May-19 Mar-20 Jan-21 Nov-21 Sep-22 Jul-23 May-24 Mar-25 Jan-26 Nov-26 Sep-27 Jul-28 May-29 Mar-30

Price Forecast  
Historical trade statistics  
Spot prices CIF Asia  
2016-2020 average

Source: Trade statistics compiled from Global Trade Atlas®, Benchmark Minerals (2016-2017),  
Fastmarkets (2017-2021), Canaccord Genuity (Forecast)



# Project Financials

## ENERGY BUSINESS



**74MW Power**

**€0.7Bn NPV** Pre-tax

**€0.5Bn NPV** Post-tax

**16% IRR** Pre-tax

**13% IRR** Post-tax

**€226M CAPEX** Phase I

**€0.066/KWh OPEX**

Payback: **4 years**

## LITHIUM BUSINESS



**40,000tpy LiOH**

**€2.8Bn NPV** Pre-tax

**€1.9Bn NPV** Post-tax

**31% IRR** Pre-tax

**26% IRR** Post-tax

**€2,640/t LiOH OPEX**

**€474M CAPEX** Phase I

Payback: **4 years**

# The Vulcan Zero Carbon Lithium™ Board

## VULCAN ENERGY RESOURCES LTD – BOARD



**Gavin Rezos**  
CHAIR

Executive Chair/CEO positions of two companies that grew from start-ups to the ASX 300.

Investment banking Director of HSBC. Previously Non-Executive Director of Iluka Resources.



**Dr Heidi Grön**  
INDEPENDENT  
NON-EXEC  
DIRECTOR

Senior executive with **Evonik**, one of the largest specialty chemicals companies in the world, with a market capitalization of €14B and 32,000 employees. 20 years' experience in the chemical industry in Germany.



**Dr. Francis Wedin**  
MANAGING DIRECTOR  
& FOUNDER-CEO

Founder of Zero Carbon Lithium Project. Battery materials and renewable energy industry executive, focused on developing global scale decarbonisation opportunities since 2014. Three discoveries of Lithium Resources on two continents.



**Josephine Bush**  
INDEPENDENT  
NON-EXEC  
DIRECTOR

Member of the **EY** Power and Utilities Board. Led and delivered the EY Global Renewables and Sustainable Business Plan and spearheaded a series of major Renewable Market Transactions.



**Dr. Horst Kreuter**  
CO-FOUNDER &  
BOARD ADVISOR

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



**Ranya Alkadamani**  
INDEPENDENT  
NON-EXEC  
DIRECTOR

Founder of **Impact Group International**. A communications strategist, focused on amplifying the work of companies that have a positive social or environmental impact.



**Annie Liu**  
INDEPENDENT  
NON-EXEC  
DIRECTOR

Former **Tesla** Head of Battery and Energy Supply Chain. Led and managed Tesla's multi-billion-dollar strategic partnerships and sourcing portfolios that support Tesla's Energy and Battery business.



**Julia Poliscanova**  
SPECIAL  
ADVISOR

Senior Director with the **EU's Transport and Environment**. Instrumental in shaping policies around EU vehicle CO2 standards & sustainable batteries.



**Rob Ierace**  
CFO / COMPANY  
SECRETARY

Chartered Accountant and Chartered Secretary with +20 years' experience.



# Experienced Development Team

## ENERGY BUSINESS



**Thorsten Weimann**  
**CHIEF OPERATING OFFICER**

+25 years' experience in geothermal project development and operation in Germany.



Consultancy company focused on deep geothermal projects at surface: **power plant, heat stations, drill pads, and permitting.** More than **300 years** engineering knowledge of Gec-Co's team. 25 team members, created in 2012

Planning and consultancy company for **deep geothermal energy projects**, based in the Upper Rhine Valley, **Germany.**

**Highly credentialed scientific team** with >100 years of combined **world-leading expertise.** 12 team members, created in 2005.

## LITHIUM BUSINESS



**Project Development team** based in Germany. **World-leading experts** in the fields of lithium chemistry, DLE and chemical engineering: 8 team members



Collaboration agreement signed with **DuPont** who will **leverage its portfolio** of DLE products to assist Vulcan with input and test work during Vulcan's Zero Carbon Lithium® project DFS.

## BUSINESS DEVELOPMENT



**Vincent Ledoux Pedailles**  
**VICE PRESIDENT**

+10 years in the lithium industry with executive and non-executive positions.

## PUBLIC AFFAIRS & PUBLIC RELATIONS



**Dr. Horst Kreuter**  
**Executive Director,**  
**Vulcan Germany**



**FINSBURY**

EUROPE



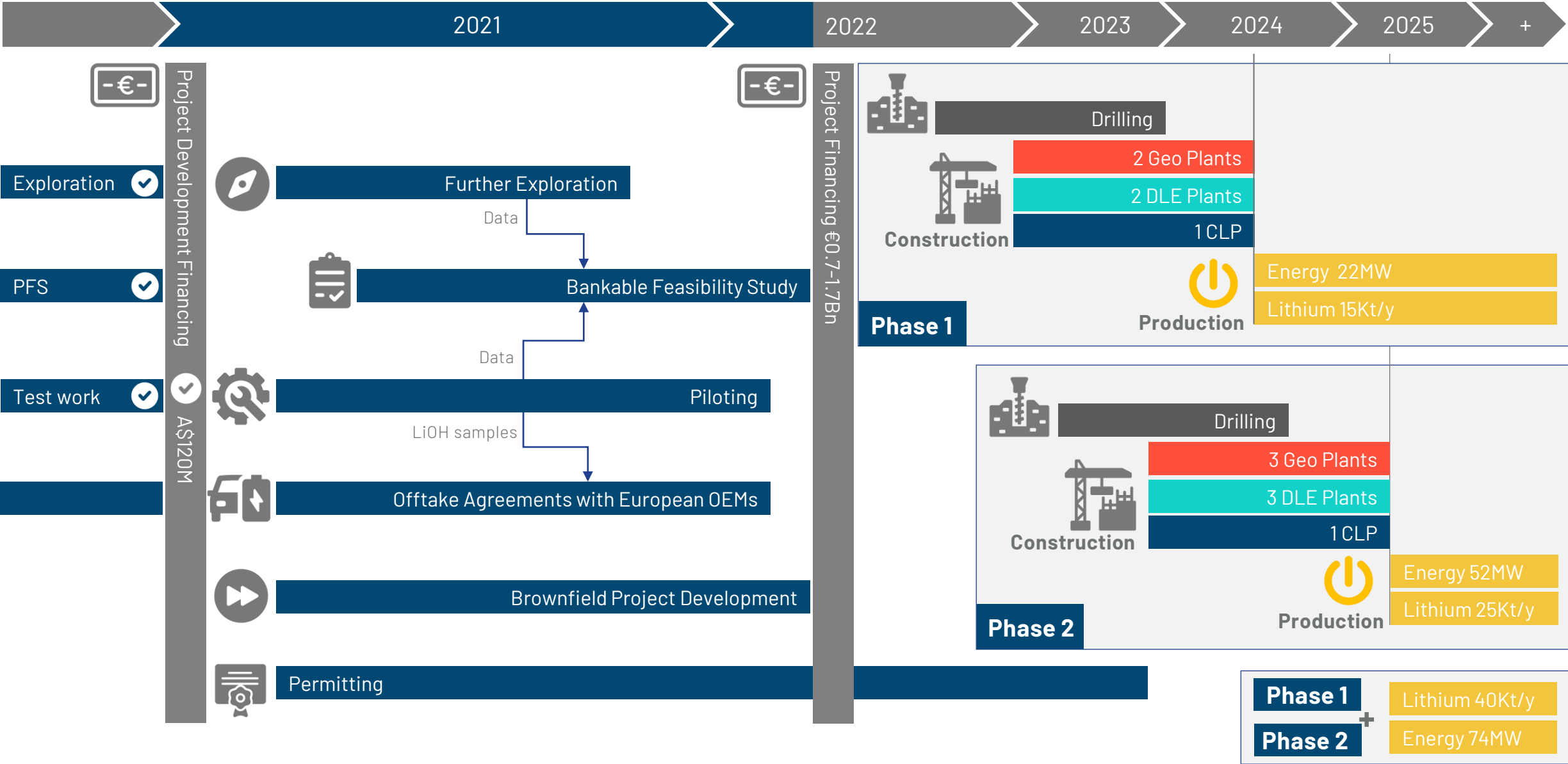
GERMANY



**CANNINGS**

AUSTRALIA

# Project Timeline



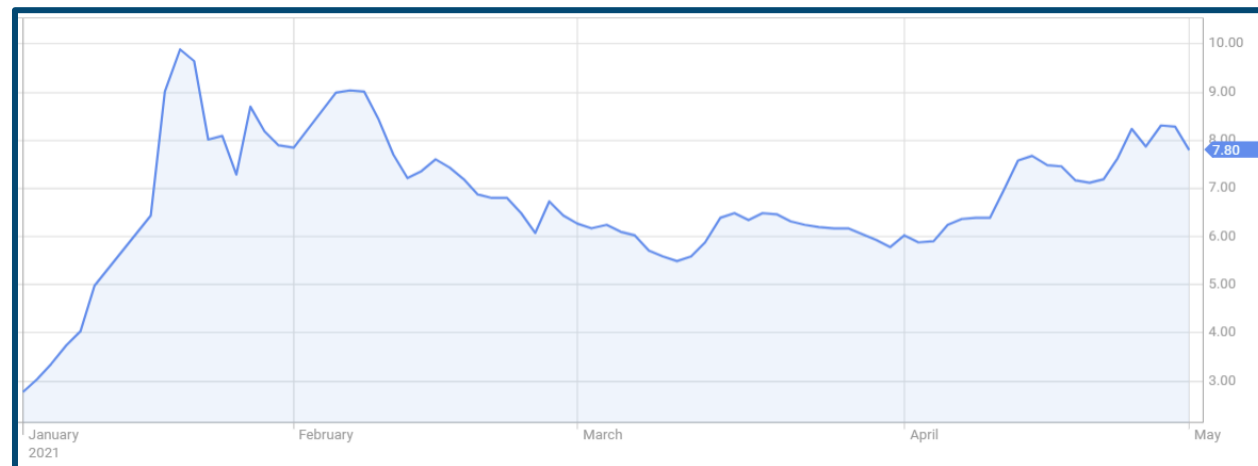
# Share Price & Capital Structure

## ASX : VUL

Shares on Issue	<b>107,464,256</b>
Performance Milestone Shares*	<b>4,400,000</b>
Performance Rights*	<b>10,950,000</b>
Market Capitalization at \$7.80 (undiluted)	<b>~\$838.2M</b>
Enterprise Value at \$7.80 (undiluted)	<b>~\$721.2M</b>
Cash Position	<b>~\$117M</b>
	<b>Fully financed to FID</b>
Top 20 Shareholders	<b>~51%</b>
Management (undiluted)	<b>~19%</b>

## Frankfurt: 6K0

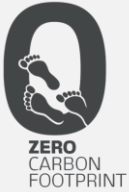
\*Refer ASX Announcement 10 July 2019 for further details.



## Key Shareholders

Dr. Francis Wedin	12.10%
Hancock Prospecting Pty Ltd	6.74%
Mr. Gavin Rezos	5.61%
Mr. John Hancock	5.00%
BNP Energy Transition Fund	1.43%

# Conclusion



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



**EUROPE'S LARGEST  
LITHIUM RESOURCE**



**LOCATION CENTRE OF  
FASTEST GROWING  
MARKET**



**SUPPORTED BY EU  
FUNDING,  
REGULATION &  
INITIATIVES**



**LOW COST &  
RESILIENT  
ECONOMICS**



**STRONG CASH  
POSITION, FULLY  
FUNDED TO FID**



**THE RIGHT TEAM  
FOR THE JOB**



**RAPIDLY ADVANCING  
LITHIUM PROJECT**

# Thank You

PUBLIC RELATIONS

EU

Germany

Australia



VULCAN ENERGY  
ZERO CARBON LITHIUM™



# Appendices



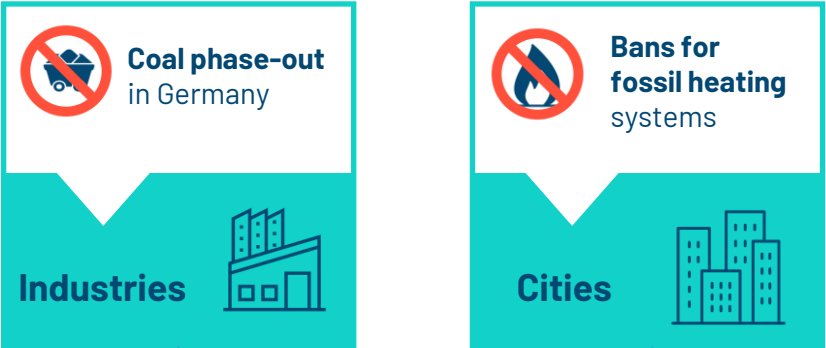
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# Appendix 1: Vulcan's Renewable Project Description

## Germany

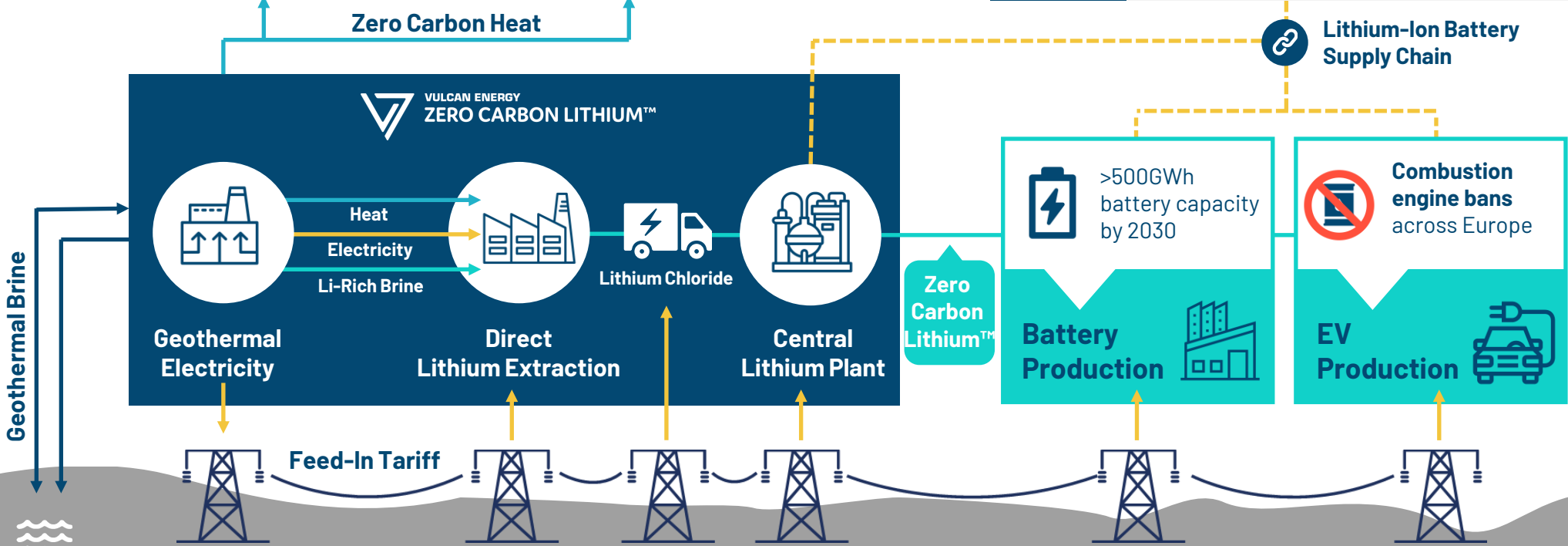


## European Union



**Regulations & Initiatives**

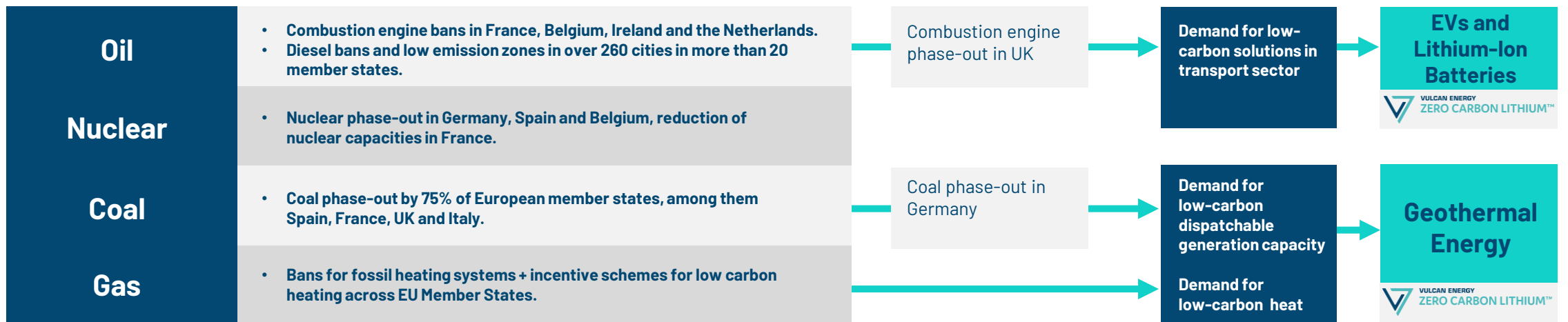
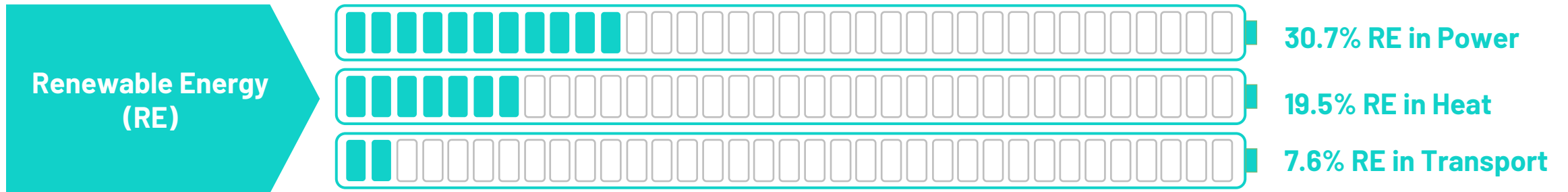
- EU New Battery regulation
- European Battery Alliance
- EU Recovery Plan
- EU Green Deal



# Appendix 2: The fossil-nuclear era in Europe is coming to an end



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



# Appendix 3: EU Map Lithium-ion Battery Capacity

	<b>Brandenburg, 2021</b> At least 20GWh		<b>Brandenburg, 2021</b> RAMP UP TO 8-12 GWh
	<b>Salzgitter, 2025</b> 40GWh		<b>Bitterfeld, 2022</b> 16 GWh
	<b>Spain, Eastern Europe, etc.</b> 4x40GWh		<b>Wroclaw, 2018</b> 6 GWh, LATER 70 GWh
	<b>Erfurt, 2022</b> 14 GWh LATER 100 GWh		<b>Konin, 2021</b> CATHODE MATERIALS
	<b>Sunderland, 2010</b> 2.5 GWh		<b>Nysa 2020</b> CATHODE MATERIALS
	<b>Willstätt, 2020</b> 1 GWh		<b>Komaron 1 + 2, 2020</b> 7.5 GWh, LATER 23.5 GWh
	<b>Germany &amp; France, 2022</b> 16 GWh, LATER 48 GWh		<b>Göd, 2018</b> 3 GWh, LATER 15 GWh
	<b>Überherrn, 2023</b> 24 GWh		<b>Mo I Rana, 2023</b> 32+2GWh
	<b>Germany, 202X</b>		<b>Agder, 2024</b> 8GWh, later 32GWh
	4 GWh, LATER 8 GWh		<b>Norway, TBC</b> Unknown
	<b>Schwarzheide, 2022</b> CATHODE MATERIALS		<b>Europe, TBC</b> Unknown
	<b>Bratislava, 2024</b> 10GWh		<b>Blyth, UK, TBC</b> Unknown
	<b>St Athan Wales, 2023</b> 10GWh, later 35Gwh		<b>France, TBC</b> Unknown
	<b>Skellefteå, 2021</b> 32 GWh LATER 40 GWh		
	<b>Hungary, TBC</b> CATHODE MATERIALS		

>800GWh LITHIUM-ION  
BATTERY CAPACITY  
PLANNED BY 2030

x80



# Appendix 4: EU Regulatory Support

## GREEN SUPPLY CHAIN

### New EU Battery Regulation including:

- Responsible sourcing of raw materials such as lithium
- CO2 footprint threshold for all batteries sold in Europe
- Traceability guidelines for all raw materials used in batteries

**Carbon Border Adjustment Mechanism:** increase cost of importing carbon heavy lithium

**Battery passport:** track & ensure responsible mineral sourcing

**ISO/TC 333 Lithium:** insuring new ISO norms includes environmental measures for lithium production



## LOCAL SUPPLY CHAIN



**European Battery Alliance:** create a competitive and fully integrated battery manufacturing chain in Europe.



**Critical Raw Materials:** Lithium added to the list of Critical Raw Materials 2020



**EIB** new energy lending policy supporting projects relating to the supply of critical raw materials



**European Raw Materials Alliance:** make Europe economically more resilient by attracting investments to the raw materials value chain.

**Thierry Breton - EU commissioner:** "We are 100% dependent on lithium imports. The EU, if finding the right environmental approach, will be self-sufficient in a few years, using its resources".

# Appendix 5: The New EU Battery Regulation

New measures announced in December 2020 including:



**1. Responsible sourcing :** New mandatory procedures to ensure sustainable and ethical sourcing of raw materials such as lithium.



**2. CO<sub>2</sub> footprint :** All batteries sold in Europe must declare their carbon footprint. This will come in 3-step approach : 1/ Declaration (2024), 2/ Classification (2026), 3/ Threshold (2027). Batteries with the highest carbon footprint will be banned in Europe.



**3. Traceability:** All raw materials used in batteries to be procured according to OECD recognized guidelines for sustainable sourcing. Thanks to blockchain technology, each battery will have a digital passport tracking all components upstream.



**Maroš Šefčovič – European Commission VP :** *“The new EU battery CO2 regulation will have an immediate impact on the market, which up until now has been driven only by price”.*

**Thierry Breton – EU commissioner:** *“We are 100% dependent on lithium imports. The EU, if finding the right environmental approach, will be self-sufficient in a few years, using its resources”.*

## Other EU measures and initiatives supporting lithium:



EU list of Critical Raw Materials & European Raw Materials Alliance



EIB new energy lending policy supporting projects relating to the supply of critical raw materials



European Battery Alliance

# Appendix 6: Vulcan financially supported by the EU

**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.



The infographic features a large blue banner at the top with the European Union flag (a circle of twelve yellow stars on a blue background). Below the banner, the text 'May '20' is displayed in a large, bold, blue font. Underneath this, the text 'Agreement signed with EU-backed body to launch Vulcan Zero Carbon Lithium® Project.' is written in a bold, black font. At the bottom of the infographic, there are three logos: the European Commission logo (a blue rectangle with the EU flag and the text 'European Commission' below it), the EIT InnoEnergy logo (a green circular logo with 'eit' inside, followed by 'InnoEnergy' and 'Knowledge Innovation Community' below it), and the European Investment Bank logo (a blue and grey stylized logo with the text 'European Investment Bank' to its right).

**May '20**

**Agreement signed with EU-backed body to launch Vulcan Zero Carbon Lithium® Project.**

 European Commission

 **EIT InnoEnergy**  
Knowledge Innovation Community

 **European Investment Bank**

# Appendix 7: Vulcan & Circular to establish world-first full lithium traceability & transparency across the EU supply chain



Circular offers a software solution that enables customers to track raw materials and CO2 emissions through supply chains to demonstrate responsible sourcing and sustainability.

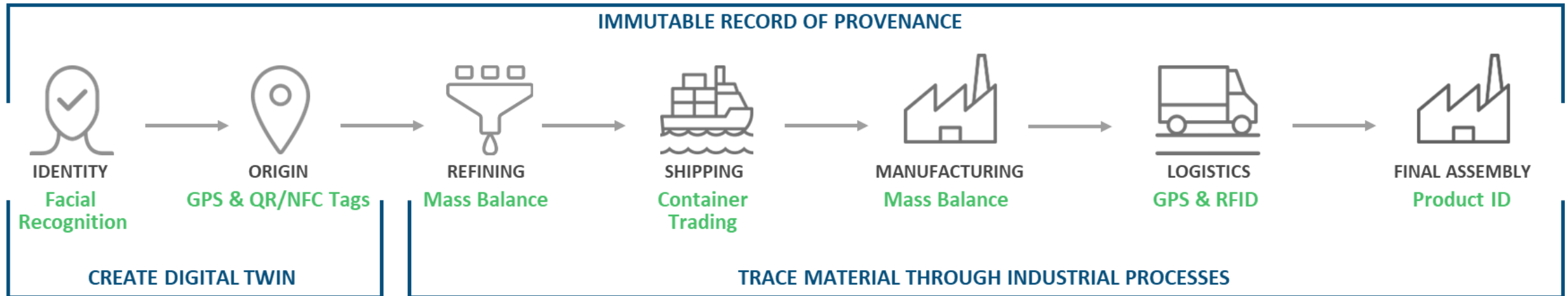
By applying blockchain, artificial intelligence, machine learning, facial recognition, mass balancing and other technologies Circular makes sure that the digital twin is reliably linked to the physical resource through out its entire journey. This enables:

1. Reputational Protection

2. Proof of compliance with guidelines and regulations

3. Dynamic carbon tracking

4. Reducing due diligence, audits and reporting costs



Example applied to the cobalt supply chain

Circular's  
existing  
customers:



CATL



POSCO  
CHEMICAL





# Appendix 8: Vulcan to offset CO2 penalties for automakers

## CO<sub>2</sub> emissions linked to lithium production

### Hard Rock Mining



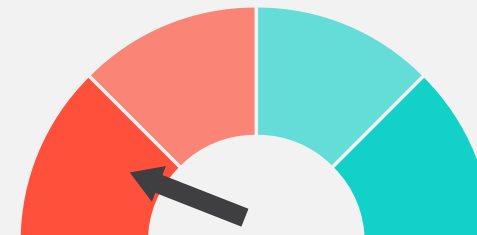
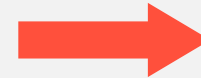
675kg CO<sub>2</sub> per EV  
From Lithium Production



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



19M tons of CO<sub>2</sub>  
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



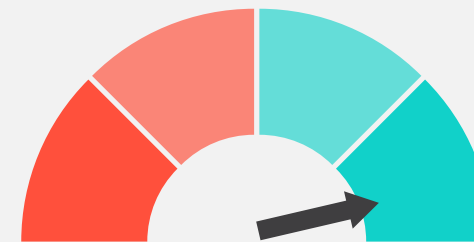
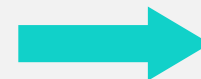
-238kg CO<sub>2</sub> per EV  
From Lithium Production



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



-7M tons of CO<sub>2</sub>  
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<sub>2</sub>** generated by the rest of their supply chain.

# Appendix 9: Vulcan Energy's Board

## VULCAN ENERGY RESOURCES LTD - BOARD

**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.

**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.

Management & Executive experience in resources sector on four continents; bilingual; dual Swedish & Australian nationality.

**Dr. Horst Kreuter**  
CO-FOUNDER &  
BOARD ADVISOR



Ex-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.

**Annie Liu**  
NON-EXEC  
DIRECTOR



Former **Tesla** Head of Battery and Energy Supply Chain. Led and managed Tesla's multi-billion-dollar strategic partnerships and sourcing portfolios that support Tesla's Energy and Battery business units including Battery, Battery Raw Material, Energy Storage, Solar and Solar Glass, including raw materials sourcing efforts such as lithium for battery cells.

20 years' experience with Tesla and Microsoft.

**Dr. Heidi Grön**  
NON-EXEC  
DIRECTOR



Dr. Grön is a chemical engineer by background with 20 years' experience in the chemicals industry.

Since 2007, Dr. Grön has been a senior executive with **Evonik**, one of the largest specialty chemicals companies in the world, with a market capitalization of €14B and 32,000 employees.

At Evonik, Dr. Grön is currently responsible for: Global product; Impact assessment and development of solutions for the chemicals strategy for sustainability; Management of Evonik's major investment volumes.

**Josephine Bush**  
NON-EXEC  
DIRECTOR



Member of the **EY** Power and Utilities Board. Led and delivered the EY Global Renewables and Sustainable Business Plan and spearheaded a series of major Renewable Market Transactions

Successfully advised on the first environmental yieldco London Stock Exchange listing, Greencoat UK Wind PLC.

Ms. Bush is a Chartered Tax Advisor, holds an MA Law degree from St Catharine's College, Cambridge, and brings a wealth of experience in ESG strategic advisory.

**Ranya Alkadamani**  
NON-EXEC  
DIRECTOR



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.

**Julia Poliscanova**  
SPECIAL  
ADVISOR



Senior Director with the **EU's Transport and Environment**. Instrumental in shaping policies around EU vehicle CO2 standards & sustainable batteries.

On the steering committee for the Battery CO2 Passport program of the Global Battery Alliance.

Previously worked for the Mayor of London and in the European Parliament following EU legislation on renewables, energy efficiency and sustainable transport.

**Rob Ierace**  
CFO / COMPANY  
SECRETARY

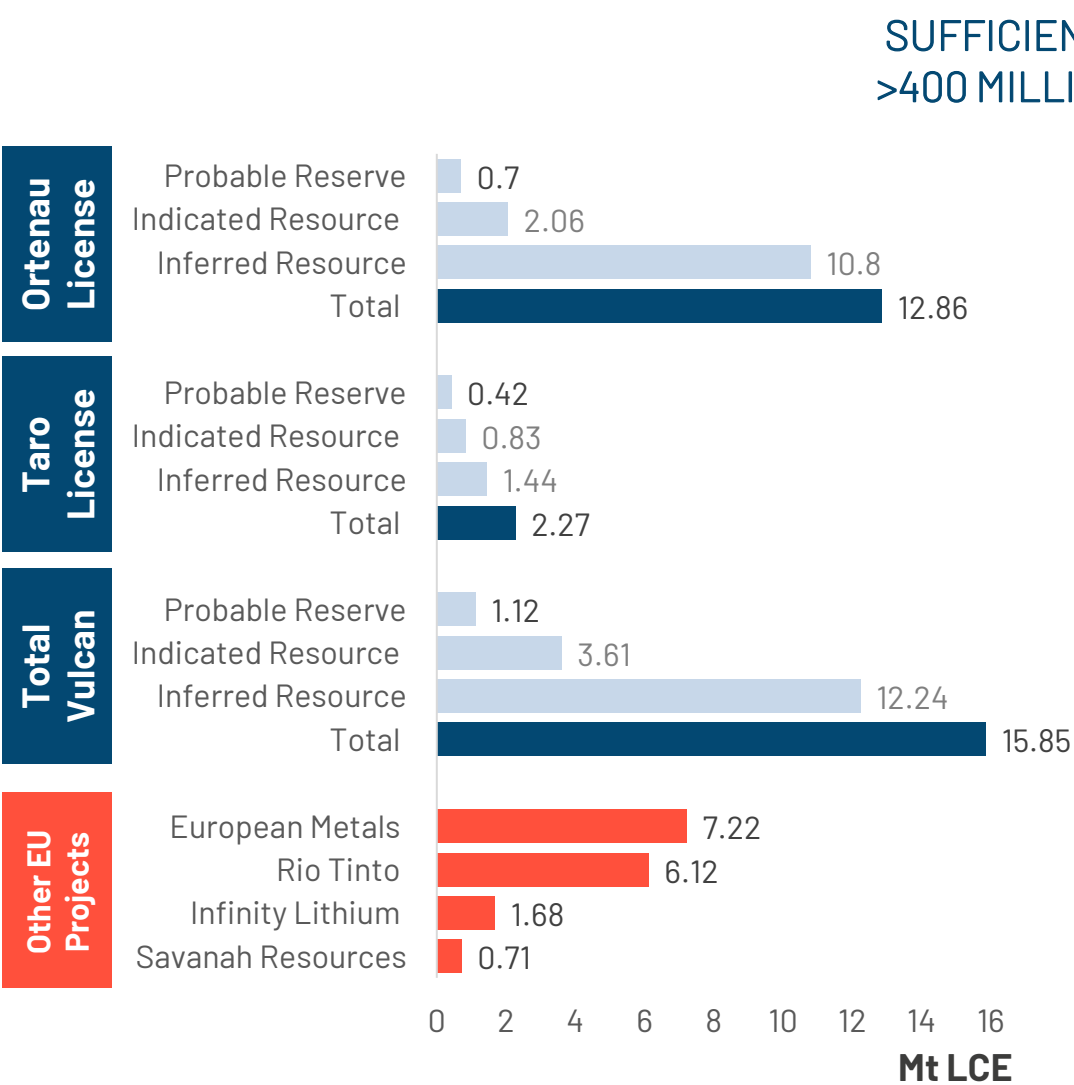


Chartered Accountant and Chartered Secretary with +20 years experience.

Experience in corporate governance, debt and capital raising, tax planning, corporate acquisitions and divestment and farm in/farm out transactions.

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.

# Appendix 10: Largest Lithium Resource in Europe



SUFFICIENT TO SUPPLY  
>400 MILLION ELECTRIC  
VEHICLES



- Very large license package >1,000km<sup>2</sup>
- **3 exploration permits granted** and several applications
- Largest lithium resource in Europe: **15.85Mt LCE**

Notes: Vulcan's URVP Li-Brine resource and reserve area in Europe. Mineral resources are not mineral reserves and do not have demonstrated economic viability. The preceding statements of Reserves conforms to the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) 2012 edition. 100% of the material in the PFS project schedule is included in the Probable Ore Reserves category. The Probable Ore Reserves were calculated assuming the production and processing methods determined for the PFS. Sources for other company data, which have all at the stage of having completed a Pre-Feasibility Study, with varying mixes of Inferred, Indicated and Measured Resources: ASX:EMH 10/2020 presentation, ASX:RIO: 12/2020 release, ASX: INF: 06/2020 presentation, AIM:SAV: 11/2020 presentation. Refer to Appendix 4

# Appendix 11: Brine Composition Comparison

		Upper Rhine Valley Brine	Salton Sea Brine		URV vs SS
Salts (Cations)	Analyte	Value	Value	Units	%
Lithium: Source of revenue	Li	214	213	mg/l	+1%
	Na	22,231	59,600	mg/l	-63%
	K	4,878	18,126	mg/l	-73%
	Rb	30.0	-	mg/l	
	Cs	16.0	-	mg/l	
	Mg	99	54	mg/l	+83%
	Ca	5,195	31,714	mg/l	-84%
	Sr	276	475	mg/l	-42%
	Ba	14.4	139	mg/l	-90%
Anions					
	Cl	60,567	145,000	mg/l	-58%
	SO4	172	127	mg/l	+35%
	F	4.7	24	mg/l	-81%
	Br	288	-	mg/l	
Metals (Cations)					
Requires additional purification step if high	B	47	401	mg/l	-88%
	Be	0.0207	0.2	mg/l	-91%
Can negatively affect DLE if high	Si	67.2	550	mg/l	-88%
Can negatively affect DLE if high	As	20.3	8.8	mg/l	+131%
Can negatively affect DLE if high	Mn	24.5	1,563	mg/l	-98%
Can negatively affect DLE if high	Fe	37.4	664	mg/l	-94%
Can negatively affect DLE if high	Zn	5.2	492	mg/l	-99%
	Pb	0.156	108	mg/l	-100%
Can negatively affect DLE if high	Al	0.014	16	mg/l	-100%
	Ni	0.188	0.5	mg/l	-61%
Can negatively affect DLE if high	Co	0.015	8	mg/l	-100%
	Sb	0.717	6.5	mg/l	-89%
	Ti	<0.1	-	mg/l	
	V	0.165	0.6	mg/l	-71%
	Cr	0.181	2	mg/l	-89%
	Cd	0.0205	3	mg/l	-99%
	Mo	0.0124	8	mg/l	-100%
	Tl	0.328	2	mg/l	-86%
pH		5.828	4.9	-	

The Salton Sea in California

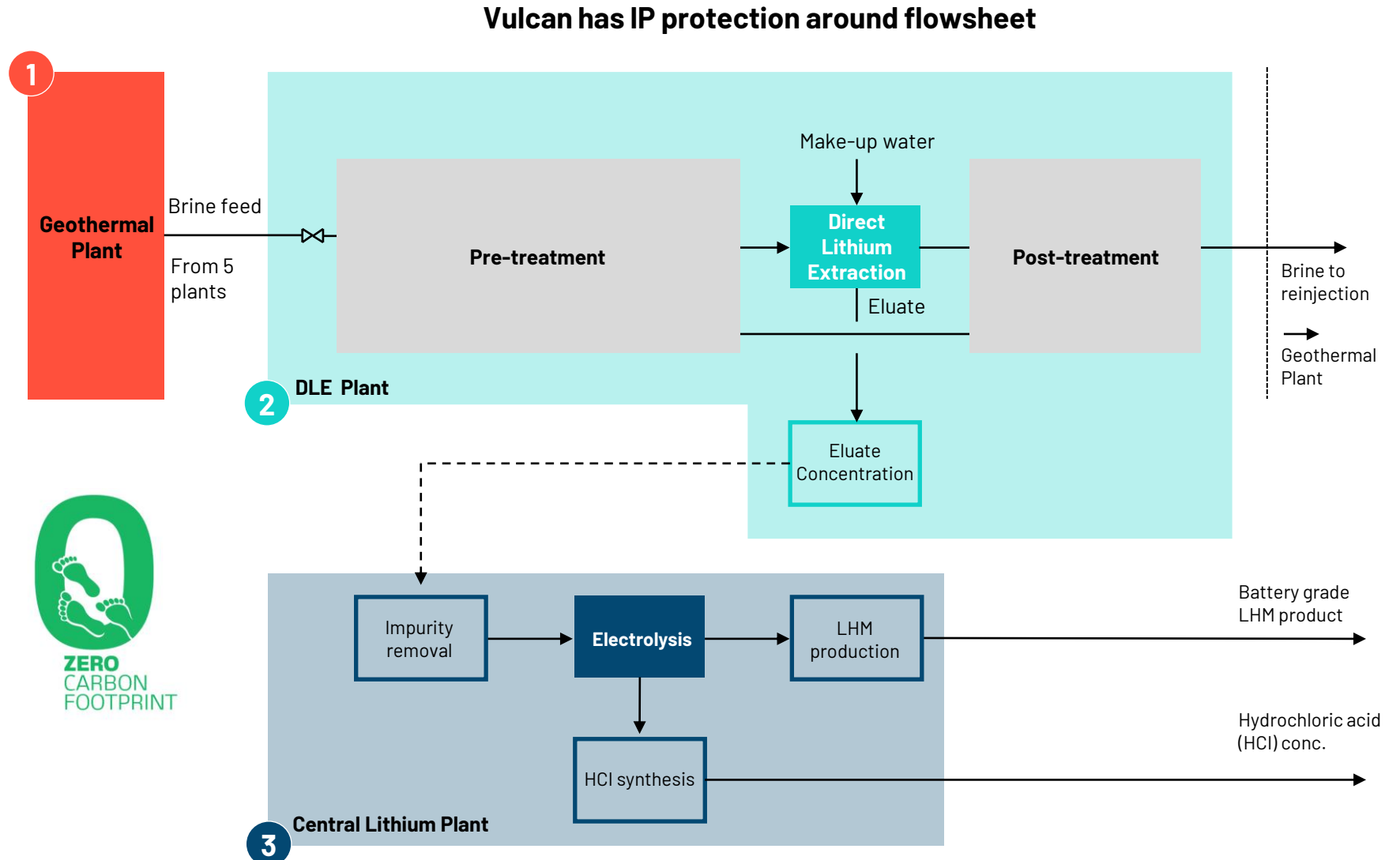


The Upper Rhine Valley in Germany

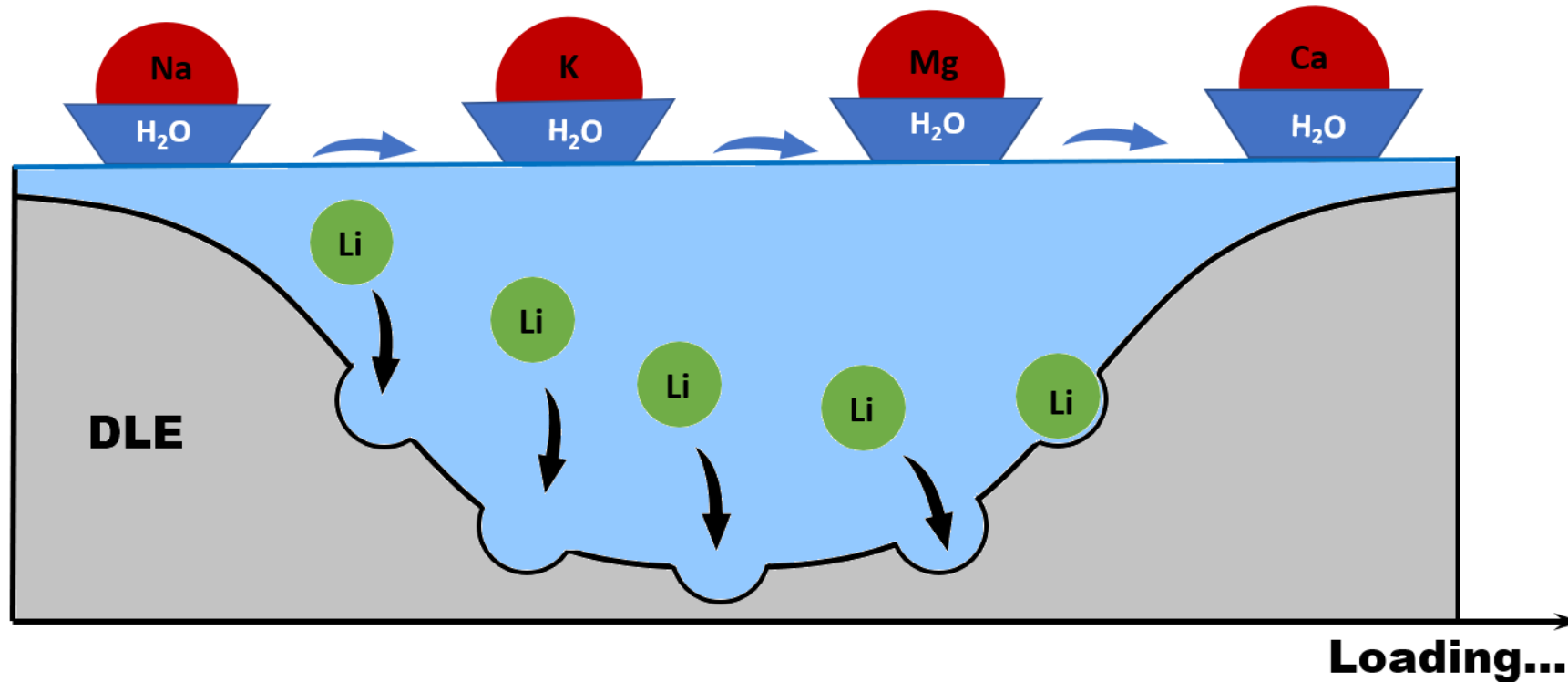
Note: Refer to ASX announcement of 10 March 2021 "High grade lithium, low impurity results from Vulcan's 2021 Upper Rhine Valley bulk brine sampling". Comparison of Vulcan's January 2021 Upper Rhine Valley sample result analysed at KIT (n=1), compared to Salton Sea brine results (n=unknown) as recorded in publicly available literature (<https://gdr.openei.org/submissions/499> for all multi-element results except silica; US Patent 4429535 for pre-flash silica values). Salton Sea values adjusted by the density 1.25 -> from mg/kg to mg/l.

# Appendix 12: Process Flow Sheet

- 1 Hot brine extracted from the ground and generates steam that powers turbines and produces renewable electricity
  - Standard geothermal production wells successfully implemented for decades on salars
- 2 Brine flow is diverted, and lithium is extracted from the solution with a Direct Lithium Extraction (DLE) process.
  - Commercially used for decades
- 3
  - Lithium chloride sent to 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 renewable resources, no fossil fuels are burnt



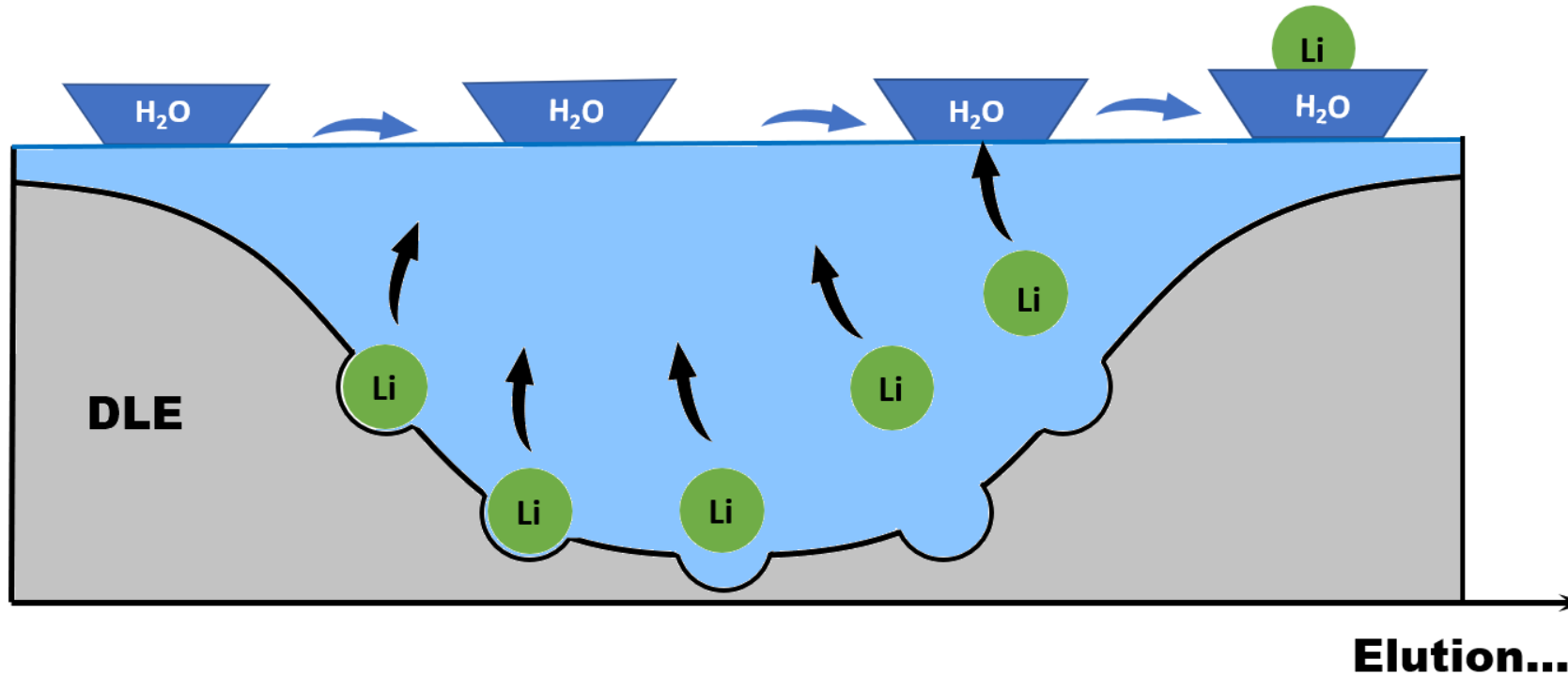
# Appendix 13: Adsorption Process Step 1



Geothermal brine has a **high salinity** – it contains ions of various sizes and electric charges. Water molecules surrounding the ions make up a **hydration shell**. Small lithium ions require a double hydration shell to stabilize their electric charge in the solution. In brines with high salinity this is not possible due to the competition for water molecules with the other ions. Thus, lithium ions 'sink' to the surface of a sorbent material.

During the loading Li<sup>+</sup> is adsorbed on the DLE material, while all the other ions pass through.

## Appendix 14: Adsorption Process Step 2



When the loaded DLE material is washed with water, an excess of free water molecules becomes available to the lithium ions. Formation of a double hydration shell is an energetically favored process, which drives the desorption of the lithium ions from the surface of a sorbent material.

This process is called elution and the collected wash water is called the eluate.

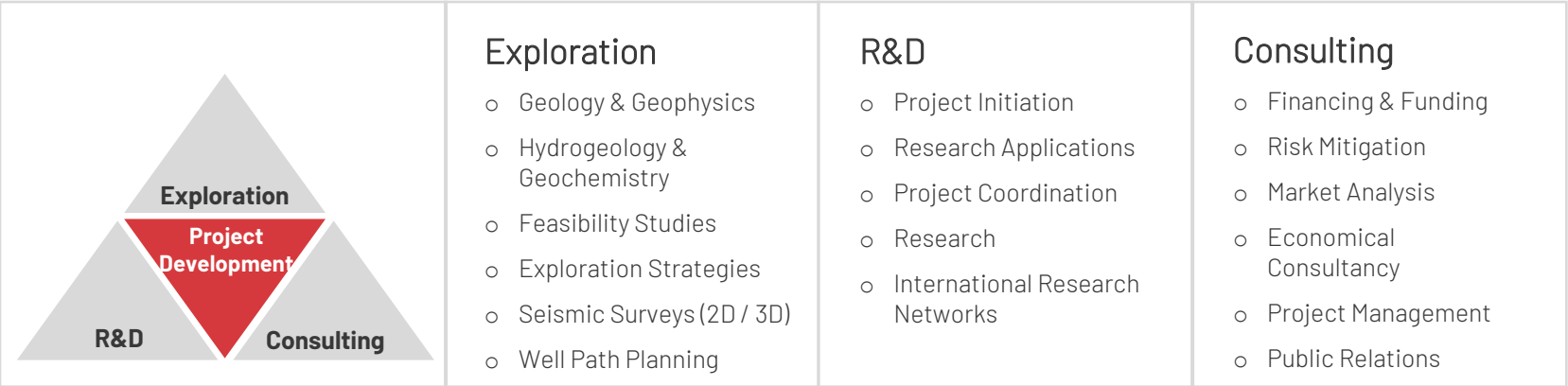
Eluate has a high concentration of lithium ions and very low concentration of impurities.

# Appendix 15: Agreement To Acquire GeoThermal Engineering GmbH

GeoT is a **planning and consultancy** company for **deep geothermal energy projects**, based in the Upper Rhine Valley, Germany



- **Highly credentialed scientific team** with >100 years of combined world-leading expertise in developing geothermal projects, from exploration to production
- **Motivations are fully aligned:** to decarbonize heat and power in Europe with geothermal development in the Upper Rhine Valley
- Acquisition is part of Vulcan’s plans to **rapidly grow its development team** in Germany, to accelerate its Zero Carbon Lithium® project towards production



1

Binary Cycle Geothermal Plant

✓

Agreement is in line with Vulcan’s **strategy**:



Pursue commercially mature energy solutions



Work with **leading companies** in their field



**Minimize risks** by welcoming decades of experience of German deep geothermal project development



# Appendix 16: Agreement To Acquire Gec-Co

Gec-Co Global Engineering is a consultancy company focused on deep geothermal projects at surface: power plant, heat stations, drill pads, and permitting.



- More than 20 years experience in geothermal.
- More than 300 years engineering knowledge of Gec-Co's team.
- Involved in geothermal projects in high and low enthalpy brines worldwide.
- ~ 25 employees

## Local

gec-co supports municipalities in planning and implementation of hydro- and petrothermal projects. These activities include currently Traunreut, Kirchweidach and Höhenrain.

## National

With branches in Augsburg, Bremen and Karlsruhe, gec-co is represented directly in the Molasse Basin, the Upper Rhine Graben and the North German Basin.

## Europe

gec-co designs geothermal power and heating plants in other European countries. The most recent projects are in the Netherlands, Hungary, Romania and Switzerland.

## International

gec-co is involved in the development of geothermal projects in the high and low enthalpy area worldwide. Current projects are in particular in Turkey, East Africa and China.

1

## Binary Cycle Geothermal Plant



Agreement is in line with Vulcan's strategy:



Pursue commercially mature energy solutions



Work with leading companies in their field



Minimize risks by welcoming decades of experience of German deep geothermal project development

# Appendix 17: Agreement With DuPont To De-Risk Direct Lithium Extraction Further



Dupont, a Fortune 500 Top 50 company, is one of the world's largest producers of specialty chemicals



- Collaboration agreement signed with DuPont in January 2021
- DuPont owns proprietary **DLE products** suitable for Vulcan's Zero Carbon Lithium flowsheet
- DuPont will **leverage its portfolio** of DLE products to assist Vulcan with input and test work during Vulcan's Zero Carbon Lithium project DFS
- This input will be provided at **no cost** to Vulcan provided the parties enter into a **supply agreement for DLE products** following the completion of the DFS

2

## Direct Lithium Extraction Plant



Agreement is in line with Vulcan's **strategy**:



Pursue commercially mature DLE products

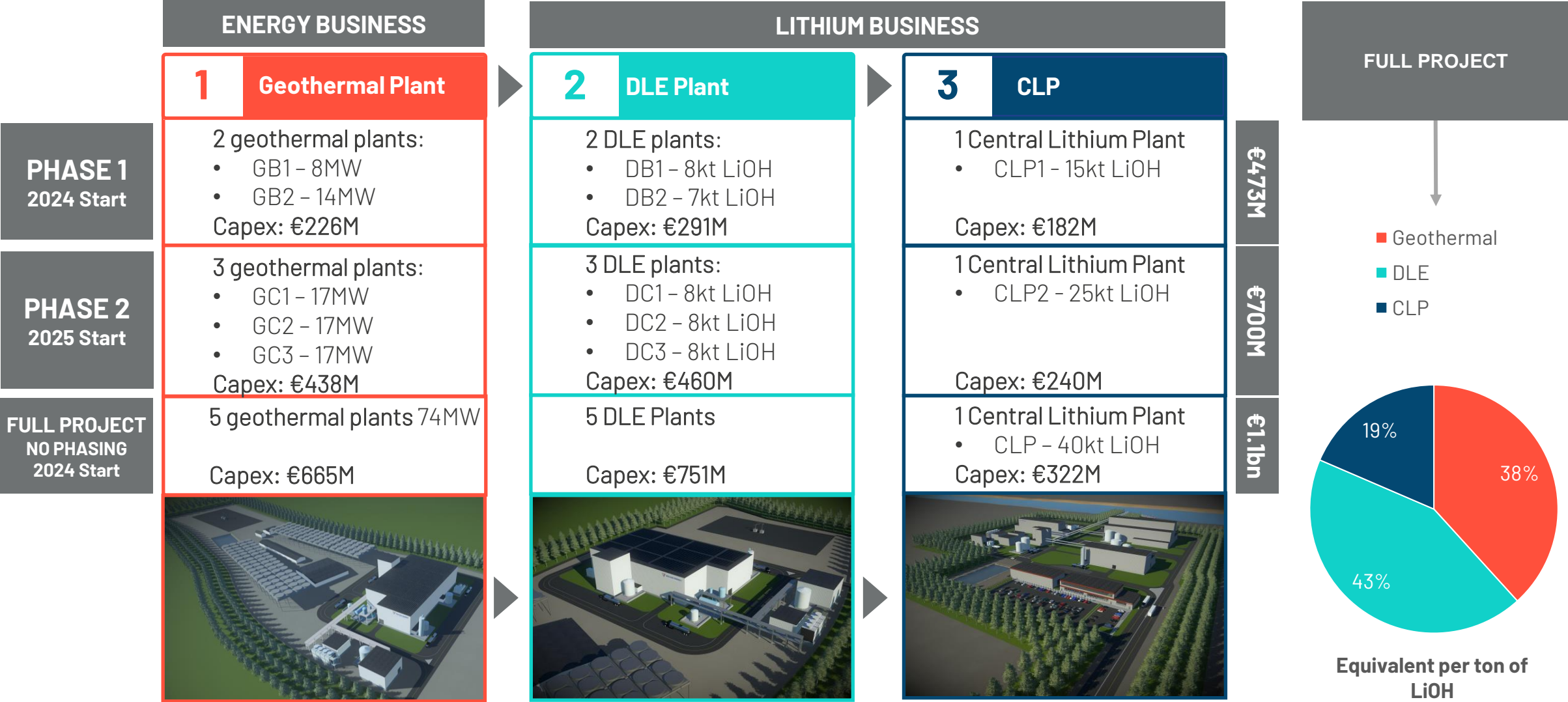


Work with **major suppliers** who can **manufacture at scale**



**Minimize technical risks** and accelerate development of the project

# Appendix 18: Project Economics - CAPEX



# Appendix 19: Project Economics – Possible Structures

Full project developed at the same time but **separated** in two different businesses: Energy and Lithium.

## FULL PROJECT - NO PHASING 2024 Start

### ENERGY BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP				
74MW				

### LITHIUM BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP				
40Ktpy LiOH				

Revenues €M/y	157	500
Net Op. Cash Fl. €M/y	114	394
NPV Pre-tax €M	685	2,802
NPV Post-tax €M	470	1,897
IRR Pre-tax	16%	31%
IRR Post-tax	13%	26%
Payback (year)	6	4
CAPEX €M	665	1,073
CAPEX Geo		
CAPEX DLE		751
CAPEX CLP	0.066	322
OPEX €/KWh or LiOH€/t		2,681

Phase 1 developed first, **separated** in two different businesses: Energy and Lithium.

## PHASE 1 2024 Start

### ENERGY BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
22MW				

### LITHIUM BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
15Ktpy LiOH				

46	187
31	140
155	971
99	644
13%	27%
11%	22%
4	4
226	474
226	
	291
	182
0.078	3,201

Phase 2 developed second, **separated** in two different businesses: Energy and Lithium.

## PHASE 2 2025 Start

### ENERGY BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
52MW				

### LITHIUM BUSINESS

GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
25Ktpy LiOH				

111	312
83	242
530	1,647
371	1,111
18%	32%
15%	26%
7	5
438	700
438	
	460
	240
0.061	2,855

Notes: Lithium Hydroxide Battery Quality at €12,542 or \$14,925/t

Phase 1 relates to Taro license, Phase 2 to Ortenau license.

Ortenau license is 100% owned by Vulcan. Vulcan has a 51% interest in Taro, with the right to earn at least 80% interest.

# Appendix 19: Project Economics – Possible Structures

Full project developed at the same time and integrated under one business.

FULL PROJECT NO PHASING 2024 Start				
INTEGRATED BUSINESS				
GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
74MW & 40Ktpy LiOH				

<b>Revenues €M/y</b>	<b>652</b>
<b>Net Op. Cash Fl. €M/y</b>	<b>507</b>
<b>NPV Pre-tax €M</b>	<b>3,443</b>
<b>NPV Post-tax €M</b>	<b>2,250</b>
<b>IRR Pre-tax</b>	<b>26%</b>
<b>IRR Post-tax</b>	<b>21%</b>
<b>Payback (year)</b>	<b>5</b>
<b>CAPEX €M</b>	<b>1,738</b>
<i>CAPEX Geo</i>	<i>665</i>
<i>CAPEX DLE</i>	<i>751</i>
<i>CAPEX CLP</i>	<i>322</i>
<b>OPEX €/KWh or LiOH€/t</b>	<b>2,640</b>

Phase 1 developed first and is an integrated business

PHASE 1 2024 Start				
INTEGRATED BUSINESS				
GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
21MW & 15Ktpy LiOH				

<b>232</b>
<b>171</b>
<b>1,114</b>
<b>703</b>
<b>23%</b>
<b>18%</b>
<b>5</b>
<b>700</b>
<i>226</i>
<i>291</i>
<i>182</i>
<b>3,139</b>

Phase 2 developed second and is an integrated business

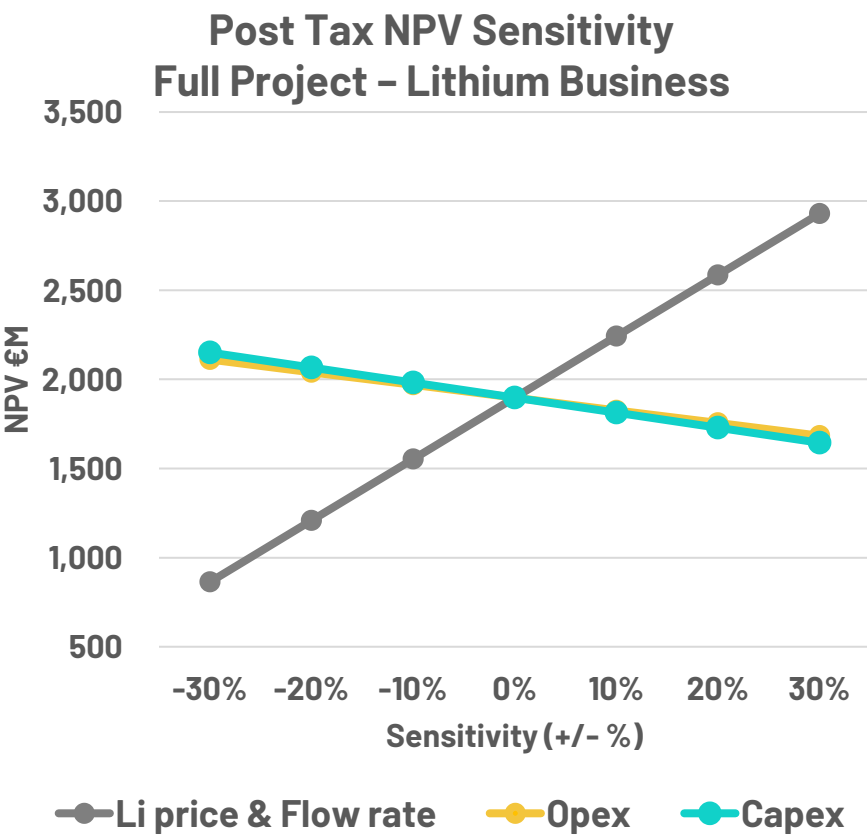
PHASE 2 2025 Start				
INTEGRATED BUSINESS				
GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
52MW & 25Ktpy LiOH				

<b>420</b>
<b>324</b>
<b>2,145</b>
<b>1,403</b>
<b>27%</b>
<b>22%</b>
<b>6</b>
<b>1,138</b>
<i>438</i>
<i>460</i>
<i>240</i>
<b>2,792</b>

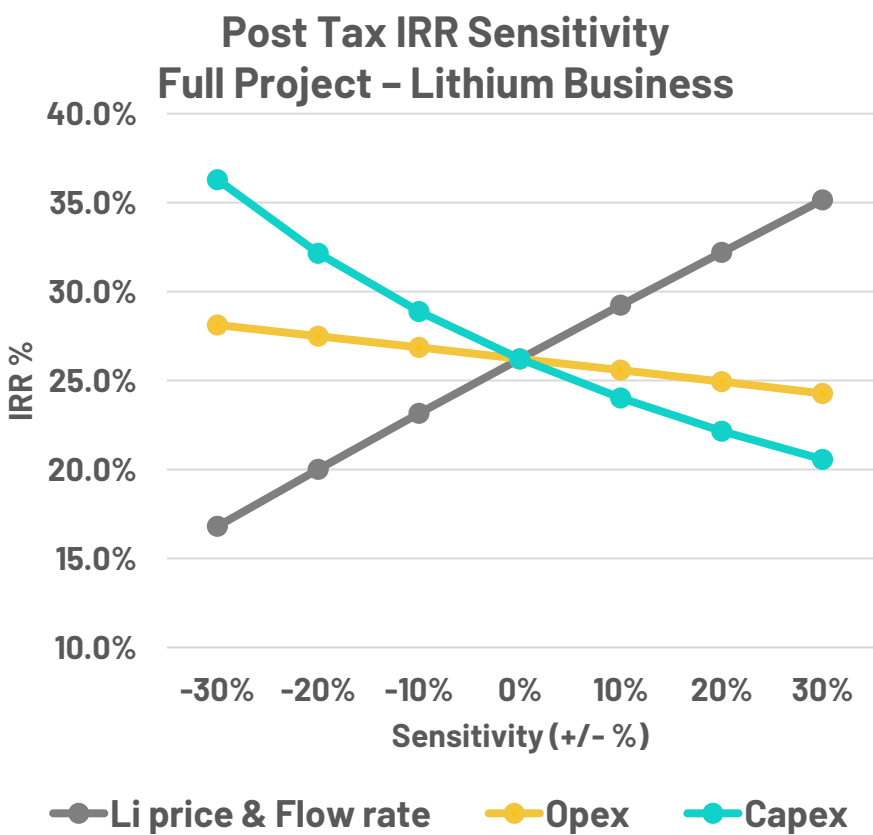
# Appendix 20: Project Economics – Sensitivities Analysis

## Project economics are resilient to extreme case scenarios

Full 40kt/y lithium business(DLE&CLP) developed at the same time with no phasing. Not including geothermal.



LITHIUM BUSINESS				
GB1	GB2	GC1	GC2	GC3
DB1	DB2	DC1	DC2	DC3
CLP1		CLP2		
40Ktpy LiOH				
LiOH Price			\$14,925	
LiOH Price			€12,542	
Revenues(€/M/y)			499	
Net Op. Cash Fl.			394	
NPV Pre-tax €M			2,803	
NPV Post-tax €M			1,897	
IRR Pre-tax			31%	
IRR Post-tax			26%	
Payback(year)			4	
CAPEX €M			1,073	
OPEX LiOH €/t			2,681	



Notes: LiOH prices -10%: \$13,498/€11,343, -20%: \$11,998/€10,083, -30%: \$10,498/€8,822

# Appendix 21: information for slide 8 & 9

Company	Code	Project	Stage	Resource Category	Resources M tonnes	Resource Grade (Li2O)	Contained LCE Tonnes	Information Source
European Metals	ASX: EMH	Cinovec	PFS Complete	Indicated & Inferred	695.9	0.42	7.22	Corporate Presentation Released October 2020
Rio Tinto	ASX: RIO	Jadar	PFS Complete	Indicated & Inferred	139.3	1.78	6.12	ASX Announcement Released 10 December 2020
Infinity Lithium	ASX: INF	San Jose	PFS Complete	Indicated & Inferred	111.3	0.61	1.68	ASX Announcement Released 22 August 2019
Savannah Resources	AIM: SAV	Barroso	DFS Underway	Measured, Indicated & Inferred	27.0	1.00	0.71	Corporate Presentation Released November 2020
Company	Project		Stage	Resource Category	Brine Volume	Resource Grade	Contained LCE Tonnes	Information Source
Controlled Thermal Resources	Hell's Kitchen		PEA Completed	Inferred	Unknown	181mg/l Li	2.7	Company Website
E3 Metals	Clearwater, Rocky and Exshaw		PEA Completed	Inferred	5.5 billion m <sup>3</sup>	74.6mg/l Li	2.2	PEA released in December 2020

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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



# Thank You

## PUBLIC RELATIONS

EU

Germany

Australia