

# Vulcan Energy Resources

## 2021 Annual General Meeting Managing Director's Address

Monday, 29 November 2021

Dr Francis Wedin, Managing Director  
and Founder-CEO



**VULCAN ENERGY**  
**ZERO CARBON LITHIUM™**





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At Vulcan, we strongly believe in our Zero Carbon Lithium™ Project, its technical and economic potential, and the positive impact it could have on the world. We are trying to build a new type of project - integrating geothermal renewable energy, lithium extraction and lithium chemicals refining, without burning fossil fuels.

However, our project is highly complex and involves many known and unknown risks, some of which are beyond our control. We detailed a number of these risks in our Equity Raising presentation dated 14 September 2021 and in our ASX Announcement "Positive Pre-Feasibility Study" dated 15 January 2021<sup>1</sup>. We believe that we have the right measures in place to mitigate these risks, and the right team to execute on the project.

As with all new projects, we have made various assumptions in the technical and economic studies undertaken in relation to our Zero Carbon Lithium™ Project, including with respect to factors such as lithium grade, heat of the brine, lithium recoveries, permitting, and geothermal brine flow rates. We believe that these assumptions are reasonable, and have been made having regard to accepted practice and utilising Vulcan's in-house scientific team, along with the oversight of independent, third-party consultants. However, as with all assumptions, there is no guarantee that these assumptions will ultimately turn out to be correct, and we will continue to review and revise our assumptions and do our best to explain them as we progress our project.<sup>2</sup>

Our planned timeline to commercial production is a target. We are working hard to meet it, and we believe it is achievable, but the risk of delay in the timeline to commercialisation is significant.

This is a highly complex project which has never been attempted before. We want you to be aware of the risks, understand the assumptions, and know there might be delays but promise that we will keep you updated.

Being the first is hard, but it is exciting.

We are proud to share our journey with you, towards the decarbonisation of lithium and energy in Europe, but please be aware of the risks.

### IMPORTANT INFORMATION

#### Summary Information

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Refer to heading "Investment Risks" and "Forward Looking Statements" on pages 3. In addition, please refer to the ASX Announcements dated 15 December 2020 (entitled "Updated Ortenau Indicated and Inferred Resource") and 15 January 2021 (entitled "Positive Pre-Feasibility Study") which refer to the Company's Mineral Resources and Ore Reserves (respectively) included in the Presentation, available on [www.v-er.eu](http://www.v-er.eu). 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 in this Presentation have not been materially modified from the original market announcements.

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## Forward-looking statements

This Presentation may contain certain forward-looking statements. Often, but not always, forward-looking statements can be identified by the use of forward-looking words such as "may", "will", "expect", "intend", "plan", "estimate", "target", "propose", "anticipate", "continue", "outlook" and "guidance", or other similar words. Such forward-looking statements may include, but are not limited to, statements regarding: the proposed use of funds; estimated mineral resources and ore reserves; expected future demand for lithium products; planned production and operating costs; planned capital requirements; planned strategies and corporate objectives; and expected construction and production commencement dates.

By their nature, forward-looking statements inherently involve known and unknown risks, uncertainties and other factors that may cause actual results, performance and achievements to be materially greater or less than estimated, including those generally associated with the lithium industry and/or resources exploration companies such as those in the "Risk factors" section of the September ERP, the risks contained in the ASX Announcement "Positive Pre-Feasibility Study" released to ASX on 15 January 2021 and the "Risk factors" section of the Equity Raising Presentation released to ASX on 2 February 2021 (together the "Previous Disclosures").

These factors may include, but are not limited to, changes in commodity and renewable energy prices, foreign exchange fluctuations and general economic conditions, increased costs and demand for production inputs, the speculative nature of exploration and project development (including the risks of obtaining necessary licenses and permits and diminishing quantities or grades of reserves), political and social risks, changes to the regulatory framework within which Vulcan operates or may in the future operate, environmental conditions including climate change and extreme weather conditions, geological and geotechnical events, environmental issues, the recruitment and retention of key personnel, industrial relations issues and litigation.

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## Ore Reserves and Mineral Resources Reporting

It is a requirement of the ASX Listing Rules that the reporting of ore reserves and mineral resources in Australia comply with the Joint Ore Reserves Committee's Australasian Code for Reporting of Mineral Resources and Ore Reserves ("JORC Code"). Investors outside Australia should note that while ore reserve and mineral resource estimates of the Company in this document comply with the JORC Code (such JORC Code-compliant ore reserves and mineral resources being "Ore Reserves" and "Mineral Resources" respectively), they may not comply with the relevant guidelines in other countries and, in particular, do not comply with (i) National Instrument 43-101 (Standards of Disclosure for Mineral Projects) of the Canadian Securities Administrators (the "Canadian NI 43-101 Standards"); or (ii) Industry Guide 7, which governs disclosures of mineral reserves in registration statements filed with the US Securities and Exchange Commission ("SEC"). Information contained in this Presentation describing mineral deposits may not be comparable to similar information made public by companies subject to the reporting and disclosure requirements of Canadian or US securities laws. In particular, Industry Guide 7 does not recognise classifications other than proven and probable reserves and, as a result, the SEC generally does not permit mining companies to disclose their mineral resources in SEC filings. You should not assume that quantities reported as "resources" will be converted to reserves under the JORC Code or any other reporting regime, or that the Company will be able to legally and economically extract any such resources.

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# Vulcan: Goal to become world's first Zero Carbon Lithium™ & renewable energy company

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Goal to become world's first integrated Zero Carbon Lithium™ and renewable energy company



Geothermal energy & lithium production in Germany



Proposed dual revenue Green energy & lithium



In the heart of the fastest growing lithium battery market in the world<sup>1</sup>



Largest JORC lithium Resource in Europe<sup>2</sup>



Potential for very low OPEX operation



Strong cash position



Team of leading experts



Project supported by the EU



**ENERGY BUSINESS**  
Aiming to be a significant renewable heat & power producer



**LITHIUM BUSINESS**  
Developing substantial lithium chemicals production



Note 1: Based on electric vehicle sales and lithium-ion battery production growth

Note 2: Refer to Appendix 7 and 13 for further details

## Bringing the Zero Carbon Lithium™ Project to fruition; 2021 milestones



### Pre-Feasibility Study

Post-tax NPV €2.1b  
(full project; phased)



### Offtake agreements

Lithium:

- LG Energy Solution
- Renault Group
- Umicore
- Stellantis

*Further lithium offtakes in progress  
Renewable heat offtakes in progress*



### \$320m capital raised

Goldman Sachs and  
Canaccord



### First battery quality

lithium hydroxide  
monohydrate from pilot  
plant, developed in-  
house by Vulcan



### Team growth

Incl. acquisition of  
geothermal geology and  
engineering businesses



### Central Lithium Plant

Secured site at one of  
the largest chemical  
parks in Europe



### Additional permits

Growth of largest  
lithium resource in  
Europe: 15.85Mt LCE



### 3D seismic data

Surveys acquired  
totalling 315 km<sup>2</sup>



### Frankfurt Exchange

Appointed Berenberg to  
sponsor full regulated prime  
standards listing



### Electric drill rigs

Acquired a scarce,  
strategic asset for  
Vulcan



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Right place, right time  
for fully integrated renewable  
energy and sustainable lithium  
chemicals business in Europe



VULCAN ENERGY  
ZERO CARBON LITHIUM™



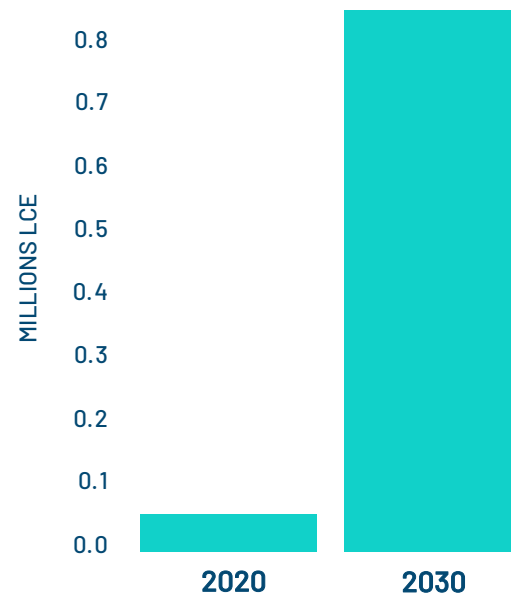
## How to support 30 million EVs by 2030 in the EU?

### 1,000GWh Lithium-ion Battery Capacity By 2030<sup>1</sup>



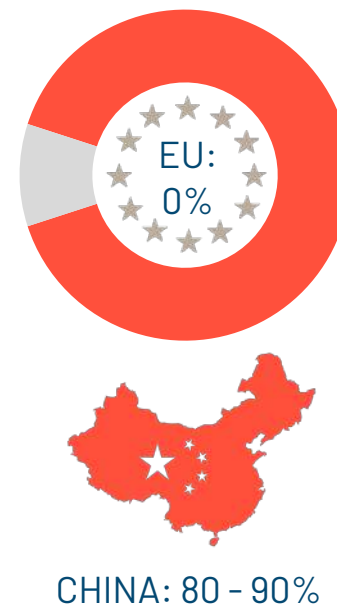
Source: Public announcements

### EU: Fastest Growing Lithium Market In The World<sup>2</sup>



Source: Based on LiB capacity, Benchmark Minerals & Roland Berger

### Zero Local Supply Of Lithium Hydroxide



Source: Bloomberg

Note 1: Refer to Appendix 3 for further details on EU lithium-ion battery capacity  
Note 2: Based on electric vehicle sales and lithium-ion battery production growth

## Auto battery and cathode-makers committing to carbon neutrality

### RENAULT GROUP

'Reducing carbon footprint is not just reducing vehicle emissions while they are being operated, but also [...] from the company's resource extraction and production processes through to the end of the vehicle's life cycle'



'Road to carbon neutrality: With our suppliers, we work in partnership to implement responsible procurement practices, to ensure sustainable progress throughout the entire supply chain, with specific emphasis wise use of natural resources and reduced environmental impacts'

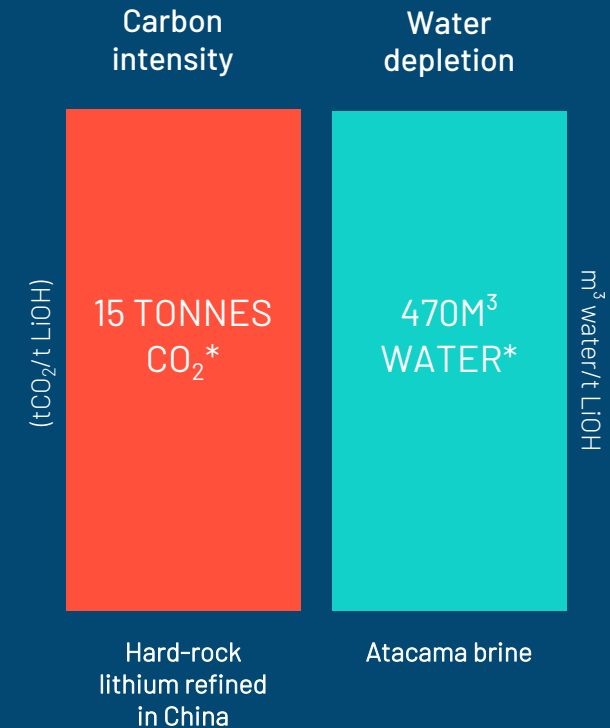


'LG Energy Solution commits to be 100 percent carbon neutral by 2030. LG will set an example in cutting carbon emissions through battery production and promote the expansion of EVs'



'Umicore commits to carbon neutrality for its Scope 1 and Scope 2 GHG emissions by 2035 ... Umicore pledges that its future growth, whether organic or through M&A, will be entirely carbon neutral.'

Current lithium production has a significant environmental footprint:



\*Source: Minviro



# International and European agreement and regulation supporting renewables and electrification of transport

## Glasgow Climate Pact



Calls upon Parties to accelerate the development, deployment and dissemination of technologies, and the adoption of policies, to transition towards low-emission energy systems, including by **rapidly scaling up the deployment of clean power generation and energy efficiency measures**, including accelerating efforts towards the phasedown of unabated coal power and phase-out of inefficient fossil fuel subsidies<sup>1</sup>

## German Federal coalition



Coalition agreement<sup>2</sup> includes:

- Order to secure the goal of climate neutrality
- Make greater use of the potential of geothermal energy for energy supply
- Generate 50% of heat in a climate-neutral way by 2030
- Significantly expedite planning and permitting processes
- All new cars sold to be electric by 2035.

## Green supply chain



- New EU Battery Regulation
- Carbon Border Adjustment Mechanism
- Battery Passport
- ISO/TC 333 Lithium



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. –  
**Thierry Breton - EU commissioner**

## Local supply chain



- European Battery Alliance
- Critical Raw Materials List
- EIB new energy lending policy
- European Raw Materials Alliance

<sup>1</sup>[https://unfccc.int/sites/default/files/resource/cop26\\_auv\\_2f\\_cover\\_decision.pdf](https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf)

<sup>2</sup>Koalitionsvertrag 2021 – 2025 zwischen der Sozialdemokratischen Partei Deutschlands (SPD), BÜNDNIS 90 / DIE GRÜNEN und den Freien Demokraten (FDP)  
Photo: Bloomberg



VULCAN ENERGIE  
ZERO CARBON LITHIUM™

# Delivering the Zero Carbon Lithium™ Project

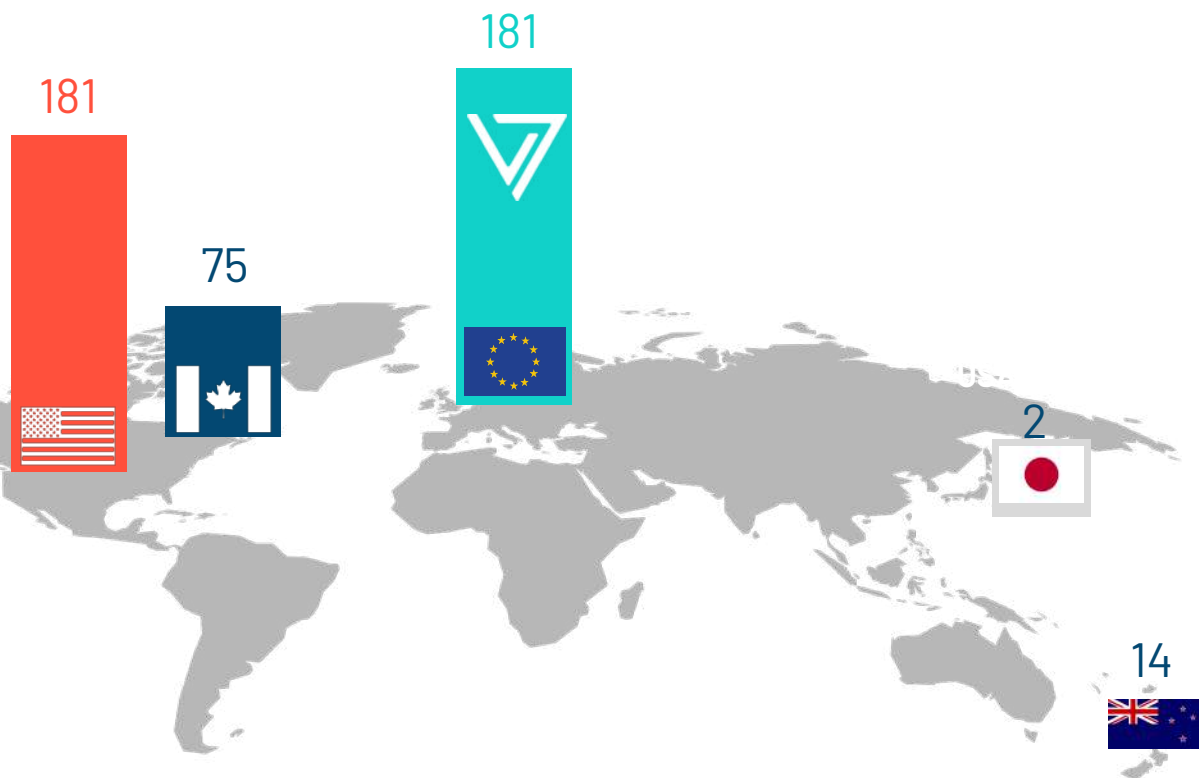


VULCAN ENERGY  
ZERO CARBON LITHIUM™



## We scoured the globe to find the right conditions for our Zero Carbon Lithium™ development

Lithium concentration  
In brine (mg/L Lithium)



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

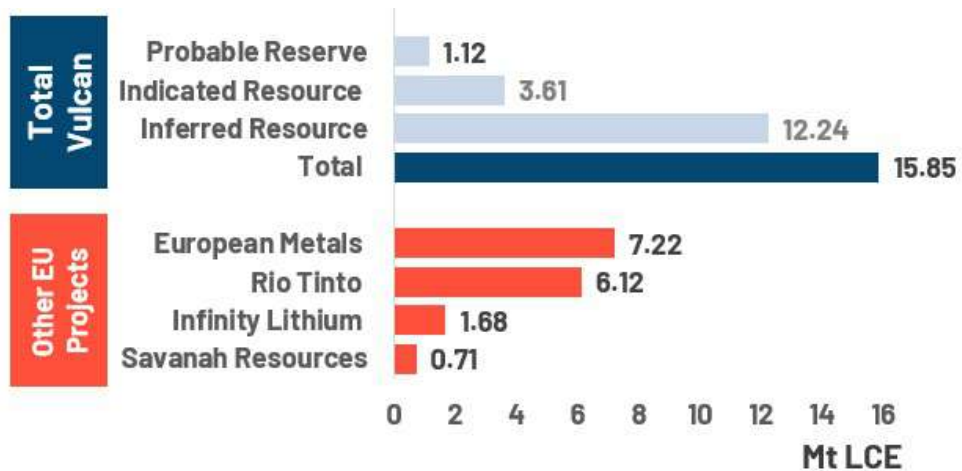
- 1 Renewable heat
- 2 High lithium grades
- 3 High brine flow rate potential

Our initial 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.

## We've defined the largest JORC lithium resource in Europe



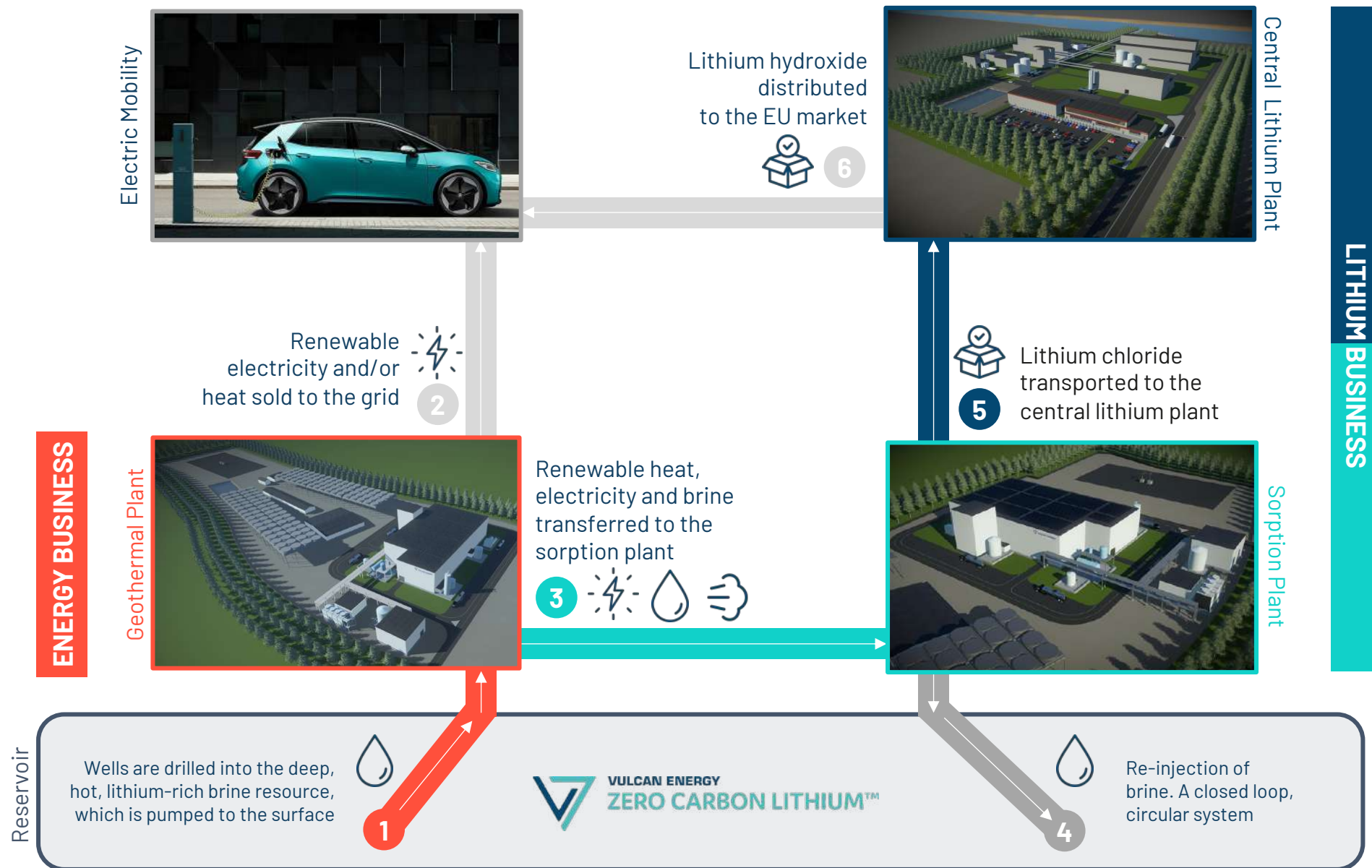
- Large license package
- Largest lithium resource in Europe: 15.85Mt LCE
- Significant potential to scale up production as market grows: advantage over mined sources



**Large enough to supply millions of EVs as the market scales up**



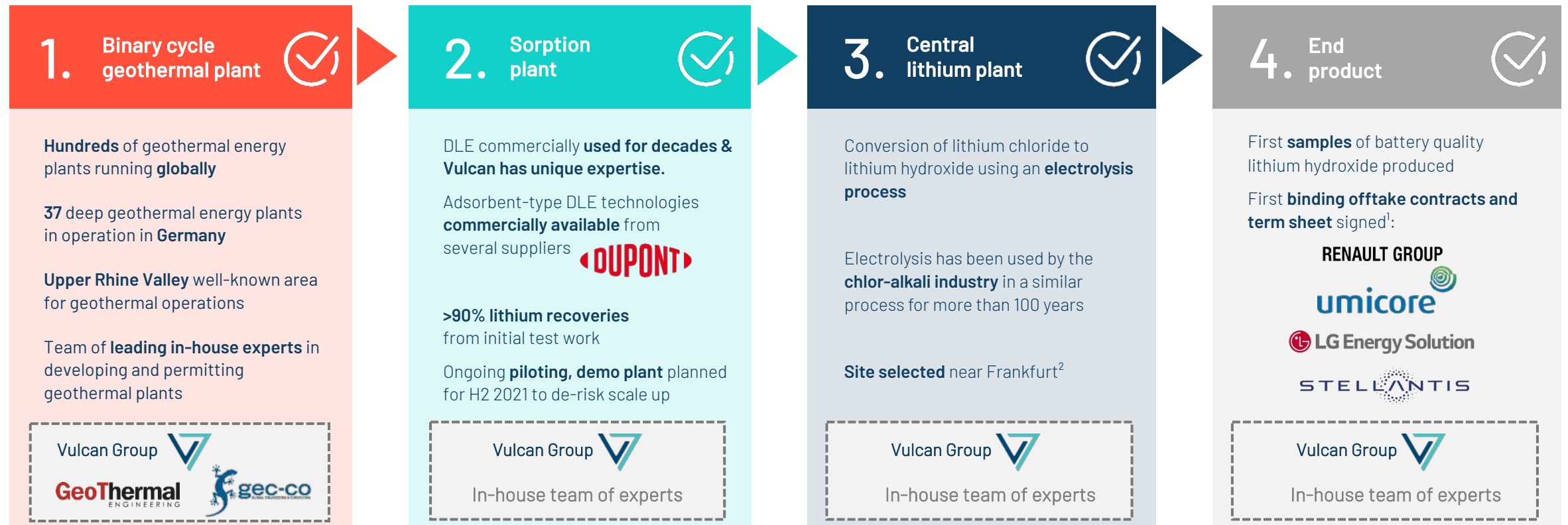
# Vulcan's renewable energy and lithium chemicals project



# Commercially available technologies combined and adapted to be fossil-free

Our process incorporates technologies with commercial analogues across the world.

What is unique about us is the proposed combination of these different steps, and our **strict exclusion of fossil fuels to power our process.**



Note 1: Refer to slide 25 for further details regarding the Company's offtake arrangements

Note 2: Refer to Appendix 12 for more information on the location of the CLP



## Lithium division update

### Laboratory work

- Lab and pilot studies for DFS active since April 2021, generating data for DFS
- Expanded laboratory to be opened in early 2022

### Pilot plant operations

- Pilot plant 1, located at an operational geothermal plant, focused on:
  - Brine pre-treatment
  - Lithium extraction
  - Post treatment to return brine to same state
- Multiple sorbents from commercial providers have been successfully tested, including from DuPont and others, providing optionality
- Scale-up of piloting continuing during 2021-22
- Rapidly growing team on pilot and lab sites in Germany



Images of lithium hydroxide monohydrate from Zero Carbon Lithium™ project

### Demonstration (Demo) plant

- Demo Plant fully integrated with all process steps including electrolysis
- DLE at site with “live” geothermal brine
- Conversion to LHM in a chemical park (same as commercial plant design)
- All recycles to be included
- Enables the Vulcan team to run the full process onsite and provide training prior to commercial operation
- Major skids ordered and under construction
- The DLE section of the Demo Plant is targeted to commence operation in Q2 2022, and will represent an approximately 1:200 scale of the first commercial plant.



Rendering of Vulcan's Demo Plant, major skids ordered and currently under construction.



# Proposed dual purpose renewable energy and battery chemicals project

## Energy Business, Zero Carbon Lithium™ Business:

### Binary Cycle Geothermal Plant



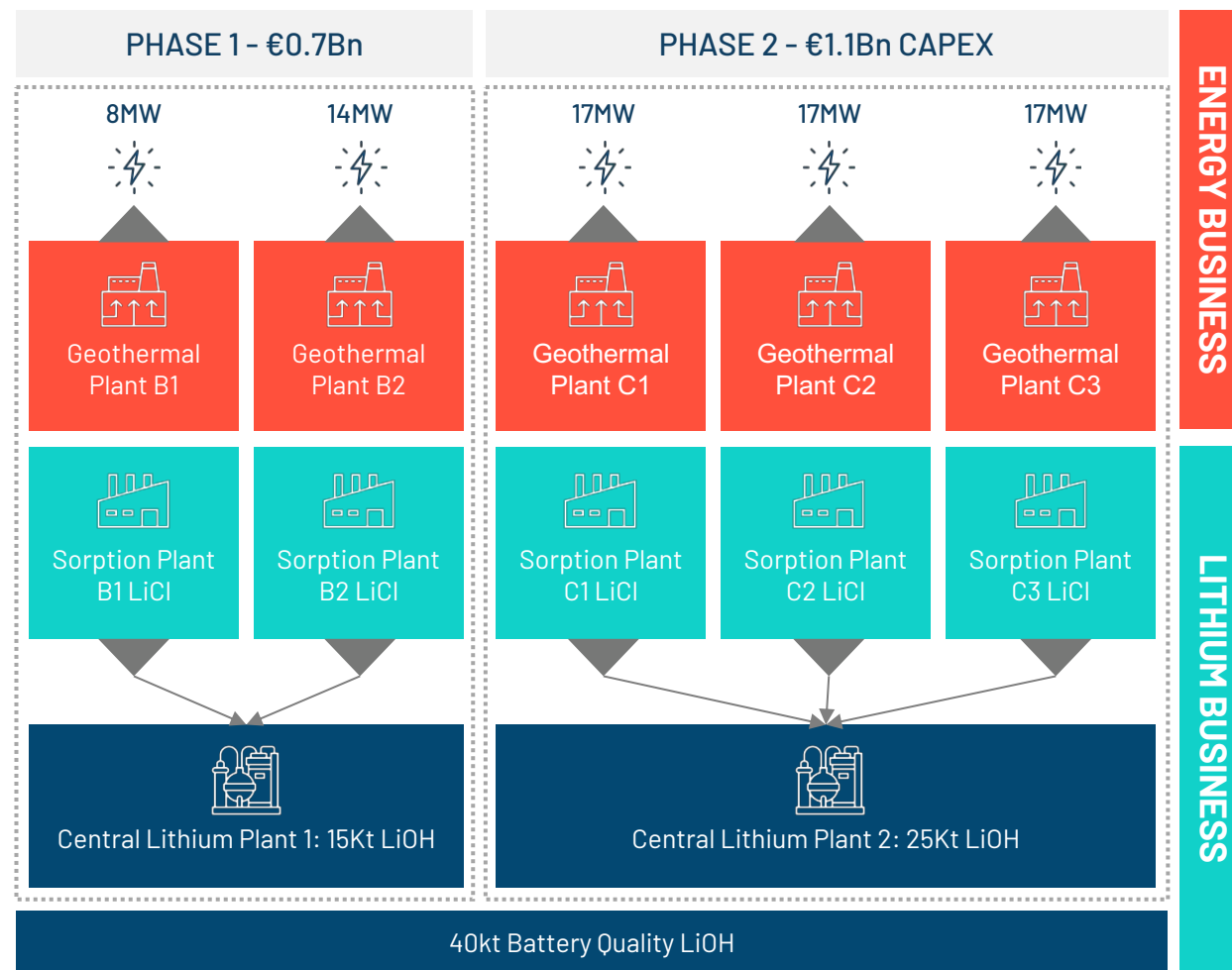
### Lithium Sorption Plant



### Central Lithium Plant



## Target metrics from Pre-Feasibility Study:





# Dual revenues: energy and lithium

## ENERGY BUSINESS



**Decarbonising the grid**

**Grid**



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

**Feed-in Tariff**  
€25.2c /KWh

**Guaranteed**  
for 20 years



**Coal phase-out**  
in Germany

**Industries**



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

Heat offtake negotiations with local stakeholders under way



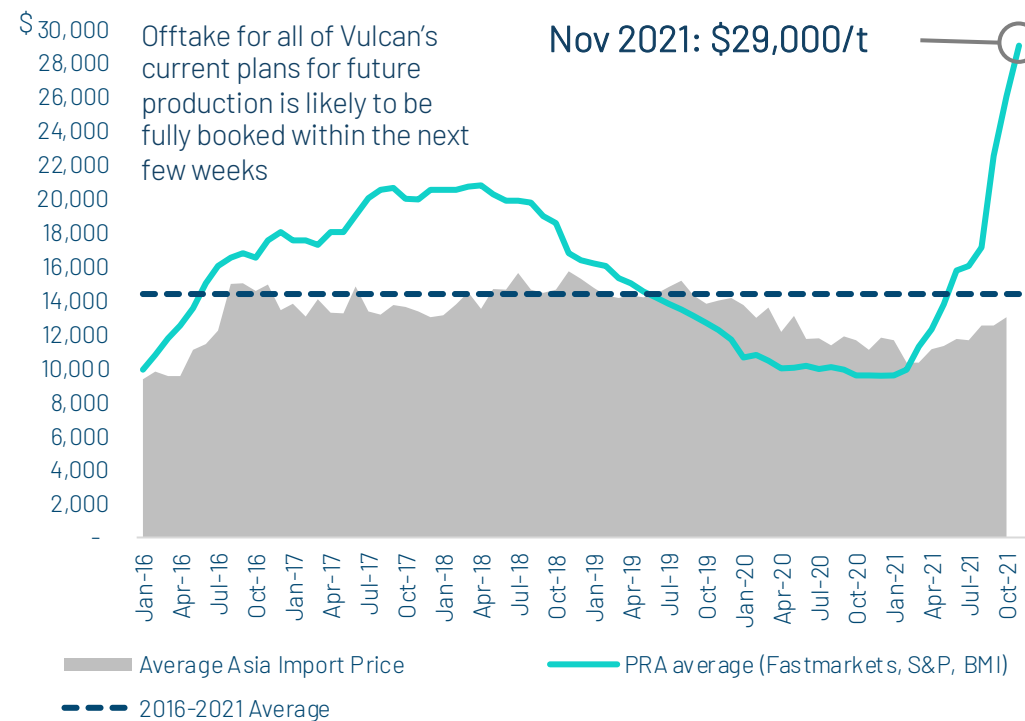
**Bans for fossil heating systems**

**Cities**



## LITHIUM BUSINESS

### Lithium hydroxide prices



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

## Securing long term lithium supply contracts

### Renault Group

- Binding lithium hydroxide offtake agreement
- Initial **6-year term**, starting in **2026**
- Renault to purchase between **26,000 to 32,000 metric tonnes** of battery grade lithium chemicals
- In line with Renault Group's strategy to offer competitive, sustainable and 'made in Europe' EVs
- Renault Group will be able to **avoid from 300 to 700 kg of CO<sub>2</sub>** for a 50-kWh battery.

### umicore

- Binding lithium hydroxide offtake agreement
- Initial **5-year term**, starting in **2025**, which can be extended by further 5 years
- Umicore to purchase **a minimum of 28,000t and a maximum of 42,000t** of battery grade lithium hydroxide
- Umicore is a **leader in cathode materials production** used in Lithium-ion batteries
- In Poland, Umicore has built **the first cathode materials plant in Europe**

### LG Energy Solution

- Binding lithium hydroxide offtake term sheet
- Initial **5-year term**, starting in **2025**, which can be extended by further 5 years
- LGES to purchase **up to 10,000tpy** of battery grade lithium hydroxide
- LGES is the **largest producer of lithium-ion batteries for EVs in the world**
- LGES is operating a **6GWh LIB factory in Poland**, and planning to increase this capacity to 65GWh

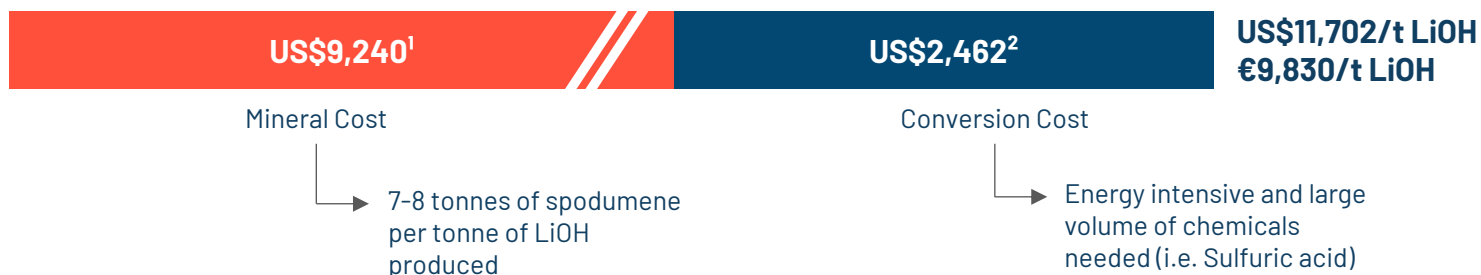
### STELLANTIS

- Binding lithium hydroxide offtake agreement
- Initial **5-year term**, starting in **2026**
- Stellantis to purchase **a minimum of 81,000t and a maximum of 99,000t** of battery grade lithium hydroxide
- By 2030, **70% of Stellantis EU sales will be electric vehicles**
- Stellantis is planning to build 5 battery cell manufacturing plants to reach **260GWh lithium-ion battery manufacturing capacity**.

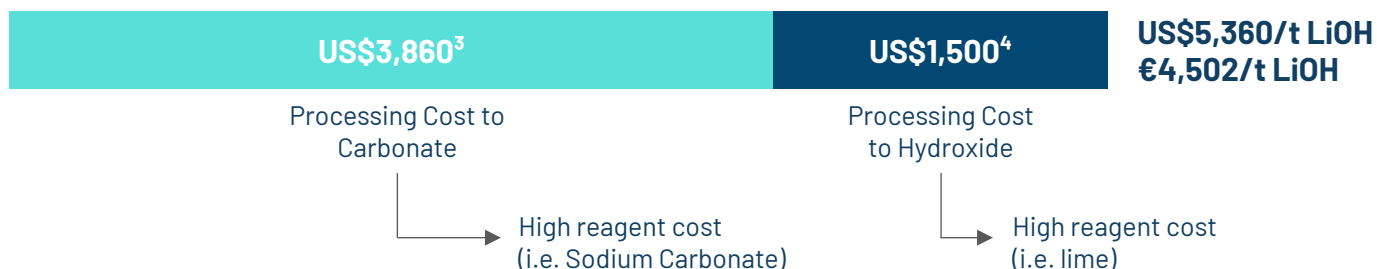
# Potential for very low OPEX operation

## Select South American brine and Australian/Chinese mineral conversion vs Vulcan's process

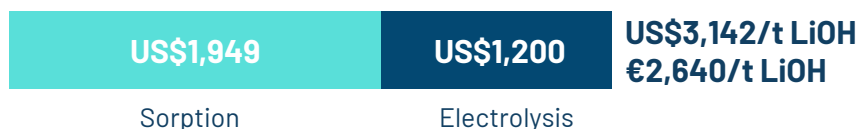
### LiOH VIA HARD-ROCK PROCESSING



### LiOH VIA BRINE PROCESSING



### VULCAN'S PROCESS⁵



Note 1: S&P Global Platts, 27 August 2021, 6% Spodumene Concentrate FOB Australia: \$1,320/mt

Note 2: Kidman Resources PFS announcement, October 2018, contingency on Refinery OPEX of 15%. Cash operating cost including royalties.

Note 3: Cash operating costs lithium carbonate, Orocobre 2021 Annual report

Note 4: Orocobre 2020 Corporate Presentation - Naraha Lithium Hydroxide plant, Japan

Note 5: Refer to Appendix 9-11 for further details regarding the Project economics and production targets

Note 6: Figures in this slide assume an exchange rate of €0.84/US\$1.00

Note 7: Vulcan notes that the comparison operating cost figures above are actual results from lithium hydroxide projects that are currently in production, whereas the above data for Vulcan's process is based on estimates in the PFS. As the Project is still at an early exploration and development stage, there is a high level of inherent uncertainty associated with the Project. A comprehensive list of risks is flagged in the PFS under "Project Risks and Opportunities"

## Feedstock

Vulcan's "feedstock" is expected to be low cost and have a dual purpose: lithium extraction and energy production in the form of renewable electricity.

## Processing

Vulcan plans to use sorption 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 intends to use low-cost energy coming from its geothermal operation.

## Upgrading

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



**It doesn't need to cost more to be green**





## Robust target project financials and production metrics from PFS

### ENERGY BUSINESS



**74MW Power\***

\* Renewable heat sales to also be examined in DFS

€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: 6 years

### LITHIUM BUSINESS



**40,000tpy LiOH**

€2.8Bn NPV Pre-tax

€1.9Bn NPV Post-tax

31% IRR Pre-tax

26% IRR Post-tax

€2,681/t LiOH OPEX

€474M CAPEX Phase I

Payback: 4 years



**BNP PARIBAS** appointed as Financial Advisor toward financing the Zero Carbon Lithium™ Project

Note 1: Refer to Appendix 9-11 for further details regarding Project economics and production capacity

## Working hard to de-risk the project further and address all identified risks

Risk	Mitigation
Availability of key equipment	Vulcan has agreed to acquire two electric drill rigs, re-purposed from the oil and gas industry, which can reach the target depths required to reach the deep geothermal reservoir in the Upper Rhine Valley. Vulcan is developing its own in-house drilling unit, VERCANA, which will provide approximately 30 jobs locally. This will be a strategic asset, as decarbonisation efforts in Germany and Europe continue to accelerate, and demand for renewable heat increases.
Brine flow rates	Vulcan uses modern geothermal industry best practice by incorporating 3D seismic data and analysis into its geological modelling to target high-flow fault zones, and factors in state-of-the-art techniques to increase flow, such as double completion of wells and multi-reservoir completion, using the experience of its technical team.
Resources/Reserves	Vulcan utilises the considerable local geological expertise of its team, as well as state-of-the-art 3D seismic data, to construct the most accurate models it can. Vulcan reports on its estimates of Mineral Resources and Ore Reserves in compliance with the JORC Code, the ASX Listing Rules and applicable regulation. Vulcan's resource estimates and reserves are signed off by independent external consultants APEX Geoscience Ltd. and GLJ Ltd. respectively.
Sorption	We are testing multiple alumina-based sorbents at our pilot plant to find the best fit. Similar approaches are used at multiple locations around the world with existing lithium production. This and other types of similar DLE techniques are being used in numerous new lithium developments worldwide. We are adapting this technology to fit with our geothermal brine, in collaboration with companies such as Dupont, and with the experience of our team. Critically, we are testing on "live" geothermal brine, which so far has produced encouraging results.
Permitting	We will continue to keep our stakeholders updated on the timetable, and if anything changes, we will inform the market. We have a team of experts in geothermal development who have developed numerous projects in the past. We have received encouragement from state and federal governments that renewable energy project permitting times will be reduced as a priority, and domestic production of strategic raw materials will also be prioritised.
Social acceptance	This is normal and we will work to address these concerns. Vulcan has an experienced public relations team. We use geothermal industry best practice, and we are commencing community engagement in the various areas where we intend to develop projects. We think that by clearly and transparently explaining our process to develop renewable heat and power, combined with sustainable lithium extraction, we will achieve stakeholder acceptance.



# Community engagement: building trust and understanding



VULCAN ENERGY  
ZERO CARBON LITHIUM™



# Materially improving the global battery chemicals supply chain

## Energising the Green Future of Extraction



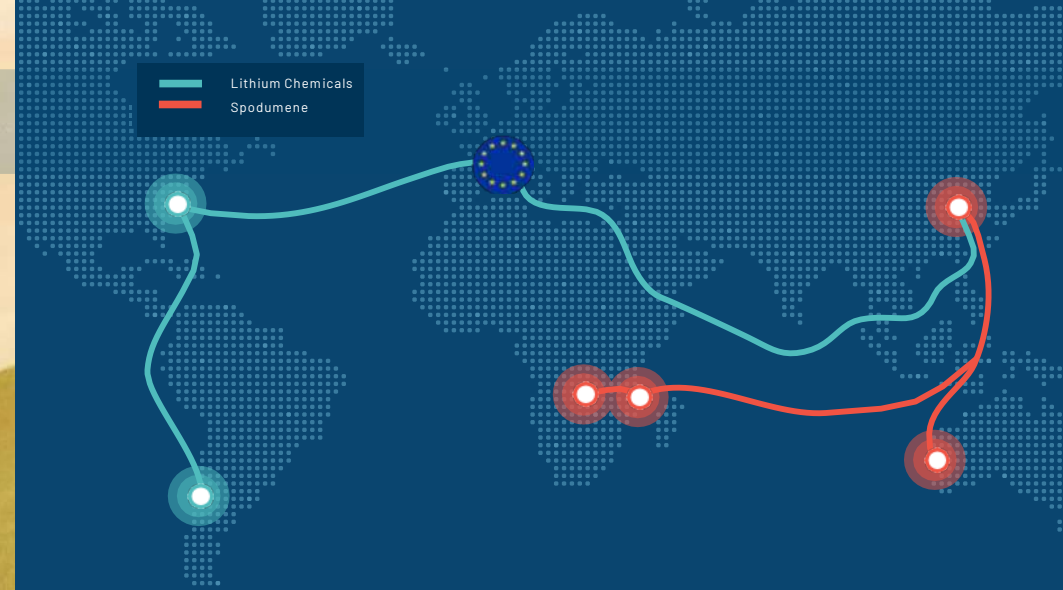
Process development and R&D development of world's first lithium and renewable energy co-production process in Pre-Feasibility Study: Zero Carbon Lithium™.

Life cycle assessment shows leading environmental credentials including negative carbon footprint (Scope 1, 2, 3) for planned lithium production, a world first.

Working with Circular to achieve world's first lithium traceability and dynamic CO<sub>2</sub> measurement across supply chain.

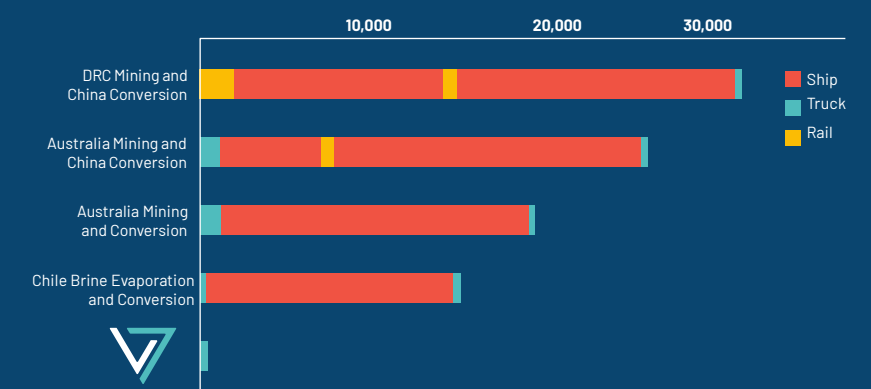
Admission to Global Battery Alliance toward advancing battery materials traceability and transparency.

**CARBON NEUTRAL NOW, AND IN THE FUTURE.**



## Transport Distances for Different Lithium Chemicals

Transport Distances for Different Lithium Chemicals



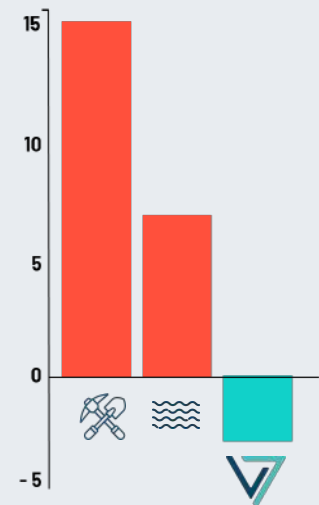
**As well as having a carbon neutral process, the Vulcan Zero Carbon Lithium™ Project also intends to reduce the transport distance of lithium chemicals into Europe to almost zero, compared with Europe's current options which are geopolitically undesirable and/or have a large carbon footprint of transport.**

# Leading environmental credentials

Per tonne of lithium hydroxide produced

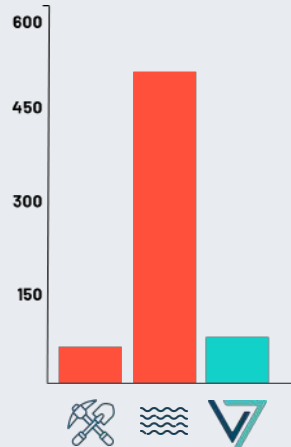
## CARBON EMISSIONS (Scope 1,2,3)

Tonnes CO<sub>2</sub>



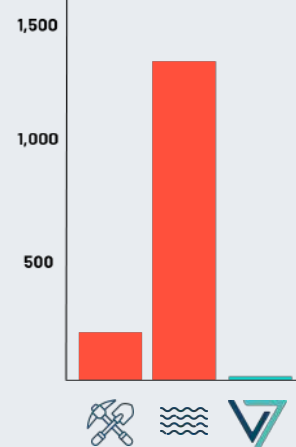
## WATER CONSUMPTION

m<sup>3</sup>



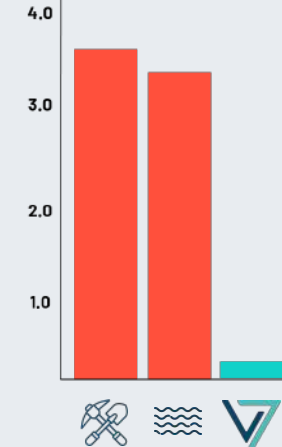
## LAND USE

m<sup>2</sup>



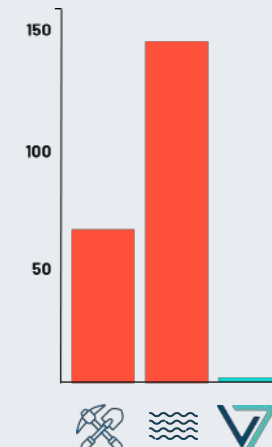
## REAGENTS CONSUMPTION

Tonnes



## WASTE GENERATION

Tonnes



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

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

 **VULCAN ENERGIE**  
**ZERO CARBON LITHIUM™**



**Goal to have the lowest  
environmental footprint of any  
lithium project globally**

## Four pillars of community engagement

### Public affairs



- Discuss and exchange ideas regularly with political representatives
- Recent meetings with CDU and the Greens
- Presentations for members of the state parliaments
- Introduction of Vulcan and questions and answers in the municipal councils

### Media engagement



- Raise awareness through in-depth reporting
- Interviews with national and international magazines, TV Stations, Radio broadcasts
- Background-stories in the Laboratory/ Pilot Plant

### Community outreach



- Community roadshows, school presentations, discussion forums
- Recent events include booth at Inno Energy's The Business Booster in Berlin
- Info-Community Hotline
- Website with milestones and updates
- Sponsoring of environmental events

### Partnerships/ cooperation



- Conduct research projects with universities and colleges, as well as renowned research institutions
- Cooperate with renewable energy networks/ battery and raw material alliances
- Engagement in regional technology networks



# Government support for geothermal technology and the expansion of renewable energy projects

## Germany's new Federal Coalition targets<sup>1</sup>

- ✓ Committed to phase out coal by 2030
- ✓ End sales of new combustion engines by 2035
- ✓ End power generation from gas by 2040

## State government of Baden-Württemberg

- Launched a task force aimed at halving the planning and approval timeline for the commissioning of new projects<sup>2</sup>.
- Greens-CDU Coalition in Baden-Württemberg, stated in their Coalition Contract<sup>3</sup>:

*"We support sustainable approaches for the extraction of lithium in the Upper Rhine Graben."*

*We want to demonstrate the possibilities of deep geothermal energy through initial large-scale projects, which are being closely supported by the state government, the licensing authorities and the research community, and then take the step toward widespread application. The "Deep Geothermal Roadmap" is to be continued in this spirit.*

## Engaging with government



Dr Horst Kreuter, Vulcan Germany CEO meeting with Greens leader Winfried Kretschmann



Thorsten Weismann, Vulcan COO, meeting with CDU representatives

<sup>1</sup><https://www.reuters.com/business/cop/exclusive-germanys-government-in-waiting-agrees-phase-out-coal-by-2030-sources-2021-11-23>

<sup>2</sup><https://www.baden-wuerttemberg.de/de/service/presse/pressemitteilung/pid/task-force-soll-ausbau-erneuerbarer-energien-beschleunigen/>

<sup>3</sup>[https://www.baden-wuerttemberg.de/fileadmin/redaktion/dateien/PDF/210506\\_Koalitionsvertrag\\_2021-2026.pdf](https://www.baden-wuerttemberg.de/fileadmin/redaktion/dateien/PDF/210506_Koalitionsvertrag_2021-2026.pdf)

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The right team  
for the job

# Vulcan – Zero Carbon Lithium™ Team



**Thorsten Weimann**  
Chief Operating Officer

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



**Markus Ritzauer**  
Chief Financial Officer – Germany

Markus has over 20 years' experience in finance roles within the chemicals industry.



**Dr Stephen Harrison**  
Chief Technical Officer

CTO of Simbol Materials for seven years (2008-2015), where he led the scientific and engineering teams through a rapid process development.



**Beate Holzwarth**  
Chief Communication Officer

Beate has over 20 years' experience in various communication and marketing roles within Mercedes-Benz Cars and Daimler Trucks.



**Vincent Ledoux-Pedailles**  
Vice President – Business Development

Vincent has over 10 years of commercial experience in the chemicals and mining industry. Vincent was previously Executive Director – Corporate Strategy at Infinity Lithium Corporation,



**Rob Ierace**  
Chief Financial Officer – Australia

Robert is a Chartered Accountant and Chartered Secretary with over 20 years experience, predominately with ASX and A listed resource and oil and gas exploration and production companies.



**Daniel Tydde**  
Company Secretary & In-House Legal Counsel

Daniel is an experienced corporate lawyer with over 15 years' experience across a wide range of corporate, commercial and finance areas.



**Jess Bukowski**  
Public & Investor Relations Manager

Jess has extensive experience advising top 20 ASX companies on communications, media and investor relations including 15 years with Fortescue Metals Group.

## Renewable Energy Business



**Markus Ruff**  
CEO Global Engineering & Consulting Company



**Tobias Hochschild**  
CEO GeoThermal Engineering GmbH



## Lithium Chemicals Business



**Dr Thomas Aicher**  
Lead Chemical Engineer



**Dr Angela Digennaro**  
Lab Manager

**Chemical Engineering & Piloting Team**

**Laboratory Team**



**VULCAN ENERGIE**  
**ZERO CARBON LITHIUM™**



**80 People**



**Leading Engineering Team**



**40% Female Workforce**



# Vulcan – Zero Carbon Lithium™ Board



**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. Track record of success in lithium industry as an executive since 2014, including the discovery of three resources on two continents. PhD in Geology, MBA in Renewable Energy, global experience in battery metals sector.



**Gavin Rezos**  
Chair

Executive Chair/CEO positions of three 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, principal of Viaticus Capital, Non-Executive Director of Kuniko Limited and Non-Executive Chair Resources & Energy Group Limited.



**Dr. Horst Kreuter**  
Co-Founder, Board Advisor  
& Exec Director Germany

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-Executive  
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-Executive 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..



**Josephine Bush**  
Non-Executive 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-Executive 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 former 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 CO<sub>2</sub> standards & sustainable batteries. On the steering committee for the Battery CO<sub>2</sub> 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.



**Vulcan is leading the way with a 67% female Board composition**

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# Delivering the Zero Carbon Lithium™ Project



VULCAN ENERGY  
ZERO CARBON LITHIUM™

# Enabling renewable energy and decarbonisation through the Zero Carbon Lithium™ Project



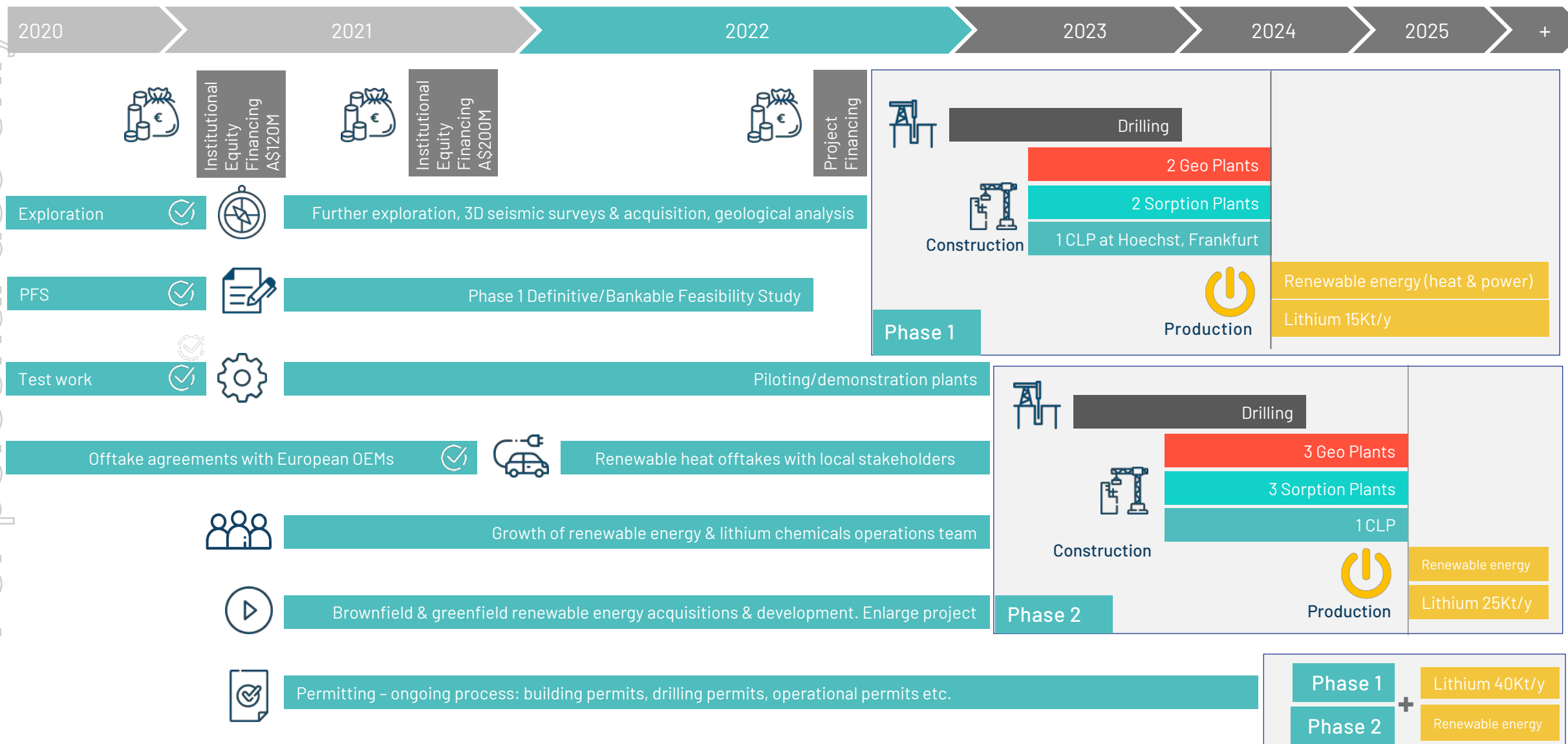
VULCAN ENERGY  
ZERO CARBON LITHIUM™

Vulcan Group: integrated, in-house capability to execute on our strategy

Vulcan's expertise and assets	Renewable energy	Lithium	Sustainability	Finance	Customers
	<b>Gec-co</b> Above-surface geothermal engineering team <b>GeoT</b> Sub-surface geothermal & engineering team <b>VERCANA</b> Deep geothermal rigs & team Exploration data packages acquired Multiple geothermal-lithium brine licences Multiple renewable energy projects in development across multiple licences	Fully equipped in-house lab with team Operational pilot plant Chemical engineering team Demonstration plant under construction	Carbon neutrality commitment during development and operations Life Cycle Assessment and global study on the environmental footprint of lithium hydroxide production Supply chain traceability and CO <sub>2</sub> measurement	Strong cash position A\$320 million capital raising in 2021 Low cost and resilient financials	Three definitive lithium offtake agreements One lithium term sheet Multiple heat offtakes in discussion
	Independent expertise			Capital raisings   Financing advisors   Listing advisors	Customers
Industrial ecosystem	 	 	 		  



# Target project timeline





# Share price and capital structure

## ASX : VUL

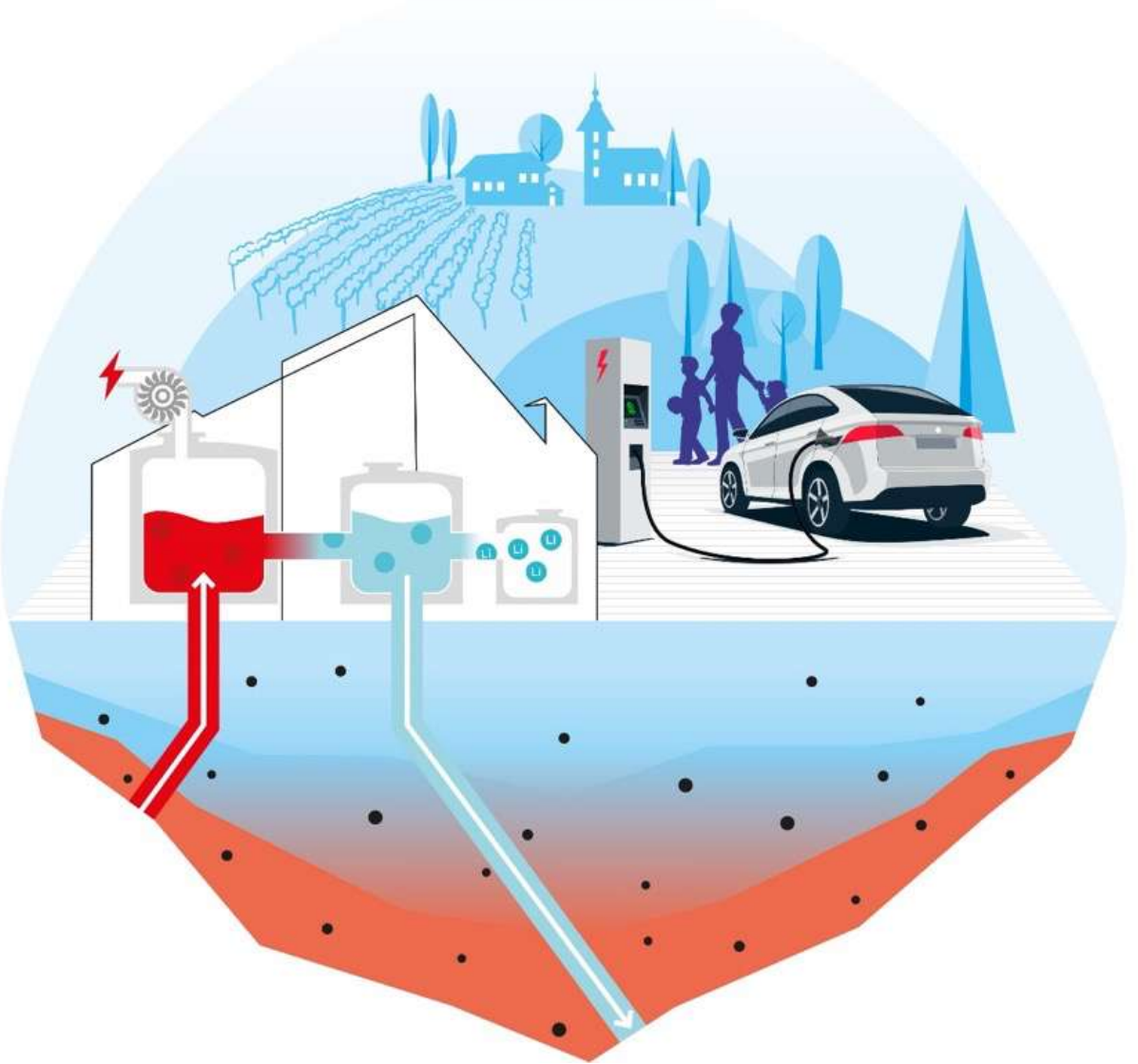
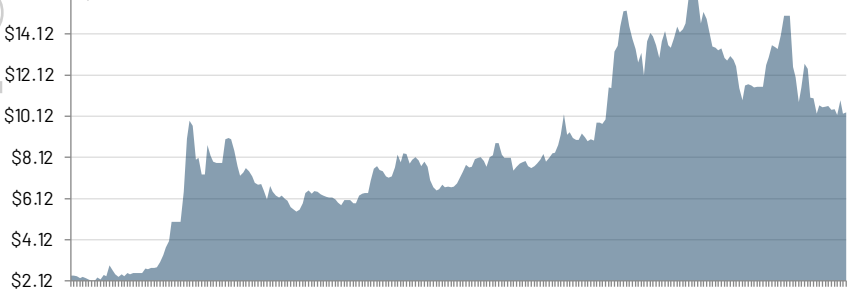
Shares on Issue	123,834,613
Performance Milestone Shares*	4,491,174
Performance Rights*	11,238,688
Market Capitalisation at \$10.25 (undiluted)	~\$1.27B
Enterprise Value at \$10.25 (undiluted)	~\$0.98B
Cash Position	~\$290M
Top 20 Shareholders	~50%
Management (undiluted)	~16%

## Frankfurt: 6K0

### Key Shareholders\*\*

Dr. Francis Wedin	10.52%
Hancock Prospecting Pty Ltd	6.66%
Mr. Gavin Rezos	4.91%

VUL share price (24 Nov 2020 - 24 Nov 2021)



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

# Conclusion



Goal to become world's first integrated Zero Carbon Lithium™ and renewable energy company



Europe's largest lithium Resource<sup>1</sup>



Location centre of fastest growing market<sup>2</sup>



Supported By EU funding, regulation & initiatives



Low cost & resilient financials



Strong cash position



The right team for the job



Rapidly advancing lithium & renewable energy project

Note 1: Refer to Appendix 4 and 5 for further information

Note 2: Based on electric vehicle sales and lithium-ion battery production growth





VULCAN ENERGY  
ZERO CARBON LITHIUM™

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# Appendices

# Lithium market dynamics favour sustainable lithium production



## Technology & Costs



"We expect **DLE technology to dominate** the future lithium mining sector. Fitch posits **geothermal lithium extraction** techniques to rise in popularity among Western consumers"<sup>1</sup>



"We could have a European producer [Vulcan] producing at **one of the lowest costs globally**. These are the kind of initiatives we expect Europe to take in order to compete on raw material globally"<sup>2</sup>



"**DLE could offer many benefits** including faster speed to market, as well as lower material costs and water usage. In Germany, Vulcan is pursuing this capability in the Upper Rhine Valley, Europe's largest lithium resource"<sup>3</sup>



## Sustainability



"**Geothermal lithium extraction has a much lower carbon footprint** than both hard rock and brine extraction methods, as well as reduced water usage"<sup>1</sup>



"The more **sustainable lithium producers will become the suppliers of choice** and be seen as less risky by customers and lenders. Country specific sustainability regulation is increasing and will likely lead to restrictions and higher production costs for producers that are less environmentally friendly"<sup>3</sup>



"The drive for **greener cars must be matched by cleaner lithium**"<sup>5</sup>



## Market Balance



"Incorporating the stronger demand outlook combined with limitations on the supply response due to rising product quality requirements is expected to see the lithium market shift from a small surplus in 2021 to a **deficit in 2022 and remain in tight for 2023-2025**, deficits widening each year"<sup>6</sup>



"Beyond 2025, we continue to forecast **significant market deficits**, noting a ~7x increase is required to meet our 2030 demand forecast"<sup>7</sup>

"We continue to expect significant demand growth for LiOH as high-performance ternary cathodes move to **market dominance** in the EV battery sector. We estimate demand to increase by **>850%** by 2030 (from 2021) to 1.1Mt LiOH"<sup>9</sup>



## Prices



"Lithium prices are likely to be impacted by **green premiums** due to heightened **priority of sustainable lithium extraction techniques**"<sup>1</sup>



"Long term Lithium Hydroxide Prices are expected to be around **\$16,000 per tonne**"<sup>1</sup>



"Our long-term assumptions for Li2CO3/LiOH remain at **~US\$15,000/t**"<sup>9</sup>

<sup>1</sup>Fitch Ratings, Fitch Solutions Country Risk & Industry Research, 21 May 2021 <sup>2</sup>BNEF, BNEF Summit, Europe's Formula for Winning the Lithium Battery Value-chain <sup>3</sup>Deutsche Bank, Sustainability Tracker, 17 May 2021 <sup>5</sup>Financial Time, 9 September 2020 <sup>6</sup>Macquarie, Lithium Market Outlook, 12 April 2021 <sup>7</sup>Canaccord Genuity – 10 February 2021 <sup>8</sup>HSBC – 9 February 2021 <sup>9</sup>Canaccord Genuity – 12 August 2021

# Appendix 1: Vulcan's integrated renewable energy and lithium project description

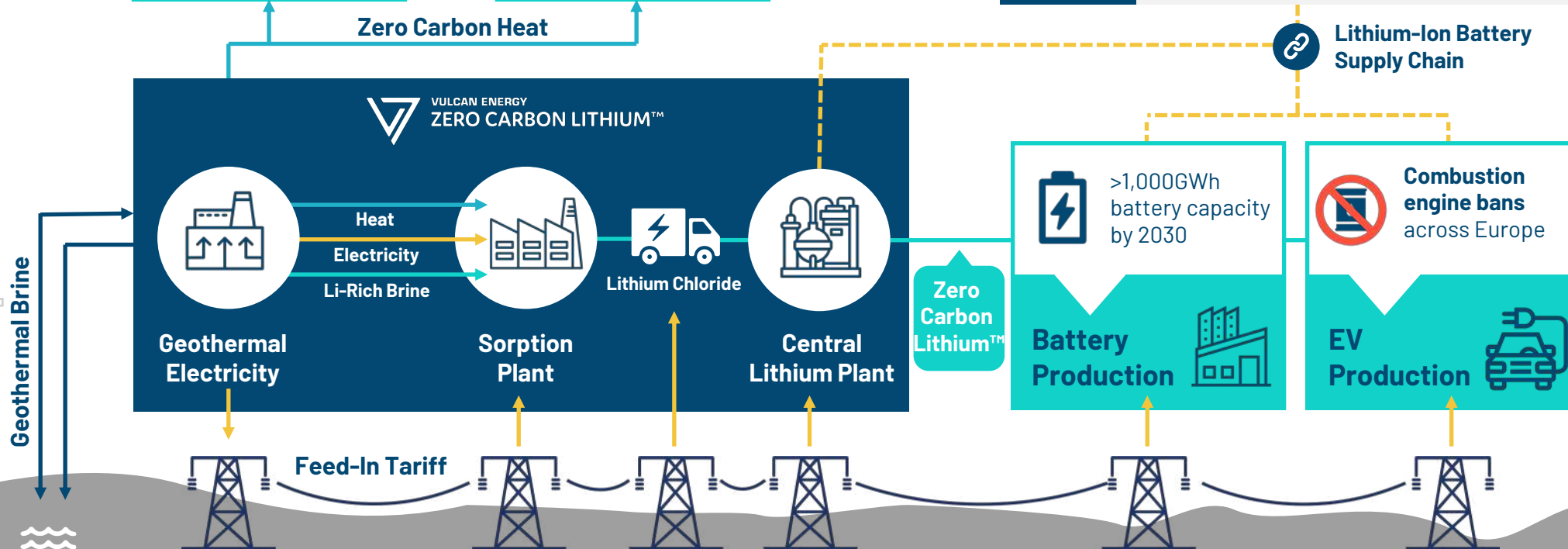
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Germany

European Union



- Regulations & Initiatives
- EU New Battery regulation
  - European Battery Alliance
  - EU Recovery Plan
  - EU Green Deal



Upper Rhine Valley Reservoir

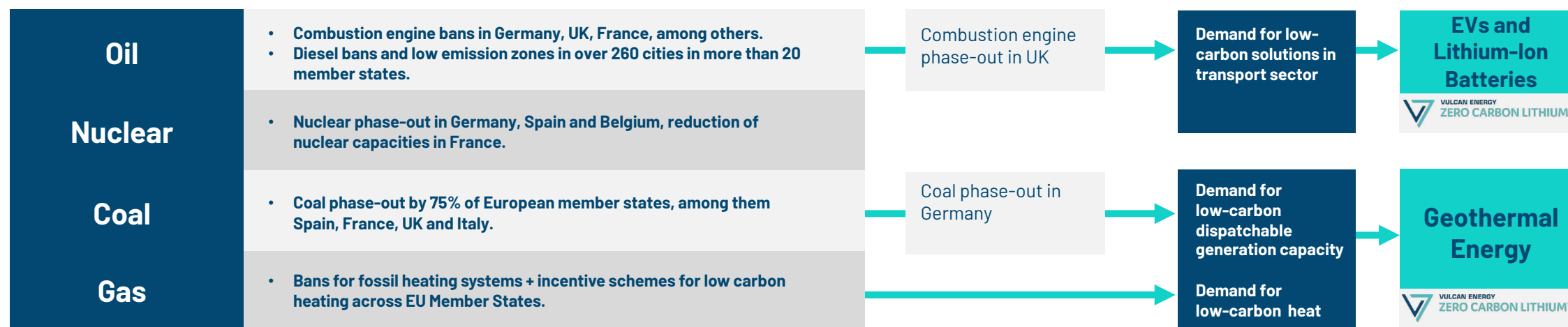
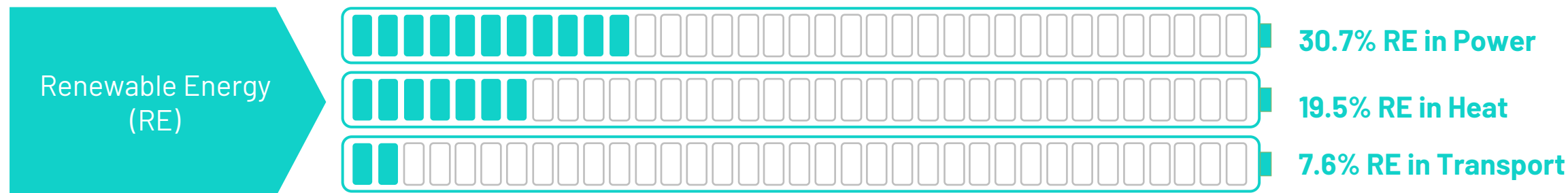


## Appendix 2: the fossil-nuclear era in Europe is coming to an end

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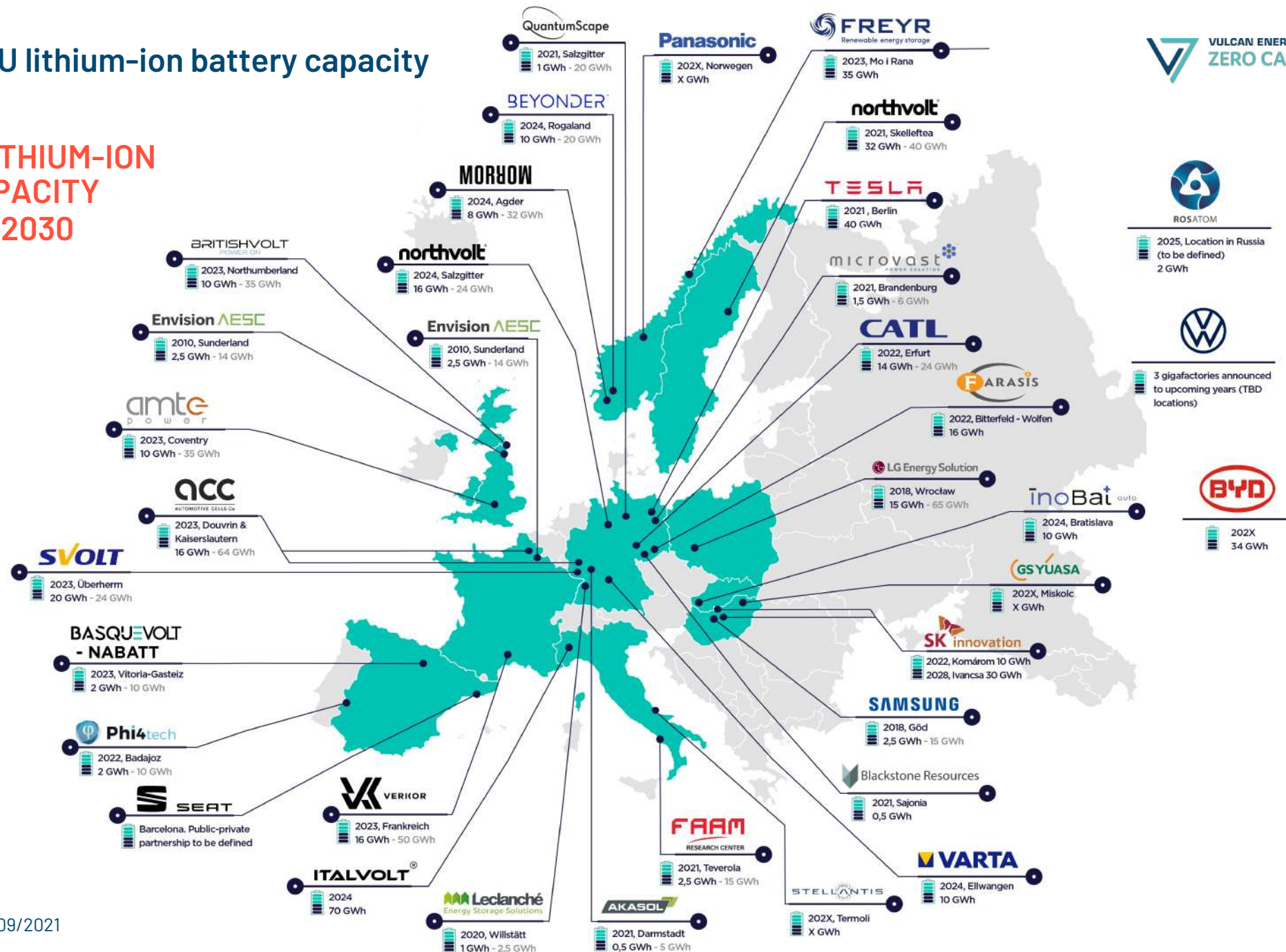


Europe is aiming for carbon neutrality, but the EU's energy transition is far from being complete:



## Appendix 3: EU lithium-ion battery capacity

>1,000GWh LITHIUM-ION  
BATTERY CAPACITY  
PLANNED BY 2030



## Appendix 4: 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 5: Vulcan supported by EU-backed group

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.



**May '20**

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

 **InnoEnergy**  
Knowledge Innovation Community

 **European Commission**

 **European Investment Bank**

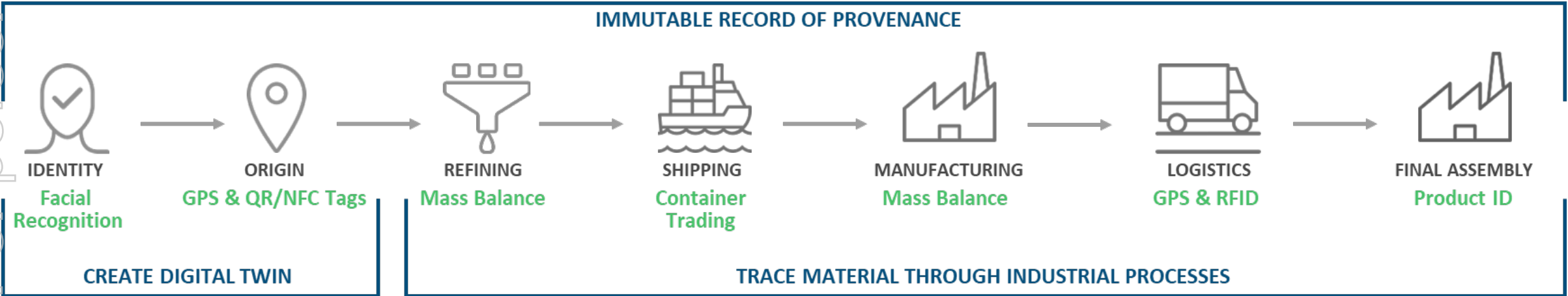
# Appendix 6: Vulcan & Circular to establish world-first full lithium traceability & transparency across the EU supply chain



Circular offers a software solution that enables customers to track raw materials and CO<sub>2</sub> 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:



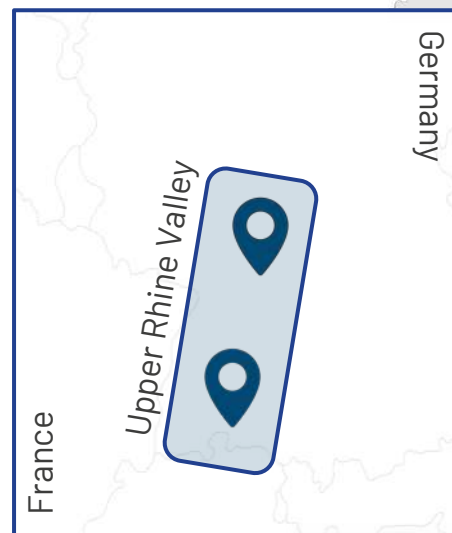
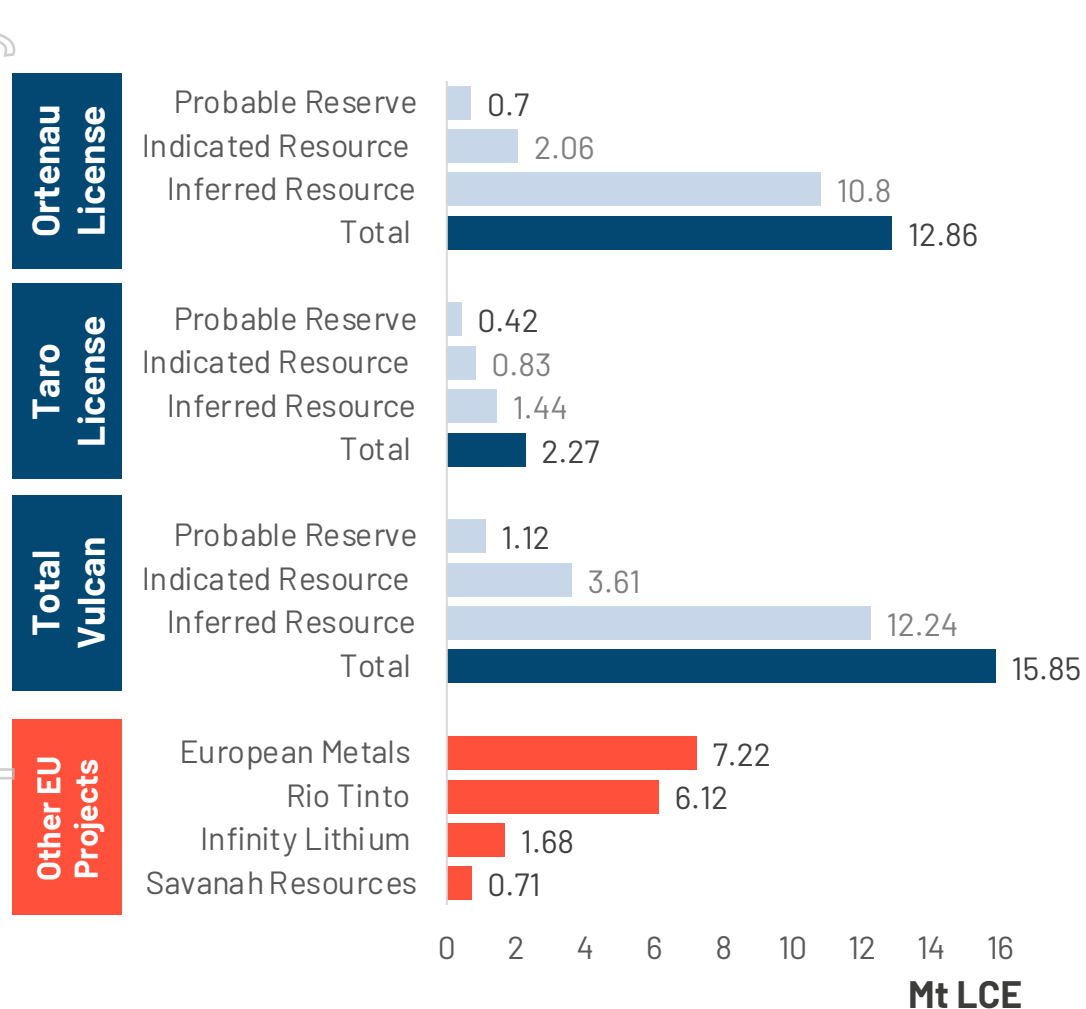
CATL



POSCO CHEMICAL



## Appendix 7: largest JORC lithium resource in Europe



- 4 exploration permits granted and several applications
- Largest lithium resource in Europe: 15.85Mt LCE

Note 1: Vulcan's URVP Li-Brine resource and reserve area in Europe. Mineral resources are not ore reserves and do not have demonstrated economic viability. Refer to the ASX Announcement entitled "Updated Ortenau Indicated and Inferred Resource" dated 15 December 2020 and the ASX Announcement entitled "Positive Pre-Feasibility Study" dated 15 January 2021, which refer to the Company's Mineral Resources and Ore Reserves (respectively) included in this Presentation, available on the Company's website and [www.asx.com](http://www.asx.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 in this Presentation have not been materially modified from the original market announcements



## Appendix 8: Brine composition comparison

		Upper Rhine Valley Brine	Salton Sea Brine	URV vs SS
Salts (Cations)	Analyte	Mg/kg Value	Mg/kg Value	%
Lithium: Source of revenue	Li	214	213	+1%
	Na	22,231	59,600	-63%
	K	4,878	18,126	-73%
	Rb	30.0	-	
	Cs	16.0	-	
	Mg	99	54	+83%
	Ca	5,195	31,714	-84%
	Sr	276	475	-42%
	Ba	14.4	139	-90%
Anions				
	Cl	60,567	145,000	-58%
	SO4	172	127	+35%
	F	4.7	24	-81%
	Br	288	-	
Metals (Cations)				
Requires additional purification step if high	B	47	401	-88%
	Be	0.0207	0.2	-91%
Can negatively affect DLE if high	Si	67.2	550	-88%
Can negatively affect DLE if high	As	20.3	8.8	+131%
Can negatively affect DLE if high	Mn	24.5	1,563	-98%
Can negatively affect DLE if high	Fe	37.4	664	-94%
Can negatively affect DLE if high	Zn	5.2	492	-99%
	Pb	0.156	108	-100%
Can negatively affect DLE if high	Al	0.014	16	-100%
	Ni	0.188	0.5	-61%
Can negatively affect DLE if high	Co	0.015	8	-100%
	Sb	0.717	6.5	-89%
	Ti	<0.1	-	
	V	0.165	0.6	-71%
	Cr	0.181	2	-89%
	Cd	0.0205	3	-99%
	Mo	0.0124	8	-100%
	Tl	0.328	2	-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 9: target project economics from PFS - CAPEX

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Note 1: Refer to the Company's ASX announcement entitled "Positive Pre-Feasibility Study" dated 15 January 2021, available on the Company's website and [www.asx.com](http://www.asx.com), for further details.

Refer to the Company's ASX announcement entitled "Positive Pre-Feasibility Study" dated 15 January 2021, available on the Company's website and [www.asx.com](http://www.asx.com), for further details. The Company confirms that all material assumptions underpinning the production targets, and the forecast financial information derived from such production targets, in this Presentation, continue to apply and have not materially changed.

## Appendix 10: Target 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					LITHIUM BUSINESS					
GB1	GB2	GC1	GC2	GC3	GB1	GB2	GC1	GC2	GC3	
SB1	SB2	SC1	SC2	SC3	SB1	SB2	SC1	SC2	SC3	
CLP					CLP					
74MW					40Ktpy LiOH					
Revenues €M/y					500					
Net Op. Cash Fl. €M/y					394					
NPV Pre-tax €M					2,802					
<b>NPV Post-tax €M</b>					<b>1,897</b>					
IRR Pre-tax					31%					
<b>IRR Post-tax</b>					<b>26%</b>					
<b>Payback (year)</b>					<b>4</b>					
CAPEX €M					1,073					
CAPEX Geo										
CAPEX Sorption					751					
CAPEX CLP					322					
<b>OPEX €/KWh or LiOH€/t</b>					<b>2,681</b>					

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

PHASE 1 2024 Start									
ENERGY BUSINESS					LITHIUM BUSINESS				
GB1	GB2	GC1	GC2	GC3	GB1	GB2	GC1	GC2	GC3
SB1	SB2	SC1	SC2	SC3	SB1	SB2	SC1	SC2	SC3
CLP1		CLP2			CLP1		CLP2		
22MW		15Ktpy LiOH							
46		187							
31		140							
155		971							
<b>99</b>		<b>644</b>							
13%		27%							
<b>11%</b>		<b>22%</b>							
<b>4</b>		<b>4</b>							
226		474							
226									
		291							
		182							
<b>0.078</b>		<b>3,201</b>							

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

PHASE 2 2025 Start									
ENERGY BUSINESS					LITHIUM BUSINESS				
GB1	GB2	GC1	GC2	GC3	GB1	GB2	GC1	GC2	GC3
SB1	SB2	SC1	SC2	SC3	SB1	SB2	SC1	SC2	SC3
CLP1		CLP2			CLP1		CLP2		
52MW		25Ktpy LiOH							
111		312							
83		242							
530		1,647							
<b>371</b>		<b>1,111</b>							
18%		32%							
<b>15%</b>		<b>26%</b>							
<b>7</b>		<b>5</b>							
438		700							
438									
		460							
		240							
<b>0.061</b>		<b>2,855</b>							

Note 1: Lithium Hydroxide Battery Quality at €12,542 or US\$14,925/t (assumes exchange rate of €0.84/US\$1.00)

Note 2: Phase 1 relates to Taro license, Phase 2 to Ortenau license

Note 3: Ortenau license is 100% owned by Vulcan. Vulcan has a 100% interest in Taro

Note 4: Refer to the Company's ASX announcement entitled "Positive Pre-Feasibility Study" dated 15 January 2021, available on the Company's website and www.asx.com, for further details.



## Appendix 11: Target 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
SB1	SB2	SC1	SC2	SC3
CLP1		CLP2		
74MW & 40Ktpy LiOH				

Phase 1 developed first and is an integrated business

PHASE 1 2024 Start				
INTEGRATED BUSINESS				
GB1	GB2	GC1	GC2	GC3
SB1	SB2	SC1	SC2	SC3
CLP1		CLP2		
21MW & 15Ktpy LiOH				

Phase 2 developed second and is an integrated business

PHASE 2 2025 Start				
INTEGRATED BUSINESS				
GB1	GB2	GC1	GC2	GC3
SB1	SB2	SC1	SC2	SC3
CLP1		CLP2		
52MW & 25Ktpy LiOH				

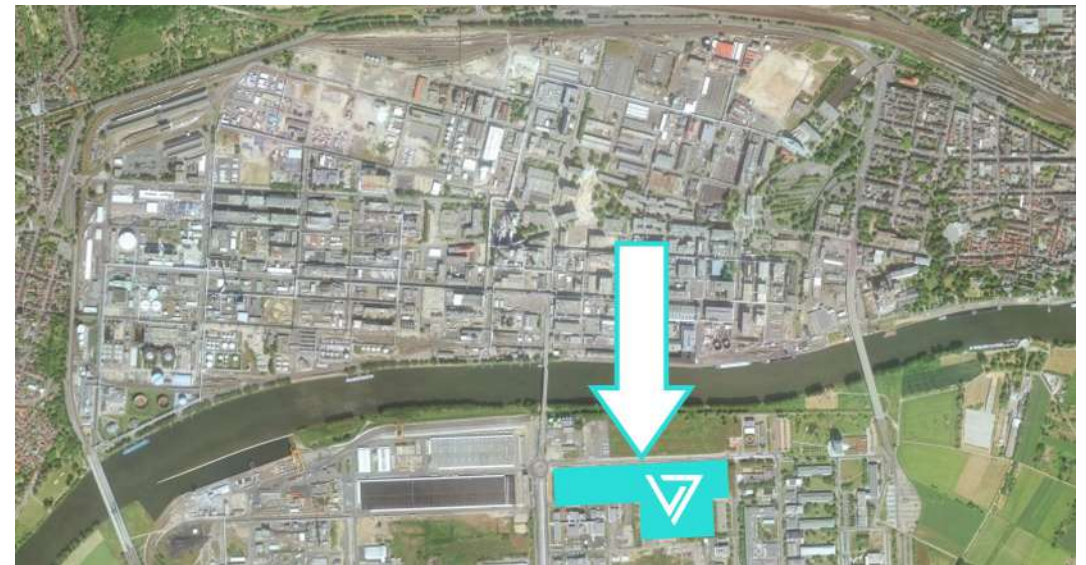
Revenues €M/y	652
Net Op. Cash Fl. €M/y	507
NPV Pre-tax €M	3,443
<b>NPV Post-tax €M</b>	<b>2,250</b>
IRR Pre-tax	26%
<b>IRR Post-tax</b>	<b>21%</b>
<b>Payback (year)</b>	<b>5</b>
CAPEX €M	1,738
CAPEX Geo	665
CAPEX Sorption	751
CAPEX CLP	322
<b>OPEX €/KWh or LiOH€/t</b>	<b>2,640</b>

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

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

## Appendix 12: Vulcan secured site for its planned commercial lithium hydroxide plant

- Vulcan signed an agreement with chemical park management company Infracore, to secure a site for its planned **Central Lithium Plant (CLP)** at the **Höchst Chemical Park**, located just outside of Frankfurt.
- Höchst is **one of Europe's largest chemical sites** and hosts more than 22,000 personnel and 90 companies including Nobian, Clariant, Sanofi and Celanese.
- The CLP is intended as a **processing hub**, processing lithium chloride from multiple combined geothermal and lithium sorption plants into lithium hydroxide monohydrate.
- From the CLP, the lithium hydroxide monohydrate is intended to be transported to Vulcan's European customers in the battery and electric vehicle industry, dramatically **lowering the transport footprint** of the current lithium supply chain.
- The Höchst site features **key advantages** for the project including:
  - proximity to Vulcan's project areas where the integrated geothermal and sorption operations are proposed to be built;
  - multiple low carbon transport modes available (barge, train);
  - availability of renewable power onsite; and
  - the required space and utilities for future phased expansion of the CLP



## Appendix 13: information for slide 11 & 12

Company <sup>1</sup>	Code	Project	Stage	Resource Category	Resources M tonnes	Resource Grade (Li2O)	Contained Mt LCE Tonnes	Information Source
European Metals	ASX: EMH	Cinovec	PFS Complete	Indicated & Inferred	695.9	0.42	7.22	Corporate Presentation July 2021 - Company Website
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	Company Presentation Released to ASX 16 February 2021
Savannah Resources	AIM: SAV	Barroso	DFS Underway	Measured, Indicated & Inferred	27.0	1.00	0.71	Corporate Presentation September 2021 - Company Website

Company	Project	Stage	Resource Category	Brine Volume	Resource Grade	Contained Mt 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

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 Géologiques et Minières Service Géologique 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

Note 1: Data provided for lithium focused peers with comparable project size and stage and published resource information

Note 2: 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 Presentation



## Appendix 14: partnership with Nico Rosberg & Rosberg X Racing Extreme-E Team

- Vulcan Energy Resources Ltd. and Mr. Nico Rosberg and the Rosberg X Racing (RXR) electric racing team in the Extreme-E competition have signed a partnership and sponsorship agreement
- Mr. Rosberg, a German national who was Formula One World Champion in 2016, is a prominent sustainability entrepreneur, and founder of the popular Greentech Festival, as well as the RXR Extreme-E team.
- Extreme E's five-race global voyage, spanning four continents, was created to highlight the impact of climate change and human activity on some of the world's most remote locations while promoting sustainability and the adoption of electric vehicles to help protect the planet.
- Based in Neustadt, Germany, Team RXR is an evolution of Team Rosberg, founded in 1994 by Nico's father and 1982 F1 World Champion, Keke Rosberg. RXR has an Australian female driver, Molly Taylor, and a Swedish male driver, FIA World Rallycross Champion Johan Kristoffersson.
- Extreme E includes other top racing names include seven-time Formula One World Champion Lewis Hamilton's X44 team, 2009 Formula One World Champion Jenson Button and world-class drivers including rally legends Carlos Sainz Snr. and Sébastien Loeb.



OFFICIAL PARTNER



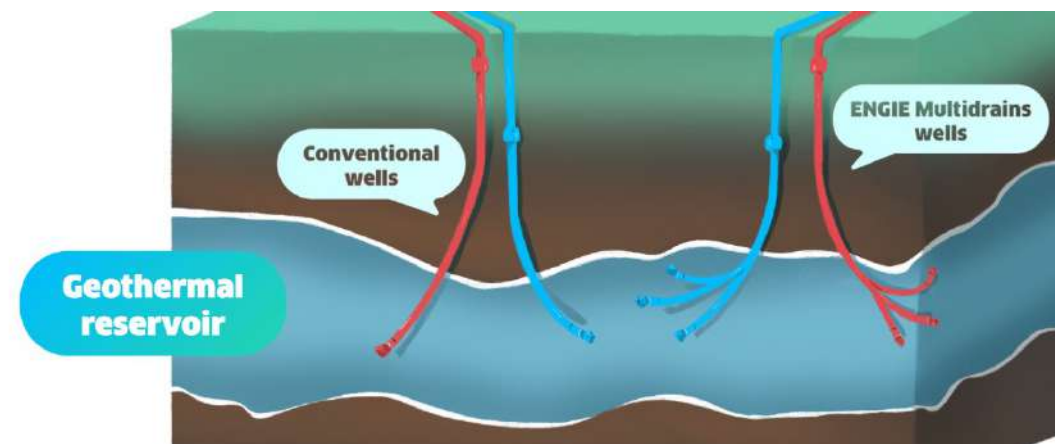
## Appendix 15: brine flow rates

Until we drill our first wells, risks around flow rate will remain. However, Vulcan believes it has an appropriate level of confidence around its flow rates assumptions, based on the experience of its team, and state-of-the-art scientific tools, data and studies.

1. Vulcan is targeting high-flow fault zones within its sedimentary reservoir units, which are predominantly the Bunter Sandstone, using state-of-the-art seismic data. When exploration for geothermal brines first began in the Upper Rhine Valley, no seismic data was used, or the data was 2D seismic only, to get a picture of the sub-surface. The industry has seen a steady progression of understanding and improvements in exploration over time, including the **use of 3D seismic**, and a corresponding increase in flow rates, as would be expected. 3D seismic is now a standard for geothermal exploration in the Upper Rhine Valley and elsewhere.
2. In our estimation of flow rates, we have conducted detailed studies using modelling information derived from seismic data in our areas. The Upper Rhine is a sedimentary graben system, geologically similar to hydrocarbon systems with **permeable formations confined by impermeable rock**. This differs to other types of geothermal plays, such as volcanic-hosted, where the systems are more complex, in general less permeable and seismic data is less useful.
3. We also factor in techniques well known in the oil and gas industry to increase flow, such as **double completion of wells** and **multi-reservoir completion** as recently promoted by Schlumberger and Engie.

Vulcan has, based on its detailed analysis and the various factors mentioned above, used between 100 and 120l/s as assumed flow rates for its projects in its PFS.

A **public list of flow rates** achieved at deep geothermal wells in and around Germany can be found in a 2014 report compiled for the German Federal Ministry of the Economy (BMWi) at the following link: [https://www.grs.de/sites/default/files/pdf/grs-316\\_teilb.pdf](https://www.grs.de/sites/default/files/pdf/grs-316_teilb.pdf). Wells displaying flow rates at greater than 100l/s are common in the list, including at Brühl in the Upper Rhine Graben, with some projects reaching up to 150l/s.



Source: Engie

## Appendix 16: R&D projects



### **Effeo**

Increasing efficiency of geothermal power plants via Project Management Jülich



### **GreGeo**

Aims to develop a new well completion strategy that aims to establish a corrosion-resistant alternative to steel.



### **GEORISK project**

Aims to develop financial schemes and mitigate the impact of the resource risk



### **GeoThermScaling**

Development and evaluation of advanced iron boride-based anti-corrosion coating with high resistance to corrosion and scaling for deep geothermal applications.



### **CROWDTHERMAL**

Empowering the European public to directly participate in the development of geothermal projects with the help of alternative financing schemes (crowdfunding) and social engagement tools.



### **MEET**

Multidisciplinary and multi-context demonstration of EGS exploration and Exploitation Techniques and potentials



### **DGE-Rollout**

Roll-out of Deep Geothermal Energy in Northwest Europe



# Thank You

## PUBLIC RELATIONS

EU/Germany

Media & Investor Relations

Australia