

Vulcan Energy Resources Half Year Results FY22

Dr Francis Wedin, Managing Director



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HY22 Highlights



Geothermal plant acquisition



Electric drill rigs acquired



Granted license area increased to over 1,000km^{2*}



Site for Central Lithium Plant secured



First battery quality lithium hydroxide monohydrate sample



Vulcan team now >100 personnel and growing



Five binding lithium offtake agreements



Dual listed on the regulated market (Prime Standard) of the FSE*



LCA results with

negative CO₂

Zero Carbon LithiumTM Project

HY22 Financial Highlights

Strengthening of the balance sheet

Net assets increased from €81M at June 2021 to €206M at December 2021 through the following:







Acquisition of 2 electric drill rigs



Acquisition of Insheim geothermal power plant



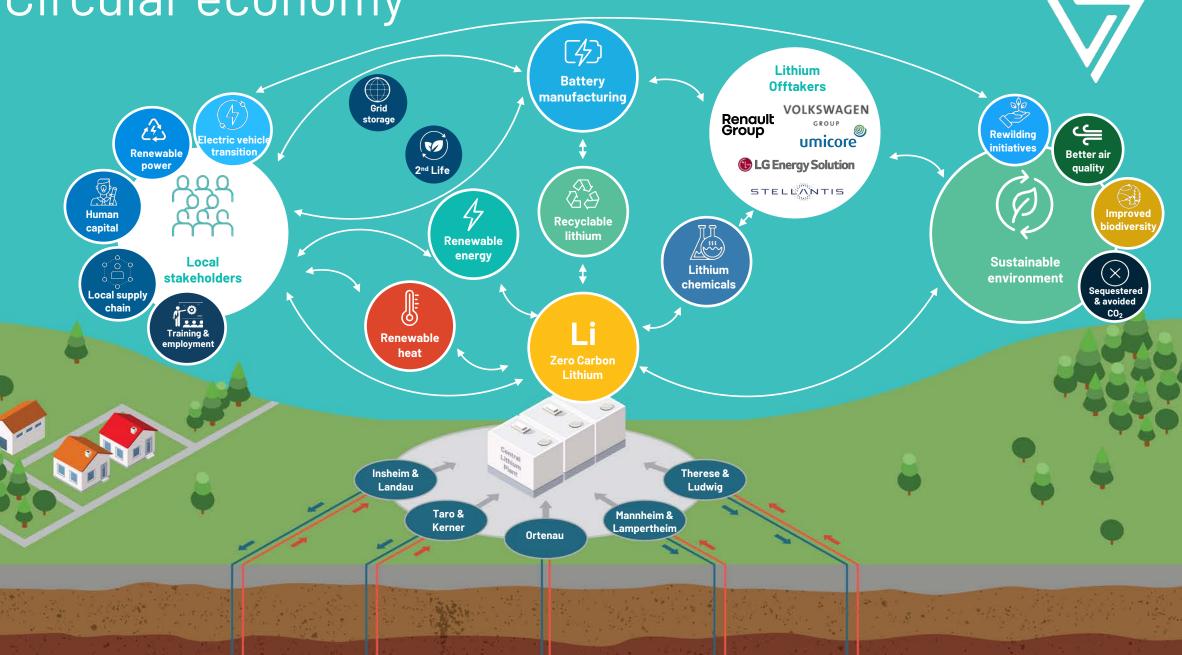
Completed acquisition of GeoT and Gec-co businesses



Deconsolidation of Norway assets through spin off of Kuniko Limited (Vulcan retains 24% share)



Circular economy





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

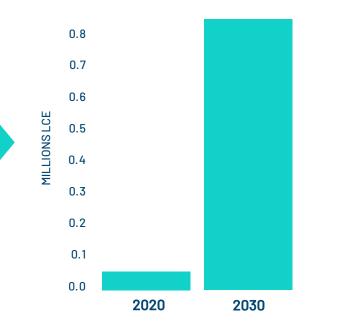
How to support 30million EVs by 2030 in Europe?



1,000GWh Lithium-ion Battery capacity by 2030¹

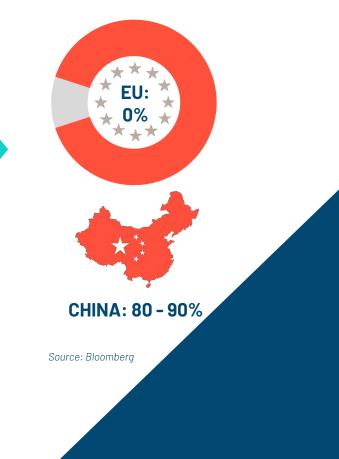


EU: fastest growing Lithium market in the world²



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

Zero local supply of lithium hydroxide



Source: Public announcements

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Note 1: Refer to Appendix 5 for further details on EU lithium-ion battery capacity

Note 2: Based on electric vehicle sales and lithium-ion battery production growth; https://www.reuters.com/article/us-climate-change-eu-transport-idUSKBN28E2KM Bloomberg - https://www.bloomberg.com/news/articles/2020-12-03/eu-aims-to-have-30-million-electric-cars-on-the-road-by-2030

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'.



'We work in partnership to implement responsible procurement practices, to ensure sustainable progress throughout the entire supply chain, with specific emphasis on the wise use of natural resources.

VOLKSWAGEN

GROUP

'By 2025, the company aims to reduce the carbon footprint of cars and light-commercial vehicles across the entire value chain by 30 percent compared to 2015 – and by 2050 to make the entire Group's balance sheet CO₂ neutral."

umicore

'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'.

🕒 LG Energy Solution

'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'.



Current Lithium production has a significant environmental footprint:



Germany and Europe prioritising the rapid growth of renewable energy sources

German Federal coalition



Coalition agreement¹ 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.

On 28 February, 2022 Germany announced it would bring forward its target to generate almost **all the country's electricity from renewable sources by 15 years to 2035.** Supply chain



- New EU Battery Regulation
- Carbon Border Adjustment Mechanism
- Battery Passport
- ISO/TC 333 Lithium
- European Battery Alliance
- Critical Raw Materials List
- EIB new energy lending policy
- European Raw Materials Alliance

Geothermal roadmap³



- Installation of 70 gigawatts of capacity, deep geothermal energy could cover more than a quarter of Germany's annual heat requirements
- Report called for:
- Mobilisation of government assistance and the national economy, to enable the drilling of deep 2,000 geothermal wells by 2030, and at least 7,000 to 10,000 more by 2050
- Billion-Euro level federal funding to support the development

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Refer to Appendix 7: The new EU Battery Regulation

³ Roadmap deep geothermal energy for Germany – recommendations for action for politics, business and science for a successful heat transition.

https://www.ieg.fraunhofer.de/content/dam/ieg/documents/Roadmap%20Tiefe%20Geothermie%20in%20Deutschland%20FhG%20HGF%200202222.pdf

Photo: Bloomberg

¹Koalitionsvertrag 2021 - 2025 zwischen der Sozialdemokratischen Partei Deutschlands (SPD), BÜNDNIS 90 / DIE GRÜNEN und den Freien Demokraten (FDP) / Coalition agreement 2021 - 2025 between the Social Democratic Party of Germany (SPD), BÜNDNIS 90 / DIE GRÜNEN and the Free Democrats (FDP)

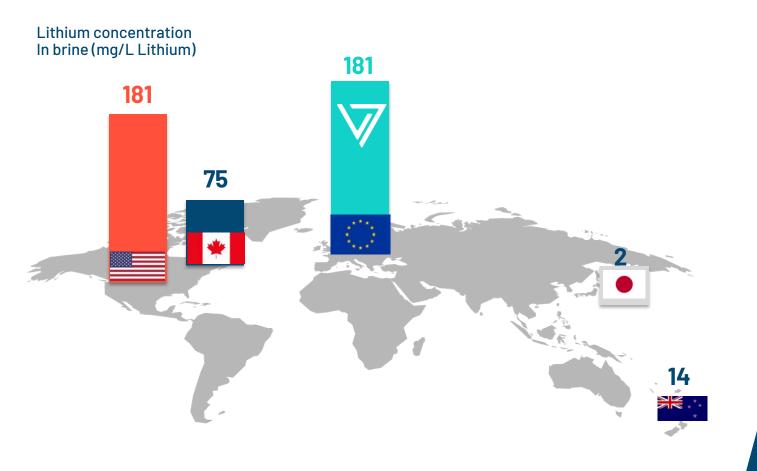
²Bloomberg, Germany brings forward goal of 100% renewable power to 2035, https://www.bloomberg.com/news/articles/2022-02-28/germany-brings-forward-goal-of-100-renewable-energy-to-2035

Delivering the Zero Carbon Lithium[™] Project

VULCAN ENERGY

CARBC

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





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:

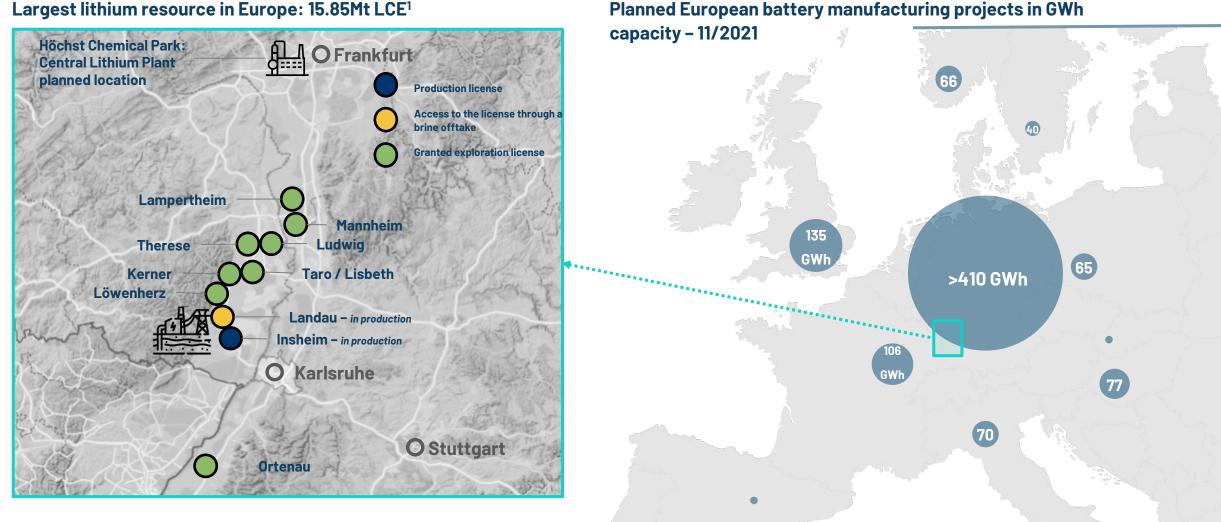
The Upper Rhine Valley in Germany
 The Salton Sea in California

We chose Germany and Europe.

Zero Carbon LithiumTM Project

Largest lithium resource at the centre of the fastest growing market in the world





Note 1: Appendix 2: Largest JORC lithium resource in Europe; Appendix 3: Lithium focused peers with comparable project size and stage for project size comparison,

Source: Batterynews.de

Vulcan's renewable energy and lithium chemicals project

Central Lithium Plant

Sorption Plan



ENERGY BUSINESS

Geothermal Plant

Electric mobility

Wells are drilled into the deep, hot, lithium-rich brine resource, which is pumped to the surface

Renewable delectricity and/or

heat sold to the grid





Re-injection of brine. A closed loop, circular system



Lithium hydroxide

to the EU market

distributed

Renewable heat, electricity and brine transferred to the sorption plant 3 2 2 2 2 2

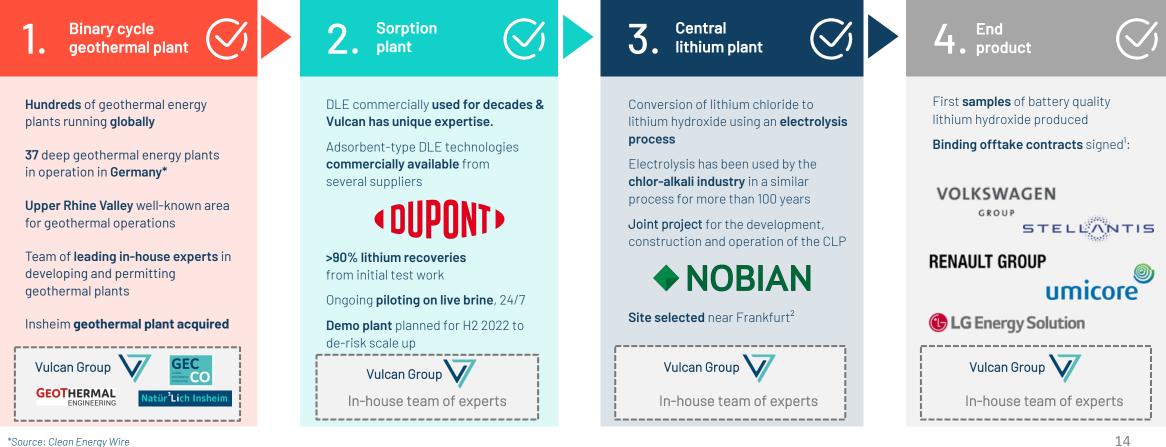


Lithium chloride transported to the central lithium plant



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.



Zero Carbon LithiumTM Project

Global DLE assets and projects

Company	Livent	Lanke Lithium	Zangge Lithium	Jintai Lithium	Eramet/ Tsingshan	Standard Lithium	Vulcan Energy	Rio Tinto	CTR	Energy Source Minerals	Berkshire Hathaway	Lake Resources/ Lilac	Compass Minerals	E3 Metals
Asset name	Hombre Muerto	Qinghai	Qinghai	Qinghai	Centenario- Ratones	Smackover	Zero Carbon Lithium™	Rincon	Hell's Kitchen	ATLIS	Salton Sea	Kachi	Great Salt Lake	Clearwater Lithium
Country	•	*)	*)	*)	•			•				•		*
DLE technology	Sorption	Sorption	Sorption	Sorption	Sorption	IX	Sorption	Sorption	IX	Sorption	IX	IX	IX	lon Exchange
DLE provider	Proprietary	Undisclosed	Undisclosed	Undisclosed	Proprietary	Proprietary LiSTR	Jndisclosed	Axion	Lilac	Proprietary ILiAD	Proprietary	Lilac	Undisclosed	Proprietary
Stage	Production	Production	Production	Production	Constructio n	Demo	Pilot	Pilot	Offsite pilot	Pilot	Pilot	Offsite pilot	Pilot	Pilot
Resource (Mt LCE)	Undisclosed	Undisclosed	Undisclosed	Undisclosed		3	16	12	3	Undisclosed	Undisclosed	4	2	7
Geothermal	×	×	×	×	×	×	\sim	×	\checkmark	\checkmark	\checkmark	×	×	×
Start date	1998	2017	2018	2019	2024	tbc	2024	2025	2024	2024	tbc	2024	tbc	2025
Capacity (ktpa LCE)	20	20	20	7	24	21	40	50	20	20	90	25	20-25	20
Ownership	Public	-	_	-	Public	Public	Public	Public	Private	Private	Public	Public	Public	Public
Significant Investments					Tsingshan \$375M 11/2021	Koch \$100M 11/2021	nstitutional Investors \$320M 2021	Rio Tinto \$825M 12/2021	GM \$?M 07/2021			Lilac Up to \$50M 09/2021		
Offtakes (announced publicly)	TESLA V	×	×	×	×	×	VOLKSWAGEN GROUP GROUPE RENAULT UMICOTE	×	gm	×	×	×	×	×

Note 1: Resources are rounded to Op.

Refer to Appendix 10: DLE Projects and Assets - References

Lithium division update



Laboratory work

Pilot plant operations

hium Hydroxid 5:1310-66-3 1: 1208-39-2

Demonstration (Demo) plant





Images of lithium hydroxide monohydrate from Zero Carbon Lithium™ project



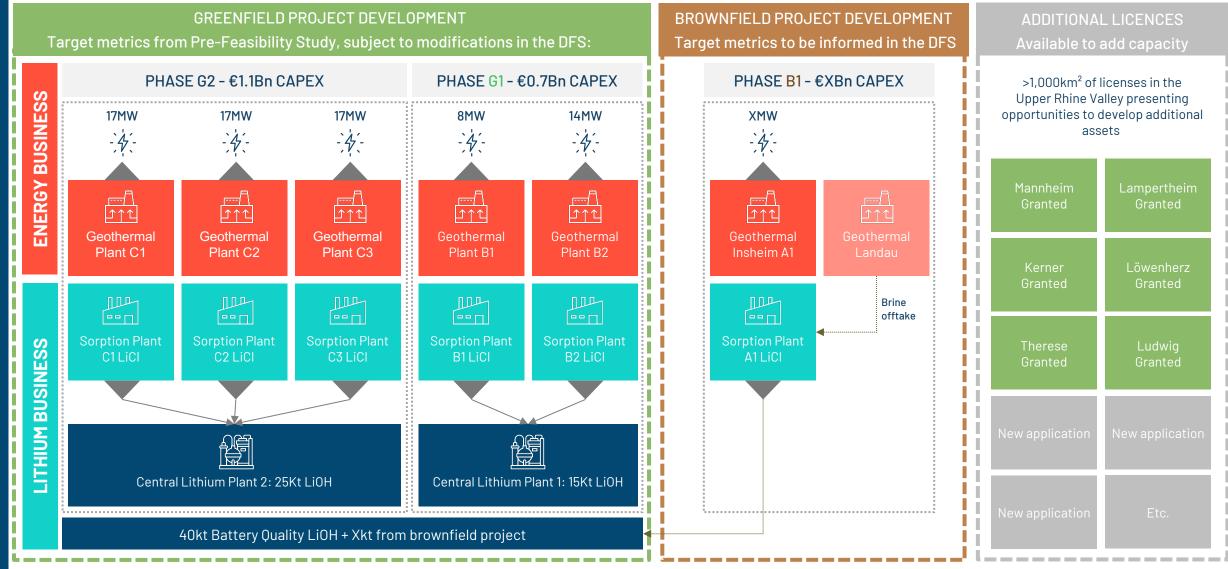
Rendering of Vulcan's Demo Plant, major skids ordered and currently under construction.

- Lab and pilot studies for DFS active since April 2021, generating data for DFS
- Expanded laboratory to be opened in early 2022
- Pilot Plant 1, located at an operational geothermal plant, with "live" geothermal brine
- Plant is 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

- 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 on in Q2 2022, and will represent an approximately 1:200 scale of the first commercial plant.

Our proposed, combined greenfield and brownfield projects to add more capacity





Note 1: Refer to Appendix 11-13 for further details regarding Project economics and production capacity

Zero Carbon LithiumTM Project

Proposed dual purpose renewable energy and battery chemicals project

BROWNFIELD PROJECT DEVELOPMENT

Target metrics to be informed in the DFS

PHASE B1 - €XBn CAPEX

Currently assessing the feasibility of

- **Geothermal Plant Insheim (A1)**
- Vulcan acquired Insheim in Dec 2021
- Current technical ability to produce up to 4.8MW power or 28.5MW thermal energy
- Aiming to upgrade capacity and increase brine flow rate
- Indicated Mineral Resource of 0.7Mt Lithium Carbonate Equivalent @181 mg/I Li
- FY2020 revenues €5.8M
- Feed-in Tariff in place

integrating lithium extraction

5km







Central Lithium Plant 1 combining greenfield and brownfield projects



Geothermal Plant - Landau

- Vulcan executed a 20-year brine offtake agreement with geox GmbH, subject to financing a third well
- Expected brine volume from the production well of at least 100 l/s
- Existing production well at Landau has the tested ability to produce at a rate of over 100 I/s, but an additional re-injection well is planned to help accommodate this flow

Note 1: Refer to Appendix 11-13 for further details regarding Project economics and production capacity

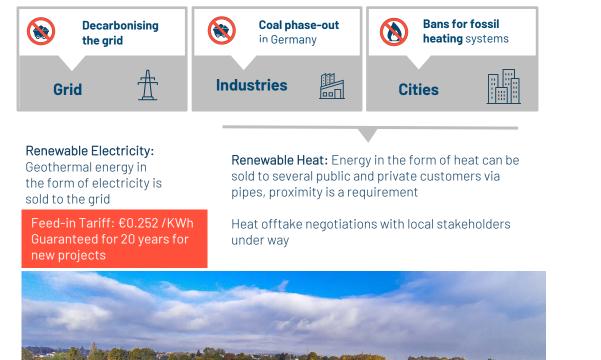
The information in this report that relates to Insheim's Mineral Resources is extracted from the ASX announcement made by Vulcan on 20 January 2020 ("Maiden Indicated Resource Insheim Vulcan Zero Carbon Lithium"), which is available on www.v-er.eu. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement 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.

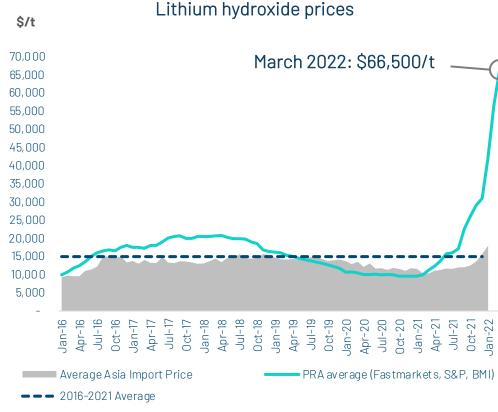
Dual revenues: energy and lithium

ENERGY BUSINESS



LITHIUM BUSINESS





Source: Trade statistics compiled from Global Trade Atlas®, Benchmark Minerals (2016-2017), Fastmarkets (2017-2022)

Zero Carbon LithiumTM Project

Securing long term lithium supply contracts

umicore

- Binding lithium hydroxide offtake agreement
- Initial 5-year term, starting in 2025, which can be extended by further 5 years
- Minimum of 28,000t and a maximum of 42,000t of battery grade lithium hydroxide



vehicles

Electric

(LG Energy Solution

- Binding lithium hydroxide offtake agreement
- Initial 5-year term, starting in 2025, which can be extended by further 5 years
- Minimum of 41,000t -50,000t of battery grade lithium hydroxide

RENAULT GROUP

- Binding lithium hydroxide offtake agreement
- Initial 6-year term, starting in 2025, which can be extended by further 5 years
- Minimum of 29,000t and a maximum of 49,000t of battery grade lithium hydroxide

STELLANTIS

- **Binding lithium hydroxide offtake agreement**
- Initial **5-year term**, starting in **2026**
- Minimum of 81,000t and a maximum of 99,000t of battery grade lithium hydroxide

VOLKSWAGEN

GROUP

- **Binding lithium hydroxide offtake agreement**
- Initial 5-year term, starting in 2026
- Between 34,000t and 42,000t of battery grade lithium hydroxide





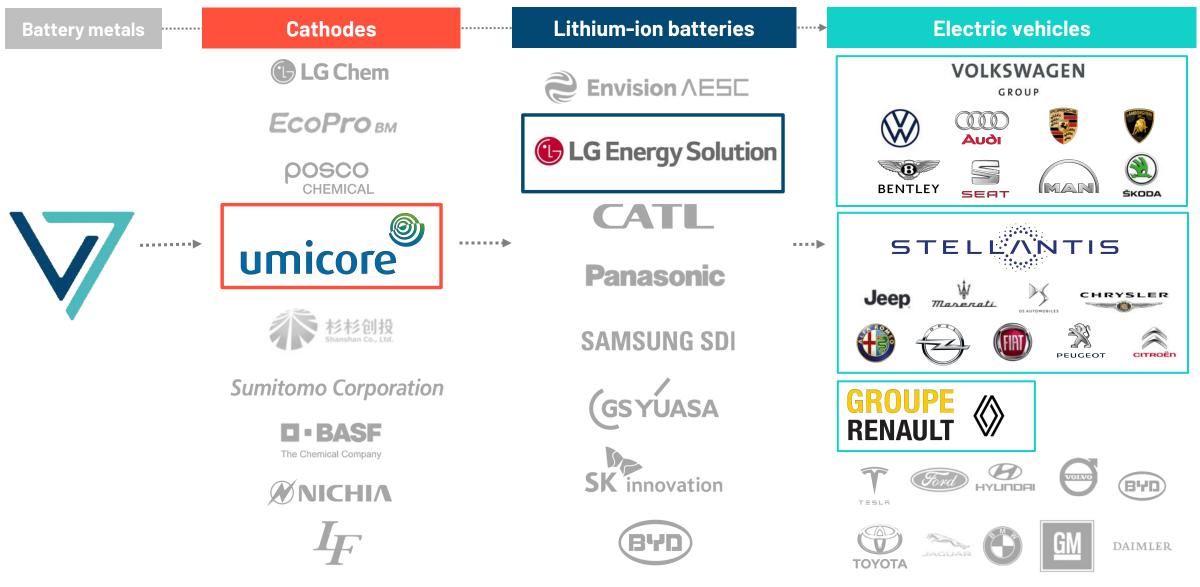
Vulcan Energy signed a binging lithium offtake agreement with Umicore Group in October 2021. Vulcan's VP Business Development, Vincent Ledoux Pedailles, with representatives from Umicore.

Note 1: Refer to Vulcan Investor Centre for ASX announcements relating to each offtake agreement, including the Conditions Precedent terms for each agreement; https://v-er.eu/investor-centre/

Zero Carbon LithiumTM Project

Cathodes

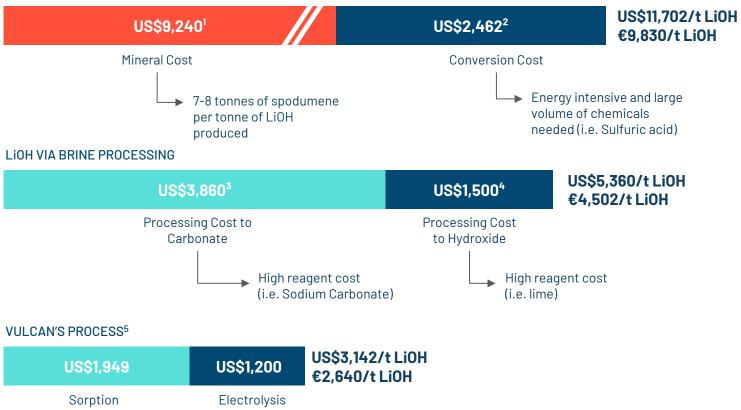
Vulcan will supply leading actors across the lithium-ion battery supply chain



Potential for very low OPEX operation

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

LIOH VIA HARD-ROCK PROCESSING





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.

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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 11-13 for further details regarding Project economics and production capacity

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"

Robust target project financials and production metrics from PFS



ENERGY BUSINESS LITHIUM BUSINESS 74MW Power* 40,000tpy LiOH * Renewable heat sales to also be examined in DFS €1.9Bn NPV Post-tax €0.7Bn NPV Pre-tax €0.5Bn NPV Post-tax €2.8Bn NPV Pre-tax 16% IRR Pre-tax **31%** IRR Pre-tax 26% IRR Post-tax 13% IRR Post-tax €474M CAPEX Phase I **€2,681/t** LiOH OPEX €226M CAPEX Phase I €0.066/KWh OPEX Payback: 4 years Payback: 6 years Numbers are based on the PFS published in 2021 and are subject to change



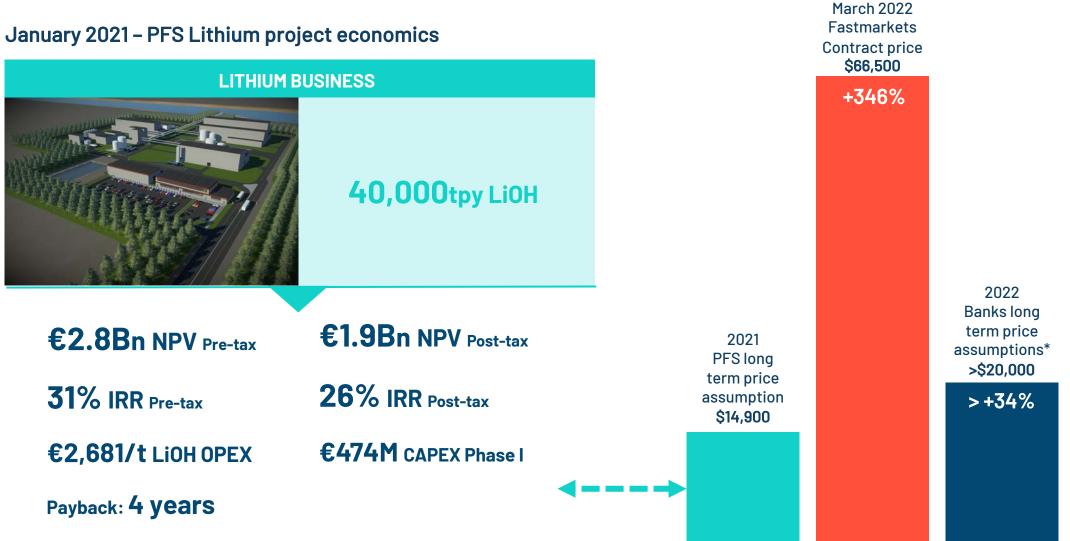
Zero Carbon LithiumTM Project

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

Improvement in lithium pricing environment since PFS





*Jefferies & Canaccord Genuity long term lithium hydroxide price forecast 2022-2030, Citi price forecast 2022-2025

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



Mitigation

Availability of key equipment	Drill rigs that can reach the deep geothermal reservoirs are in short supply in Germany. With Germany phasing out fossil fuels, rigs will likely be in short supply as there is a sharp increase in geothermal project development for heating.	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	The amount of renewable energy and lithium that can be extracted will depend on the brine flow rate achieved at each site. The flow rate from each well will be verified once the well has been drilled.	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	Lithium resources and reserves indicated must be considered as estimates only until such reserves are actually extracted and processed. Vulcan's resources are based on limited data points because the reservoir is deep.	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	Lithium extraction from brine using sorption is used commercially, but each brine chemistry is different, and risks remain when adapting to each brine.	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	The project may be affected by delays in receiving the necessary approvals from all relevant authorities and parties.	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	As with virtually any sort of new development especially for infrastructure projects, we expect some opposition - as has and has been seen with wind and solar in Germany.	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.				

Note1 : A comprehensive list of risks is flagged in the PFS under "Project Risks and Opportunities" and in the Risk Factors section of our presentation from September 2021 https://bit.ly/3bBAkVv Refer to Appendix 15: Project development timeline: example for one project area; Appendix 16: Brine flow rates

Risk

ZERO CARBON LITHUM™

Environment, Social, Governance

ZERO CARBON LIT

10

CO₂

VOI

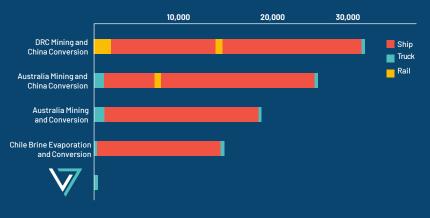
Materially improving the global battery chemicals supply chain





Transport Distances for Different Lithium Chemicals

Transport Distances for Different Lithium Chemicals



As well as having a carbon neutral process, the Vulcan Zero Carbon LithiumTH Project also intends to reduce the transport distance of lithium chemicals into Europe



Per tonne of lithium hydroxide produced

Leading environmental credentials

Source: Minviro Life Cycle Analysis 2021 & Vulcan Energy's Pre-Feasibility Study

Note 1: The Company's environmental credentials set out in this slide (and elsewhere in this Presentation) are based on the Company's Pre-Feasibility Study.

There is no guarantee that the Company will be able to achieve the targeted metrics.

Four pillars of community engagement





- 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
- 'Show truck', targeting local events and markets 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



The right team for the job

Board of Directors



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.

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.

Founder-CEO

Dr. Francis Wedin

Managing 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.

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



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.



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.



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.

Leadership team



Dr. Francis Wedin Managing Director & Founder-CEO



Dr. Horst Kreuter Executive Director Germany



Vincent Ledoux-Pedailles VP – Business Development



Rob lerace Chief Financial Officer (Australia)



Zero Carbon LithiumTM Project

Daniel Tydde CoSec & In-House Legal Counsel (Australia)



Beate Holzwarth

Chief Communication Officer (Germany)



Thorsten Weimann Chief Operating Officer



Dr Stephen Harrison Chief Technical Officer





(Germany)





Jessica Bukowski Public & Investor Relations Manager (Australia)

Dr Meinhard Grodde

In-House Legal Counsel



Renewable Energy Business

Markus Ruff

Engineering &

Consulting Company

CEO Global



Tobias

Hochschild

CEO GeoThermal

Engineering GmbH

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



Zero Carbon LithiumTM Project

Target project timeline



Permitting process Additional licenses granted Environmental Studies, building permits, drilling permits, operational permits

Zero Carbon LithiumTM Project

Share price and capital structure

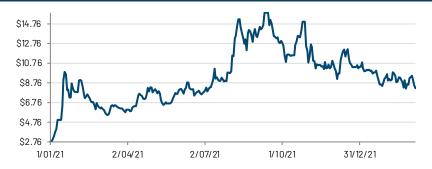
ASX : VUL	
Shares on Issue	131,607,598
Performance Shares*	91,174
Performance Rights	8,656,324
Market Capitalisation at A\$8.230 (undiluted) (as of 8 March 2022)	~A\$1.07B
Cash Position (as of 31 December 2021)	€135M
Top 20 Shareholders	~53%
Management (undiluted)	~19%

Frankfurt: VUL

Dual listed on the regulated market Prime Standard) of the FSE, subsequent to the reporting period

Key Shareholders	
Dr. Francis Wedin	12.51%
Gavin Rezos	5.77%
Hancock Prospecting Pty Ltd	5.64%

VUL share price (AUD) (1 January 2021 – 8 March 2022)





Conclusion





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



Europe's largest lithium Resource¹



Location centre of fastest growing market²



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: Appendix 2: Largest JORC lithium resource in Europe; Appendix 3: Lithium focused peers with comparable project size and stage for project size comparison, and Appendix 4: Vulcan supported by EU-backed group and 5 for further information, Appendix 5: EU lithium-ion battery capacity Note 2: Based on electric vehicle sales and lithium-ion battery production growth



Appendices

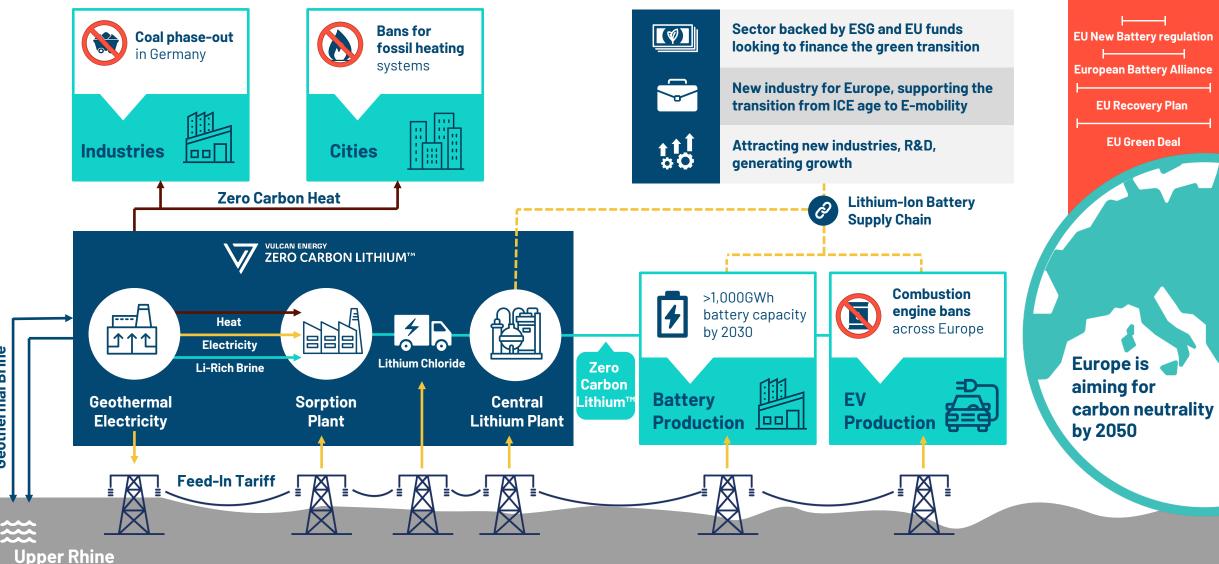
Appendix 1: Vulcan's integrated renewable energy and lithium project description

Germany

Regulations & Initiatives



European Union

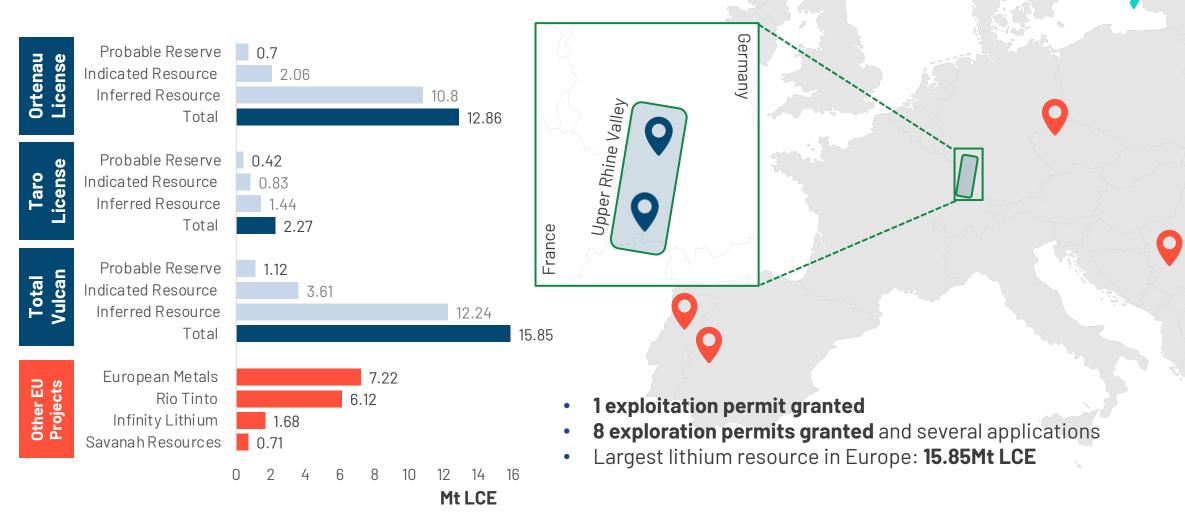


Valley Reservoir

Geothermal Brine

Zero Carbon LithiumTM Project

Appendix 2: Largest JORC lithium resource in Europe



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 <u>www.asx.com</u>. The Company confirms that it is not aware of any new information or data that materially affects the information including in the original market announcements and that all material assumptions and technical 39 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 3: Europe-focused and DLE lithium projects peer comparison references



Company ¹	Code	Project	Stage	Resource Category	Resources M tonnes	Resource Grade (Li20)	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/I Li	2.7	Company Website
E3 Metals	Clearwater, Rocky and Exshaw	PEA Completed	Inferred	5.5 billion m ³	74.6mg/I 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 Geologiques et Minieres Service Geologique National

Pauwels, H. and Fouillac, C. (1993) Chemistry and isotopes of deep geothermal saline fluids in the Upper Rhine Graben: Origin of compounds and water-rock interactions. Geochimica et Cosmochimica Acro Vol. 51, 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

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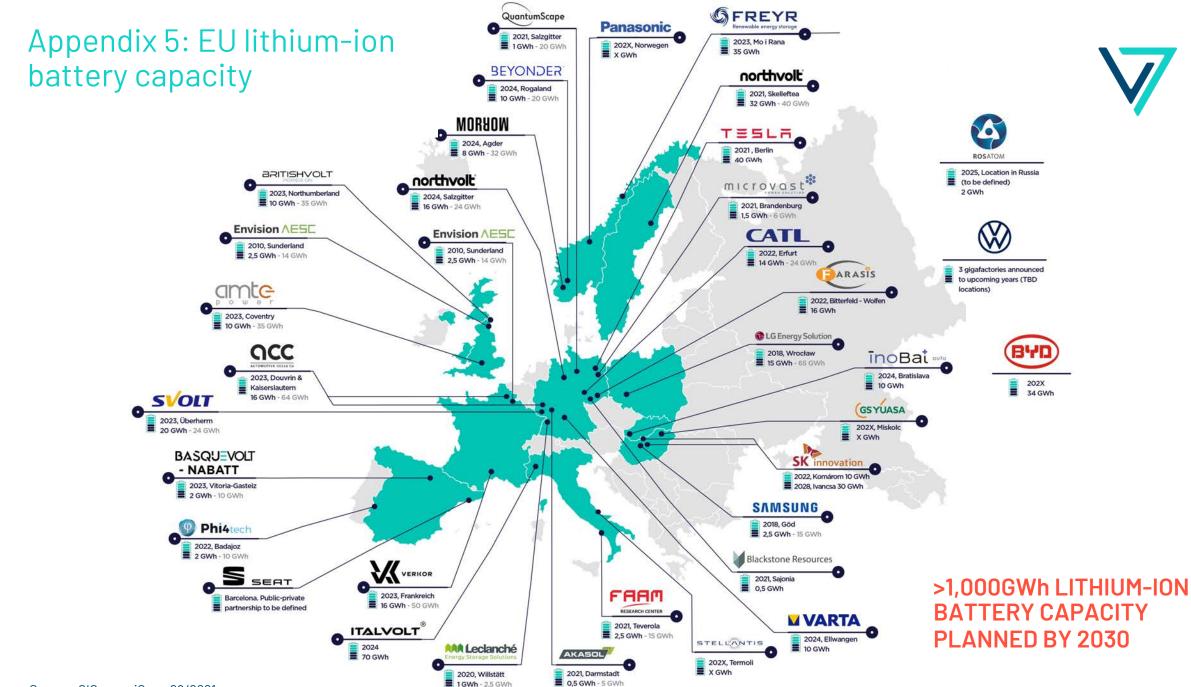
Appendix 4: Vulcan supported by EU-backed group

EIT InnoEnergy will marshal its ecosystem and significant EUwide resources to launch the Zero Carbon Lithium Project forward:

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







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Source: CIC energiGune 09/2021

Appendix 6: Lithium market dynamics favour sustainable lithium production



Zero Carbon LithiumTM Project

¹Fitch Ratings, Fitch Solutions Country Risk & Industry Research, 21 May 2021²BNEF, BNEF Summit, Europe's Formula for Winning the Lithium Battery Value-chain ³Deutsche Bank, Sustainability Tracker, 17 May 2021 ⁵Financial Time, 9 September 2020 ⁶Macquarie, Lithium Market Outlook, 12 April 2021 ⁷Canaccord Genuity – 10 February 2021 ⁸HSBC – 9 February 2021 ⁹Canaccord Genuity – 12 August 2021

Appendix 7: The new EU Battery Regulation

New measures announced in December 2020 including:

1

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



2. CO₂ 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.



 $\bullet \bullet \bullet$

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



		Upper Rhine Valley	Salton Sea	URV vs
		Brine	Brine	SS
1000000000	Analyt	Mg/kg	Mg/kg	
Salts (Cations)	e	Value	Value	%
Lithium: Source of revenue	Li	214	213	+1%
	Na	22,231	59,600	-63%
	К	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%
	Ва	14.4	139	-90%
Anions				
	CI	60,567	145,000	-58%
	SO4	172	127	+35%
	F	4.7	24	-81%
	Br	288	-	
Metals (Cations)				
Requires additional purification step if				
high	В	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	AI	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	0.0203	8	-100%
	TI	0.328	2	-100%
pH		5.828	4.9	-80%

Appendix 8: Geothermal brine composition comparison



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: Vulcan secured site for its planned commercial lithium hydroxide plant

- Vulcan signed an agreement with chemical park management company Infraserv, 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;
 - o multiple low carbon transport modes available (barge, train);
 - o availability of renewable power onsite; and
 - o the required space and utilities for future phased expansion of the CLP





Appendix 10: DLE Projects and Assets - References



Livent	https://s22.q4cdn.com/453302215/files/doc_presentations/2021/11/Livent-Investor-Presentation_for-website.pdf
Lanke Lithium	https://www.linkedin.com/pulse/from-catamarca-qinghai-commercial-scale-direct-lithium-alex-grant/ http://www.asianmetal.com/news/1665421/Lanke-lithium-plans-to-launch-commercial-production-of-battery-grade-lithium- carbonate
Zangge Lithium	https://www.linkedin.com/pulse/from-catamarca-qinghai-commercial-scale-direct-lithium-alex-grant/
Jintai Lithium	https://www.linkedin.com/pulse/from-catamarca-qinghai-commercial-scale-direct-lithium-alex-grant/
Eramet/Tsingshan	https://www.eramet.com/sites/default/files/2021-11/IR%20presentation_Lithium_VF.pdf
Standard Lithium	https://www.standardlithium.com/projects/arkansas-smackover
Vulcan Energy	https://v-er.eu/wp-content/uploads/2021/12/2021-AGM-MD-presentation.pdf
Rio Tinto	https://www.rinconmining.com/wp-content/uploads/2021/10/Rincon-FINAL-E-210921-FINAL.pdf
CTR	CTR's NI 43 101 inferred mineral resource estimate contains ~2.7 million
Berkshire Hathaway	https://www.ft.com/content/c9760a4e-1a76-11e9-9e64-d150b3105d21
Lake Resources/Lilac	https://lakeresources.com.au/wp-content/uploads/2021/11/lke_noosa-presentation_12-nov-21.pdf http://lilacsolutions.com/2021/09/lake-resources-partners-with-lilac-solutions-for-technology-and-funding-to-develop-the-kachi- lithium-brine-project-in-argentina/
Compass Minerals	https://investors.compassminerals.com/investors-relations/investor-news/press-release-details/2021/Compass-Minerals- Identifies-Approximately-2.4-Million-Metric-Ton-Sustainable-Lithium-Resource/default.aspx
E3 Metals	https://www. <i>e3metalscorp</i> .com/_resources/presentations/corporate-presentation.pdf?v=0.084

Appendix 11: Target project economics from PFS - CAPEX

	ENERGY BUSINESS	LITHIUI			
	Geothermal Plant	2 Sorption Plant	3 CLP		FULL PROJECT
PHASE 1 2024 Start	2 geothermal plants: • GB1 – 8MW • GB2 – 14MW Capex: €226M	2 Sorption plants: • SB1 – 8kt LiOH • SB2 – 7kt LiOH Capex: €291M	1 Central Lithium Plant • CLP1 - 15kt LiOH Capex: €182M	€473M	Geothermal
PHASE 2 2025 Start	3 geothermal plants: • GC1 – 17MW • GC2 – 17MW • GC3 – 17MW Capex: €438M	3 Sorption plants: • SC1 – 8kt LiOH • SC2 – 8kt LiOH • SC3 – 8kt LiOH Capex: €460M	1 Central Lithium Plant • CLP2 - 25kt LiOH Capex: €240M	€700M	SorptionCLP
FULL PROJECT NO PHASING 2024 Start	5 geothermal plants 74MW Capex: €665M	5 Sorption Plants Capex: €751M	1 Central Lithium Plant • CLP - 40kt LiOH Capex: €322M	€1.1bn	19% 38% 43% Equivalent per tonne of LiOH

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, 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, 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 12: Target project economics - possible structures

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Numbers are based on the PFS published in 2021 and are subject to change

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

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

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

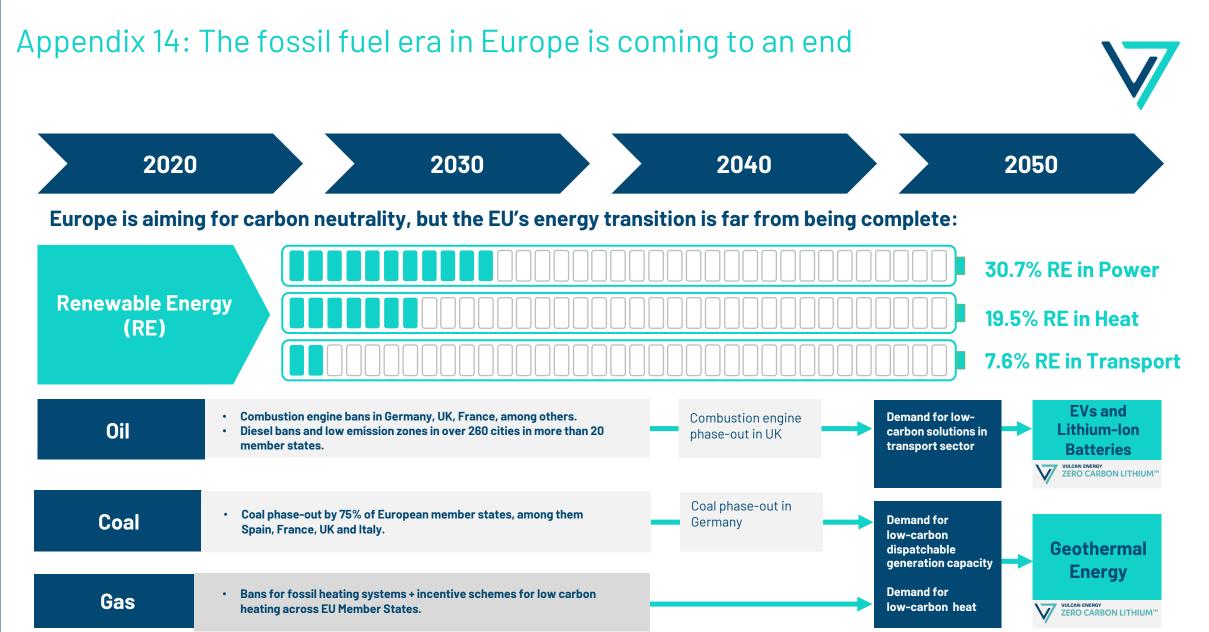
	In two unierent businesse	s, Energy and Entinum.	baomeobeo: Energy and E		PHASE 2 2025 Start			
		- NO PHASING Start		SE 1 Start				
	ENERGY BUSINESS	LITHIUM BUSINESS	ENERGY BUSINESS	LITHIUM BUSINESS	ENERGY BUSINESS	LITHIUM BUSINESS		
	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3		
	SB1 SB2 SC1 SC2 SC3	SB1 SB2 SC1 SC2 SC3	SB1 SB2 SC1 SC2 SC3	SB1 SB2 SC1 SC2 SC3	SB1 SB2 SC1 SC2 SC3	SB1 SB2 SC1 SC2 SC3		
	CLP	CLP	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2		
	74MW	40Ktpy LiOH	22MW	15Ktpy LiOH	52MW	25Ktpy LiOH		
Revenues €M/y	157	500	46	187	111	312		
Net Op. Cash Fl. €M/y	114	394	31	140	83	242		
NPV Pre-tax €M	685	2,802	155	971	530	1,647		
NPV Post-tax €M	470	1,897	99	644	371	1,111		
IRR Pre-tax	16%	31 %	13%	27 %	18%	32 %		
IRR Post-tax	13%	26%	11%	22%	15%	26% 5		
Payback (year)	6	4	4	4	7			
CAPEX €M	665	1,073	226	474	438	700		
CAPEX Geo			226		438			
CAPEX Sorption		751		291		460		
CAPEX CLP OPEX €/KWh or	0.066	322		182		240		
LiOH€/t	-	2,681	0.078	3,201	0.061	2,855		

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

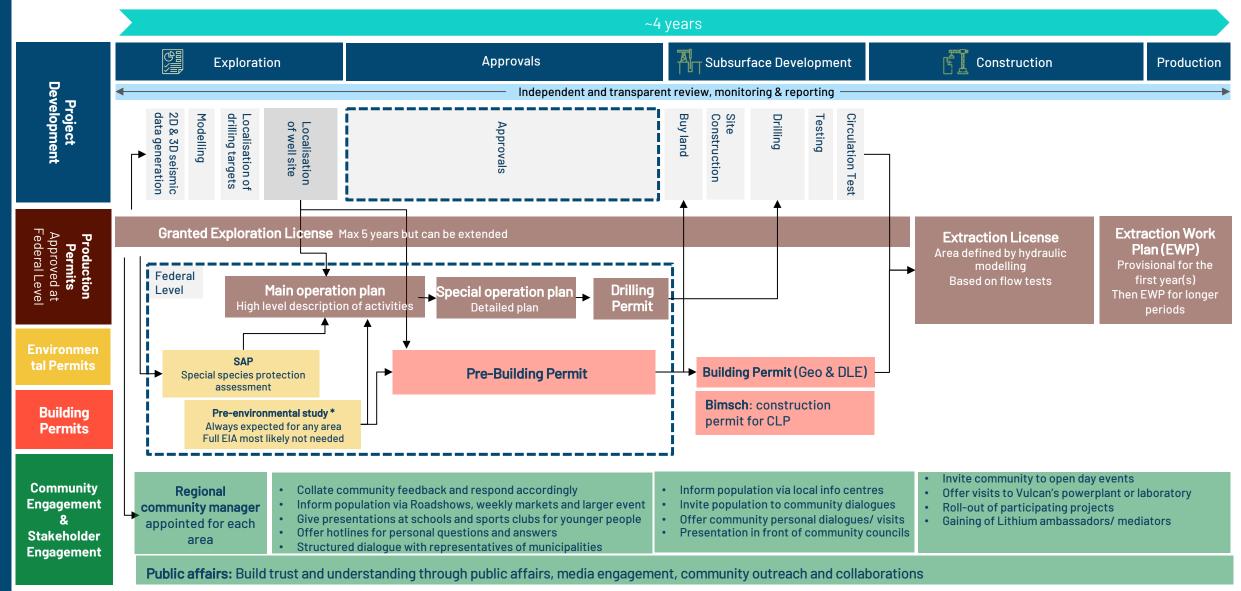
Note 2: Phase 1 relates to Taro license, Phase 2 to Ortenau license

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 15: Project development timeline: example for one project area



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Notes: Not at scale, e.g., at scale approval would be shorter and drilling would be longer. Each project area is unique, timing and plans will vary for each area *Full Environmental Study only required in protected areas

Appendix 16: 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.

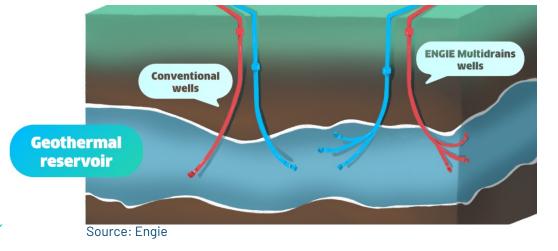
- 1. Vulcan is targeting high-flow fault zones within its sedimentary reservoir units, which are predominantly the Bunter Sandstone, using state-of-the-art seismic data. When exploration for geothermal brines first began in the Upper Rhine Valley, no seismic data was used, or the data was 2D seismic 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 120I/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.

Wells displaying flow rates at greater than 100I/s are common in the list, including at Brühl in the Upper Rhine Graben, with some projects reaching up to 150I/s.

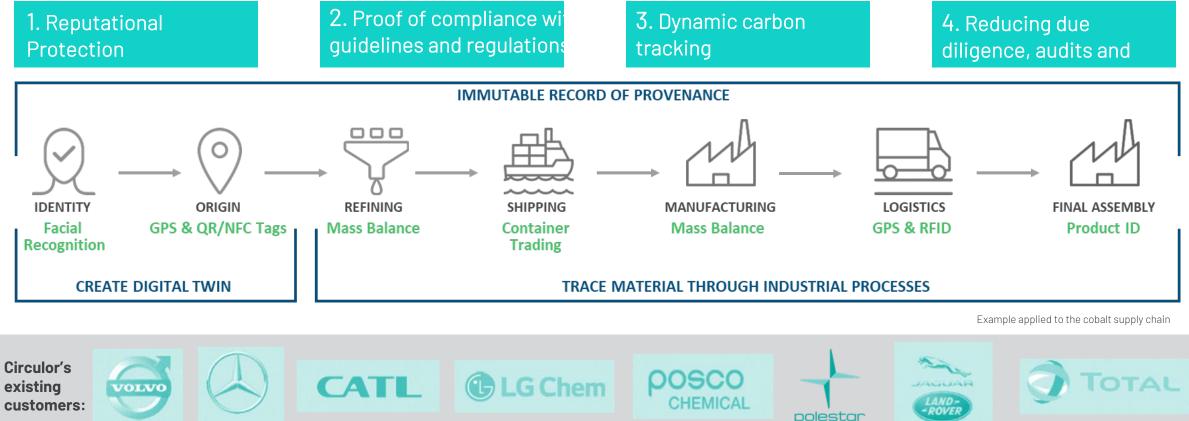


Appendix 17: Vulcan & Circulor to establish world-first full lithium traceability & transparency across the EU supply chain



Circulor 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 Circulor makes sure that the digital twin is reliably linked to the physical resource through out its entire journey. This enables:



Appendix 18: R&D projects





Effeo

Increasing efficiency of geothermal power plants via Project Management Jülich



GEORISK

AF Projekt GmbH

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.

GEOTHERMAL ENGINEERING

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.



European Commission

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

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ASX:VUL
FSE:VUL





OFFICIAL PARTNER

