#### **ASX Release 31 January 2022**



ASX:VUL FRA:6K0

#### **Fast Facts**

Issued Capital: 131,607,598 Market Cap (@\$8.83): \$1.162b

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## **Quarterly Activities Report December 2021**

Vulcan Energy Resources Limited (Vulcan; ASX: VUL, the Company) is aiming to become the world's first integrated lithium and renewable energy producer with a net zero carbon footprint. Vulcan's unique Zero Carbon Lithium™ Project aims to produce both renewable geothermal energy and lithium hydroxide for electric vehicles, from the same deep brine source in the Upper Rhine Valley, Germany.

Vulcan achieved significant project milestones during the December 2021 Quarter (the Quarter) as the Company remains focused on delivering the Zero Carbon Lithium™ Project, targeting phase one lithium production in 2024.

## **Highlights**

- Executed binding lithium offtake agreements with Tier One companies Volkswagen Group, Stellantis, Umicore and Renault Group, with the first five years of lithium production fully sold out, and significant further demand received for future project expansions.
- Acquired an operational geothermal renewable energy power plant with confirmed lithium-in-brine grades in the Upper Rhine Valley, Germany, establishing Vulcan as an operational renewable energy business.
- Signed a brine offtake agreement with a separate nearby operational geothermal plant. Combined, these provide a pathway to potentially increasing phase one lithium production plans from existing geothermal operations.
- Signed an agreement with Rhein Petroleum GmbH to purchase 3D seismic and drilling data to assist with additional project generation, following strong customer demand for expansion of the Zero Carbon Lithium™ business.
- Purchased two specialised electric drill rigs which can operate to the target depth required for deep
  geothermal renewable energy wells in the region. These are a strategic asset at a time when
  renewable energy production capacity and lithium production are critical for meeting Germany and
  Europe's climate targets.
- Head count increased to 115 across geothermal renewable energy and lithium battery chemicals business units, with significant further growth expected over the coming 12 months.
- Strong cash position of €135 million at the end of the Quarter, following A\$200m institutional equity raise in Q3 2021.



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- Entered into an agreement with major chemicals company Nobian to assess the feasibility of a joint project for the development, construction and operation of the Central Lithium Plant (CLP) after securing the site for the CLP in October 2021.
- Awarded new exploration licenses for geothermal energy and lithium in the Upper Rhine Valley, increasing Vulcan's granted license area by nearly 50% to over 1,000km<sup>2</sup>.
- Vulcan subsidiary Vulcan Energy Italy Pty Ltd was granted a new Research Permit in Italy, named "Cesano" located 20 km NNW of Rome. Vulcan considers the area to have potential for sustainable lithium battery chemicals development
- Signed a binding lithium hydroxide offtake agreement with LG Energy Solution (LGES), following the binding term sheet signed on 18 July 2021.

Vulcan's Managing Director Dr. Francis Wedin commented: "The December 2021 Quarter was a period of acceleration and expansion for Vulcan and the Zero Carbon Lithium™ Project with infrastructure, asset and data acquisitions demonstrating our willingness and ability to swiftly capitalise on strategic opportunities to ensure timely project development.

"The Insheim plant acquisition is a significant, first step in establishing Vulcan as a revenue generating, renewable energy producer and Vulcan intends to build several distributed geothermal renewable energy plants across the Upper Rhine Valley region. Discussions with multiple local stakeholders to provide renewable heating to communities and renewable power to the German grid are ongoing. Ultimately, these plants should also provide us with a pathway to sustainable lithium chemicals production for the European electric vehicle industry.

"Our binding lithium offtake agreements with Volkswagen Group, Stellantis, Umicore and Renault Group, and recently with LG Energy Solution, ensures we have a diversified mix of offtakers from the cathode, battery and automotive sectors. Our partnerships mean we will supply leading European automakers with our unique, zero carbon product and are an important foundation for securing project finance.

"Vulcan's lithium production is now fully booked for the first five years of planned operation, a unique achievement unparalleled across the sector, which is testament to our team and the uncompromising environmental credentials of the Zero Carbon Lithium™ Project.

"There is increasing demand from our customers for further supply. The 3D seismic data acquisition, together with the newly granted exploration licenses give us significant potential to rapidly advance and further scale up our project as the market continues to grow. To that end, we are targeting completion of our Phase 1 DFS in H2 2022, to accommodate the inclusion of more project areas into expanded production studies.

"I would like to thank the Vulcan team and all our stakeholders for their passion, and commitment to environmentalism and value creation through scientific endeavour. We remain focused on advancing renewable energy development and decarbonisation for the benefit of all stakeholders, and are on track with the development of Vulcan's Zero Carbon Lithium™ Project, targeting phase one production in 2024."



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The acquisition of the Insheim Plant, to be renamed NatürLich Insheim, is consistent with Vulcan's strategy to acquire and upgrade existing brownfield renewable energy and brine infrastructure. The Insheim Plant currently has the technical ability to produce a maximum of 4.8 megawatt (MW) renewable power, equivalent to approximately 8,000 households, with an additional ability to produce heating. The plant is currently producing 2.9 MW of electricity on average.



Vulcan Energy's 100% owned NatürLich Insheim, an operational geothermal renewable energy power plant in the Upper Rhine Valley, Germany.

In addition to the acquisition of Insheim, Vulcan Energy has executed a 20-year brine offtake agreement with geox GmbH, the operational Landau geothermal renewable energy plant in the Upper Rhine Valley. Under the terms of the agreement, Vulcan has the right to purchase and extract the lithium from the brine produced from Landau, and return it to the plant for re-injection. Subject to positive feasibility studies, Vulcan will seek to incorporate this offtake agreement into its Phase 1 development plans.

Vulcan purchased two specialised electric rigs, ensuring drilling can be conducted with minimum greenhouse gas emissions, consistent with Vulcan's strict carbon neutral focus. Importantly, the rigs represent a scarce, strategic asset for Vulcan, and will assist with timely project development. Vulcan's drilling company, VERCANA GmbH(Ltd.) will be headquartered in Karlsruhe, Germany and its operations will create approximately 50 regional jobs.

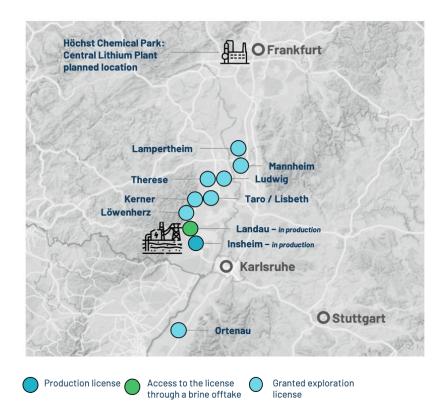
The 3D seismic data acquisition consists of two surveys totalling 315 km². The new data assists with understanding of the sub-surface in the areas, allowing the team to target high brine flow zones in a precise, tailored and careful manner, therefore contributing to public acceptance.

Vulcan's in-house geological engineering company, GeoT, continues to advance studies towards the completion of Phase 1 DFS. The studies include re-processing of 3D seismic data, integrated reservoir characterisation, structural and geomechanical studies, and fluid and heat flow simulation modelling. Once completed, this will be sent to external consultants GLJ for review.

Subsequent to the end of the Quarter, Vulcan was also granted licences cover 325km<sup>2</sup> of area in the Upper Rhine Valley which is considered by Vulcan to be prospective for deep geothermal and lithium brine.



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In addition, Vulcan subsidiary Vulcan Energy Italy Pty Ltd was granted the Cesano Permit, in Italy. The Cesano Permit extends over an area of 11.5 km2 and includes an area where a single geothermal well yielded two "hot brine" samples that contained high average lithium-in-brine historical (1976) grades of 350 and 380 mg/l Li.

Strategic decisions during the period have positioned Vulcan to potentially expand its Definitive Feasibility Study (DFS) and increase production in response to significant customer demand for sustainable lithium from the Zero Carbon Lithium™ Project. Vulcan is targeting completion of its Phase 1 DFS in H2 2022 to accommodate the inclusion of more project areas into expanded production studies.

Vulcan's stated target timeline, subject to relevant stakeholder permissions, is to commence drilling in its Phase 1 areas towards the end of 2022 and Phase 2 projects in 2023.

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Securing offtakers was a priority for 2021, with Vulcan successfully finalising binding lithium offtake agreements with tier one cathode, battery and automotive companies in Europe. Vulcan's current plans for lithium production are now fully booked for the first five years of operation.

Partner	Category	Contract	Start & duration	Volume over the duration of the contract (t)	
Umicore	Tier one cathode maker		2025 5 years	28,000 to 42,000	
Renault Group	0EM*	D. 1. 1.1.	2026 6 years	26,000 to 32,000	
Stellantis	OEM	Binding lithium hydroxide offtake	2026 5 years	81,000 to 99,000	
Volkswagen Group	OEM	agreement	2026 5 years	34,000 to 42,000	
LG Energy Solutions	Tier one battery maker		2025 5 years	41,000 to 50,000	

<sup>\*</sup>Original Equipment Manufacturer

Subsequent to the end of the Quarter, in January 2022, Vulcan signed an MOU and a term sheet ("Agreement") with Nobian, the fourth largest chlor-alkali producer in Europe. Chlor-alkali uses an electrolysis process which is similar to part of Vulcan's flowsheet. The Agreement bolsters the operational experience and expertise in electrolysis production within the Zero Carbon Lithium™ Project team. Advantageously, one of Nobian's operations is located at the Höchst chemical park near Frankfurt, where Vulcan has secured a plot for the construction of its CLP.

Vulcan's lithium processing division is progressing the Phase 1 DFS led by Vulcan's in-house team and by independent consultants Hatch Ltd. The strategy of the DFS team is to standardise the design of the DLE plants where possible, allowing for relatively modular engineering and build out in subsequent phases.

Vulcan's new laboratory will officially open in February 2022. Located in the town of Karlsruhe-Durlach the laboratory will accommodate Vulcan's expanded lithium processing division and have full in-house ICP and IC analytical capability.

In addition to the brine offtake noted above, the agreement with geox GmbH and the operational Landau geothermal renewable energy plant will provide access to accommodate Vulcan's Demonstration Lithium Extraction Plant (Demo Plant). Long lead items are on order and major skids under construction for the Demo Plant, with start-up of the first, DLE section targeted for mid-2022. Vulcan notes that delays may be possible, due to disrupted supply chains linked to COVID-19.



Rendering of Vulcan Energy's Demo Plant.



#### **Financial position**

Following the A\$200 million Placement (€124 million equivalent) completed in September 2021, during the period Vulcan used a portion of the proceeds to acquire:

- the Insheim geothermal renewable energy plant (€31.5 million entity value), with the view to expand and modernise the asset;
- specialised electric drill rigs, which will be refurbished and operation-ready in late-2022; and
- 3D seismic and drilling data from Rhein Petroleum.

Given the above outlays, the cash balance together with liquid investments was €145 million at 31 December 2021, compared to €187 million at 30 September 2021.

The cash outflows are consistent with Vulcan's strategy to accelerate and expand the company's dual renewable energy and lithium development, to meet demand from offtakers in Europe, while providing renewable heat and power for local communities.

## ESG excellence and team growth

Vulcan's raison d'être is to be a leader in Environmental, Social and Governance (ESG), as part of the Company's goal to become the world's first Zero Carbon Lithium™ business. In line with this, the Company created and filled a new position, ESG Lead, in December with responsibility to define and implement Vulcan's ESG Framework.

The Vulcan team continues to grow across geothermal renewable energy and lithium battery chemicals business units, and now totals 115. Demonstrating the Company's commitment to diversity, women represent 35% of the workforce, while 67% of Vulcan's Board of Directors are female.

Vulcan continues to expand its community outreach, as engagement with the community members, local and municipal councils, state and federal governments as well as regional media was significantly strengthened during the period. Regional managers were appointed in Ortenau, Südpfalz and Kurpfalz, overseeing teams of public affairs, communications, and project management professionals. These teams, with local knowledge and expertise, will work with the community to ensure Vulcan's mission and the Zero Carbon Lithium<sup>TM</sup> Project is understood and accepted.

The Company will capitalise on local knowledge and expertise to make a positive contribution to the energy transition in the region, while discussions with multiple local stakeholders to provide renewable heating to communities and renewable power to the German grid are ongoing. German State and Federal policy increasingly support decarbonising heating and power grids, with a focus on decentralised, renewable energy. The Vulcan Group intends to build distributed geothermal renewable energy plants across the Upper Rhine Valley region.



At Vulcan, the health and safety of employees, their families and the community is the Company's highest priority and the impact of COVID-19 continues to be managed in line with government regulation. Protocols such as working from home and staggered/reduced office and site attendance are underpinned by strict hygiene and physical distancing measures. While Vulcan's executive team is reviewing the situation closely, the Company does not currently see an impact to its target development timeline, and the pilot plant and laboratory works are still ongoing. Vulcan is also monitoring supply chain disruption due to COVID-19 for materials for its Demo Plant construction, noting that delays may be possible. The potential for additional cost and time impacts for equipment for commercial plant construction will be reviewed as part of Vulcan's Phase 1 DFS.

In November 2021, Vulcan was added to PricewaterhouseCoopers Australia (PwC) ASX "Mid-Tier 50" (MT50) list, with PwC noting: "Our analysis also demonstrates that positive ESG strategies, including supporting the transition to a lower carbon global economy, aligns with long-term value creation", and "New entrants... Vulcan Energy, saw the largest increases to market capitalisation across the MT50, on the back of strong project results and additional funding."



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Additional ASX Disclosure Information

- 1. ASX Listing Rule 5.3.1: Exploration and Evaluation expenditure during the Quarter was €4.3 million. Expenditure was on engineering studies towards the DFS for the Vulcan Zero Carbon Lithium™ Project, the purchase of 3D seismic and drilling data from Rhein Petroleum GmbH and the interpretation of existing 3D seismic and planning for 3D seismic surveys in its license areas. Interpretation costs include capitalised salaries from recently acquired engineering company GeoThermal Engineering GmbH (GeoT), where time was allocated to Vulcan licenses.
- 2. ASX Listing Rule 5.3.2: Development expenditure during the Quarter was €11.5 million. Expenditure included the acquisition of two electric drill rigs, technical equipment for the lithium plant as well as engineering demonstration costs towards plant. Engineering costs include capitalised salaries from of the demonstration recently acquired engineering company Global Engineering and Consulting GmbH (gec-co) where time was dedicated to the Vulcan demonstration plant.
- 3. ASX Listing Rule 5.3.3: While no exploration licenses were granted during the quarter ending 31 December 2021, four exploration licenses in the Upper Rhine Valley were granted in January 2022 (refer to ASX Announcement 4 January 2022 for more information). Vulcan subsidiary Vulcan Energy Italy Pty Ltd was also granted a new Research Permit in Italy in January 2022 (refer to ASX Announcement 24 January 2022 for more information). Vulcan Energy also acquired a geothermal Production License following the acquisition of the Insheim geothermal power plant (refer to ASX Announcement 10 December 2021 for more information).

## 4. ASX Listing Rule 5.3.5:

- a. Payments to related parties of the Company and their associates during the Quarter per Section 6.1 of the Appendix 5B total  $\[ \in \]$  114,000. This is comprised of an allocation of the Managing Director remuneration of  $\[ \in \]$  13,000, Non-Executive Director fees of  $\[ \in \]$  67,000 as well as consulting fees of  $\[ \in \]$  34,000 to Alto Group Inc., a company related to one of the Non-Executive Directors. Please see the Remuneration Report in the Annual Report for further details on Director's Remuneration.
- b. Payments to related parties of the Company and their associates during the Quarter per Section 6.2 of the Appendix 5B total €55,000. This amount is an allocation of the Managing Director's remuneration for work done on exploration activities associated with the Vulcan Zero Carbon Lithium™ Project. Please see the Remuneration Report in the Annual Report for further details on Director's Remuneration.



## **Reporting calendar**

H1 FY22 Results 10 March 2022

March Quarterly Activities and Cashflow Reports 28 April 2022

June Quarterly Activities and Cashflow Reports 28 July 2022

FY22 Results 15 September 2022

September Quarterly Activities and Cashflow Reports 27 October 2022

## **Corporate Directory**

Managing Director Dr Francis Wedin

Chairman Gavin Rezos

Executive Director, Germany Dr Horst Kreuter

Non-Executive Director Ranya Alkadamani

Non-Executive Director Annie Liu

Non-Executive Director Dr Heidi Grön

Non-Executive Director Josephine Bush

Company Secretary Daniel Tydde



Vulcan is aiming to become the world's first lithium producer with net zero greenhouse gas emissions. Its ZERO CARBON LITHIUM™ Project intends to produce a battery-quality lithium hydroxide chemical product from its combined geothermal energy and lithium resource, which is Europe's largest lithium resource, in Germany. Vulcan's unique, ZERO CARBON LITHIUM™ Project aims to produce both renewable geothermal energy, and lithium hydroxide, from the same deep brine source. In doing so, Vulcan intends to address lithium's EU market requirements by reducing the high carbon and water footprint of production, and total reliance on imports. Vulcan aims to supply the lithium-ion battery and electric vehicle market in Europe, which is the fastest growing in the world. The Vulcan Zero Carbon Lithium™ Project has a resource which could satisfy Europe's needs for the electric vehicle transition, from a source with net zero greenhouse gas emissions, for many years to come.



#### For and on behalf of the Board

Daniel Tydde | Company Secretary

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## Competent Person Statement:

The information in this report that relates to Mineral Resources and Ore Reserves (respectively) of the Company's Zero Carbon Lithium™ is extracted from the ASX announcements made by Vulcan on 15 December 2020 ("Updated Ortenau Indicated and Inferred Resource") and 15 January 2021 ("Positive Pre-Feasibility Study"), which are available on www.v-er.eu. 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 announcements and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcements.



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## Appendix One: Vulcan Zero Carbon Lithium™ Project Granted Licenses

Name	State	Area (ha)	Area (km²)	Туре	Expiry date (MM/YYYY)	Ownership at End of Quarter	Change in Ownership
Insheim	Rheinland-Pfalz	1,900	19	Production license Acquired during the Quarter	11/2037	100%	100%
Ortenau	Baden- Württemberg	37,360	373.6	Exploration License	06/2023	100%	N/A
Mannheim	Baden- Württemberg	14,427	144.27	Exploration License	06/2024	100%	N/A
Lampertheim	Hessen	10,803	108.03	Exploration License	07/2024	100%	N/A
Taro/Lisbeth	Baden- Württemberg	3,268	32.68	Exploration License	08/2022	100%	N/A
Ludwig	Rheinland-Pfalz	9,641	96.41	Exploration License	12/2024	100% Acquired post-Quarter	100%
Therese	Rheinland-Pfalz	8,109	81.09	Exploration License	12/2024	100% Acquired post-Quarter	100%
Kerner	Rheinland-Pfalz	7,226	72.26	Exploration License	12/2024	100% Acquired post-Quarter	100%
Löwenherz	Rheinland-Pfalz	7,543	75.43	Exploration License	12/2024	100% Acquired post-Quarter	100%
Landau	Rheinland-Pfalz	19,4937	194.94	Production license	N/A	Brine offtake agree owner/oper	
Cesano	Italy	1150	11.5	Research Permit	01/2025	100% Acquired post-Quarter	100%