

Fast Facts

Issued Capital: 123,834,613
Market Cap (@\$10.47): \$1.3b

Vulcan to acquire electric drill rigs for Zero Carbon Lithium™ Project

*Enabling renewable energy (heat/power) and decarbonisation of
electric vehicle battery raw materials supply in Europe*

Highlights

- Vulcan Energy Resources Ltd. (Vulcan, the Company; ASX: VUL) has agreed to acquire two electric drill rigs as part of the Company's Zero Carbon Lithium™ Project.
- The specialised rigs can drill to the target depth required for deep geothermal energy wells in the Upper Rhine Valley, Germany. The deep geothermal rigs represent a scarce, strategic asset for Vulcan, as Europe navigates an energy crisis and the increasing need for renewable heating.
- The electric rigs will ensure drilling can be conducted with minimum greenhouse gas emissions, consistent with Vulcan's strict carbon neutral focus. The deep geothermal rigs give Vulcan the potential to generate renewable energy for local communities in Germany (heat and/or power, depending on location), at a critical time for decarbonisation in Europe.
- Funded with a portion of the proceeds from the Company's recent \$200 million Placement, the acquisition will assist with timely project development, targeting Phase 1 production in 2024.
- Vulcan has commenced assembling an experienced in-house drilling team, which will operate under the company name "VERCANA GmbH (Ltd.)". Headquartered in Karlsruhe, Germany, VERCANA and its operations will create approximately 30 regional jobs. Following refurbishment, the rigs will be operation-ready in late 2022.
- A general update on the renewable energy project developments within the Zero Carbon Lithium™ Project is provided.
- Vulcan has also been 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."*

Highlights

Globally unique **Zero Carbon Lithium™** Project.

Combined lithium chemicals & renewable energy project in the Upper Rhine Valley of Germany.

EU's **largest** lithium resource.

Located at the heart of the EU Li-ion battery industry.

Fast-track development towards supplying the EU's battery & electric vehicle industry.

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
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Vulcan Managing Director, Dr. Francis Wedin, said: *“The acquisition of the electric drill rigs will be an important step in advancing the Zero Carbon Lithium™ Project towards production. Funded with a portion of the proceeds from our recent \$200 million capital raising, which was strongly supported by existing and new institutional investors, the acquisitions will demonstrate our willingness and ability to capitalise on strategic opportunities to ensure timely project development.*

“Consistent with our strategy to evaluate the production and sale of heat as well as power from our planned geothermal projects, the deep geothermal rigs will give us the potential to generate renewable energy, as we continue discussions with multiple local stakeholders to provide renewable heating to communities and renewable power to the German grid.

“Together with our world-renowned geothermal sub-surface and above surface engineering teams, and chemical engineering and laboratory expertise, the drilling assets will consolidate Vulcan’s major strategic holding in the Upper Rhine Valley as part of our plan to establish the first integrated renewable energy and battery chemicals company, globally.”



Logo of VERCANA GmbH (Ltd.), Vulcan’s newly formed in-house geothermal drilling company.

Details of rigs to be acquired

Rig details:

- **Vulcan 10 (former ITAG Rig 23, to be purchased from Aftermarket Drilling Service IT-AG GmbH)**
 - Max hook load: (kN) 5.780
 - Typical drilling depth: (m) >5.000
 - Total height: (m) 57
 - Draw work system: (kW) 1.470
 - Mud pumps: (kW) 2 x 1.640
 - Pressure rating: (bar) 350
 - Acquisition terms agreed, subject to execution of final contract.

- **Vulcan 20 (former Rig T-160 from WintershallDEA)**
 - Max hook load: (kN) 5.900
 - Typical drilling depth: (m) >5.000
 - Total height: (m) 58
 - Draw work system: (kW) 1.840
 - Mud pumps: (kW) 3 x 1.640
 - Pressure rating: (bar) 517
 - Acquisition completed.

Zero Carbon Lithium™ Project geothermal developments update

- Vulcan's in-house geological engineering company, GeoT, is advancing studies towards the completion of Vulcan's Phase 1 Definitive Feasibility Study (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 complete, this work will be reviewed by independent consultants GLJ Ltd. The work is in line with industry best practice towards integrating 3D seismic data into geothermal well design, and is in line with Vulcan's stated target timeline, subject to relevant stakeholder permissions, to commence drilling in its Phase 1 areas towards the end of 2022, and to commence production in 2024. Vulcan notes that neighbouring geothermal developers in the region have recently been granted their drilling permits¹.
- Government support for geothermal technology and the expansion of renewable energy projects continues to grow in the three states in which Vulcan is operating in the Upper Rhine Valley. In an effort to accelerate the expansion of renewable energy technologies in the region, the state government of Baden-Württemberg has launched a task force² aimed at halving the planning and approval timeline for the commissioning of new projects.
- This follows state governments in the Upper Rhine Graben voicing their support for geothermal lithium project development in the region, including the Greens-CDU Coalition in Baden-Württemberg, who stated in their Coalition Contract: "We support sustainable approaches for the extraction of lithium in the Upper Rhine Graben."
- The coalition agreement also states "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 spirit³".
- Against this backdrop, Vulcan has successfully engaged with representatives from a range of political parties including CDU and the Greens, with recent visits to Vulcan's pilot and laboratory operations.
- Vulcan is also encouraged that Freiburg District President Bärbel Schäfer has last week stated⁴ that deep geothermal energy must be used in the Upper Rhine Valley, as "Global warming is so relevant we have to pull out all the stops very quickly".

¹ <https://www.thinkgeoenergy.com/exploration-permit-granted-for-graben-neudorf-project-germany/>

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

³ https://www.baden-wuerttemberg.de/fileadmin/redaktion/dateien/PDF/210506_Koalitionsvertrag_2021-2026.pdf

⁴ <https://www.bo.de/lokales/ortenau/barbel-schafer-wir-beherrschen-die-technik#>



Figure 1: Recent visits to Vulcan's pilot and laboratory operations by representatives of the CDU Party, and by Winfried Kretschmann (Green Party), Minister-President of Baden-Württemberg, where they discussed the Vulcan Zero Carbon Lithium™ Project.

- As per Vulcan's stated target timeline, the Company plans to commence drilling the Phase 2 projects in 2023. While Vulcan progresses its understanding of the sub-surface with its existing 2D seismic data and additional seismic data that the Company continues to acquire, 3D seismic surveys in the Phase 2 areas are intended to be carried out prior to planned drilling. This is in line with industry best practice.
- Vulcan has previously stated in local media interviews that there have been local municipalities who have opposed Vulcan's plans to conduct a 3D seismic survey in the Phase 2 region. As Vulcan has stated before, and consistent with virtually any sort of new renewable energy development including wind and solar, there may be opposition to some of Vulcan's planned projects. The Mining Authority is responsible for granting Vulcan's 3D seismic permit application and is in the process of reviewing Vulcan's application, which Vulcan understands there are no impediments to being granted. Vulcan has requested this application review be paused whilst it engages further with local stakeholders to ensure alignment. In the meantime, we are continuing to advance our studies and understanding of the sub-surface in our Phase 2 areas, with further analysis of the seismic data that we already have, and acquisition of additional existing seismic data which is available for purchase. We are therefore not currently anticipating any delays to our Phase 2 developments. The Phase 2 DFS will follow the Phase 1 DFS, the latter which is aiming to be completed by mid-2022 completion date, consistent with Vulcan's stated plans.

- Meanwhile, Vulcan is progressing and expanding its community outreach activities, to understand and resolve any concerns that local stakeholders have, and to communicate the local benefits of clean, renewable heat and power, as well as sustainable lithium production for the automotive industry in Germany. Vulcan is committed to ensuring all stakeholders are aligned.
- Stakeholder engagement and community/public relations are an important part of Vulcan's project development, and the Company announced the appointment of experienced executives to this role in September 2021⁵. As Vulcan intends to develop multiple projects in at least four license areas over the Upper Rhine Valley, with more areas likely to be added, there will be a lot of news surrounding stakeholder engagement in the coming months and years. Shareholders will be kept informed of material developments, such as any potential delays to target project timelines, if these arise.
- Vulcan is also working to integrate further production capacity and additional project areas from its existing four licenses and from new license areas into its Phase 1 and 2 plans, including the potential addition of further phases of production capacity build out. This follows strong demand from offtake customers for both lithium chemicals and renewable heating. Vulcan hopes to update its stakeholders on these additional developments in the near future, and is targeting substantial additions to its renewable energy and lithium project pipeline and target production capacity.
- At Vulcan, the health and safety of employees, their families and the community is the Company's highest priority. Vulcan notes increased rates of COVID-19 infection in Germany, consistent with a "fourth wave" of infections spreading throughout much of Europe. Vulcan has taken steps to ensure its staff are kept safe, including working from home where possible, staggered and reduced office/site attendance, and increased testing. These protocols are underpinned by strict hygiene and physical distancing measures. Currently, Vulcan does not currently see an impact to its target development timeline, and the pilot plant and laboratory works are still ongoing, however Vulcan's executive team is reviewing the situation closely. Vulcan is also monitoring supply chain disruption due to COVID-19 for materials for its demo plant construction, and will update the market if it believes any delays are likely. 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.

⁵ See Vulcan ASX announcement September 2021

Inclusion of Vulcan into PWC ASX “Mid-Tier 50” list

Vulcan has also been added to PwC’s ASX “Mid-Tier 50” (MT50) list.

In PwC’s report, it noted that:

“There has been a significant shift in the makeup of the MT50. For the first time ever, the rise in the value of critical minerals companies outshone gold’s performance (October 2021). While gold companies still dominate (comprising 36% of the MT50 by number and 33% by value), critical minerals companies have soared, and now represent nearly a third of the aggregate MT50 value (34% by number and 31% by value). Critical mineral companies recorded the most significant increases in market capitalisation in FY21 (largely thanks to lithium and nickel prices). While five of the seven new entrants to the MT50 this year are critical mineral projects.

Moreover, we expect high demand growth in critical minerals to continue for decades, presenting significant long-term value-creation opportunities. This includes opportunities to invest further along value chains, most notably in lithium chemicals.

There is clear evidence that environmental, social and governance (ESG) factors are starting to shape the strategies of the MT50. Our analysis also demonstrates that positive ESG strategies, including supporting the transition to a lower carbon global economy, aligns with long-term value creation.

There has been considerable interest in battery minerals projects during FY21, and plenty of exploration funding, too. Of the 11 non-operating companies in the MT50, six have advanced battery minerals projects. New entrants, Develop Global (previously Venturex) and Vulcan Energy, saw the largest increases to market capitalisation across the MT50, on the back of strong project results and additional funding.”

About Vulcan

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 can 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

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Competent Person Statement:

The information in this report that relates to Mineral Resources is extracted from the ASX announcement made by Vulcan on the 15 December 2020, which is available on www.v-er.eu. The information in this presentation that relates to the Pre-Feasibility Study for the Vulcan Lithium Project is extracted from the ASX announcement "Positive Pre-Feasibility Study", released on the 15th of January 2021 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.