Vulcan Energy Resources Ltd / Vulcan Energie Ressourcen GmbH

- Founded in Perth, Australia. Founder: Dr. Francis Wedin & Dr. Horst Kreuter
- Founded in Karlsruhe.

**2018**
- Listed on the Australian Stock Exchange (ASX)

**2019**
- The German GmbH was founded in Karlsruhe.

**2020**
- Building a technical team from 2 to more than 80 people. In 2022 about 200 people planned.

**2021**
- Formation of the drilling company VERCANA GmbH
- Listing on the Frankfurt Stock Exchange

**2022**
- Goal: CO₂-free lithium production for the battery industry in Europe
- Energy production: Heat, Cold, Power

- Cash in the bank: about 200 Mil. €
- Market cap: about 800 million €
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 > 140°C
2. High lithium grades
3. High brine flow rate potential
4. Chemical composition of the brine
5. Size of reservoir

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.
**Upper Rhine Valley: Lithium Concentration**

- **Temperature**: 120 - 200°C
- **Resource area**: > 5000 km²
- **Depth**: ca. 2,500 m – 5,000 m
- **Salinity**: ca. 120 g/l
- **Lithium concentration**: Ø 181 mg/l

Wells in the Upper Rhine Valley with lithium-concentrations >100 mg/l
Ours project: Wells are drilled into the deep, hot, lithium-rich brine resource, which is pumped to the surface. Renewable electricity is sold to the grid. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant. Renewable heat, electricity, and brine are transferred to the DLE plant. Lithium hydroxide is distributed to the EU market. Lithium chloride is transported to the central lithium plant.
Examples Vulcan: Environmental Footprint

Per tonne of lithium hydroxide produced

CARBON EMISSIONS (Scope 1,2,3)
- Hard rock mining: 60% of world lithium production
- Evaporation ponds: 40% of world lithium production

WATER CONSUMPTION

LAND USE

REAGENTS CONSUMPTION

WASTE GENERATION

Source: Minviro Life Cycle Analysis 2021 & Vulcan Energy’s Pre-Feasibility Study
First Lithiumhydroxid from the Vulcan pilot plant at one of the operating geothermal plants in the Upper Rhine Valley.

The produced lithium hydroxide goes beyond the quality requirements of the battery producers.

Production goals 2025:
- 40,000 t lithium hydroxide per year.
- Batteries for about 1 million electric vehicles per year.
November 2021: Vulcan purchases two rigs for deep drilling and founded VERCANA GmbH

- The drill rigs were successfully run by the well-known traditional companies Wintershall-Dea Deutschland GmbH and ITAG Tiefbohr GmbH.

- In the coming year both rigs will be refurbished, to be drilling for the next 10 years in the Upper Rhine Valley.

- Vulcan plans to start VERCANA with about 30 employees and the headquarter in Karlsruhe.
Thank You