VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Positive PFS & Maiden JORC Ore Reserve:

Zero Carbon Lithium® Project

€2.25 B post-tax NPV[1] (energy & lithium combined, Phase 1 & 2)

74 MW of renewable energy generation

Approx. 40ktpa LHM production

€2,640/t LHM OPEX – lower than any current operation globally

Zero Carbon Lithium® Footprint – globally unique differentiator

Highlights:

- The Zero Carbon Lithium® Project's[1] first Pre-Feasibility Study (PFS) demonstrates strong potential to develop a cutting edge, combined renewable energy and lithium hydroxide project, in the centre of Europe, with net zero carbon footprint.
- Positive post-tax NPV[2] of €2.25B (full project, no phasing); phased option shows €700m NPV in Phase 1 and €1.4B NPV in Phase 2.
- Combined renewable energy-lithium project (no phasing) pre-tax IRR of 26% and post-tax IRR of 21%. Lithium as separate entity from energy shows pre-tax IRR of 31% and post-tax IRR of 26%.
- Reasonable starting capital cost of €226m for geothermal wells and plant, and €474m for Direct Lithium Extraction (DLE) plants and Central Lithium Plant (CLP) (Phase 1, Taro). Phase 2 total CAPEX €1.14B, full project (no phasing) CAPEX €1.74B.
- Sensitivity analysis shows robust project economics. Geothermal energy part of project supported by favourable feed-in tariff and recent German parliament support for geothermal.
- Maiden Probable Ore Reserve of 1.12 Mt LCE at 181 mg/l Li across Ortenau and Taro licenses.
- Main focuses of 2021 to be Definitive Feasibility Study (DFS) work, permitting, lithium extraction test-work scale up and advancing current discussions with European lithium offtakers.

[1] Zero carbon footprint based on Minviro Life Cycle Analysis study
[2] 8% discount rate applied for lithium division & 6% for geothermal energy division

ASX Release
15 January 2020
ASX: VUL
FRA: 6KO

Highlights

Aiming to be the world's first **Zero Carbon Lithium®** producer.

Large, lithium-rich geothermal brine project, in the Upper Rhine Valley of Germany.

Europe's **largest** JORC-compliant lithium resource.

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

Fast-track development of project under way towards production.

Corporate Directory

Managing Director
Dr Francis Wedin

Chairman
Gavin Rezos

Executive Director
Dr Horst Kreuter

Non-Executive Director
Ranya Alkadamani

CFO-Company Secretary
Robert Ierace

Fast Facts
Issued Capital: 79,880,997
Market Cap (@4.99c): $399m

Contact
Level 11, Brookfield Place
125 St Georges Terrace
Perth WA 6000 Australia
08 6189 8767

Vulcan Energie
Resourcen GmbH
Baischstr. 8,
76133 Karlsruhe

www.v-er.com
info@v-er.eu
@VulcanEnergyRes

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Highlights – PFS Economics

Integrated Business

	Full project developed at the same time and integrated under one business.	Phase 1 developed first and is an integrated business	Phase 2 developed second and is an integrated business
	FULL PROJECT NO PHASING 2024 Start	PHASE 1 2024 Start	PHASE 2 2025 Start
	INTEGRATED BUSINESS	INTEGRATED BUSINESS	INTEGRATED BUSINESS
	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3	GB1 GB2 GC1 GC2 GC3
	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3
	CLP	CLP1 CLP2	CLP1 CLP2
	74MW & 40Ktpy LiOH	21MW & 15Ktpy LiOH	52MW & 25Ktpy LiOH
Revenues €M/y	652	232	420
Net Op. Cash Fl. €M/y	507	171	324
NPV Pre-tax €M	3,443	1,114	2,145
NPV Post-tax €M	2,250	703	1,403
IRR Pre-tax	26%	23%	27%
IRR Post-tax	21%	18%	22%
Payback (year)	5	5	6
CAPEX €M	1,738	700	1,138
CAPEX Geo	*665*	*226*	*436*
CAPEX DLE	*751*	*291*	*460*
CAPEX CLP	*322*	*182*	*240*
OPEX LiOH €/t	2,640	3,139	2,792

Separate Businesses

	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 first, separated in two different businesses: Energy and Lithium.	
	FULL PROJECT - NO PHASING 2024 Start		PHASE 1 2024 Start		PHASE 2 2025 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
	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3
	CLP	CLP1	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2
	40Ktpy LiOH	40Ktpy LiOH	21MW	15Ktpy LiOH	21MW	15Ktpy 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%
Payback (year)	6	4	4	4	7	5
CAPEX €M	665	1,073	226	474	438	700
CAPEX Geo			*226*		*438*	
CAPEX DLE		*751*		*291*		*460*
CAPEX CLP	0.066	*322*		*182*		*240*
OPEX €/KWh or LiOH€/t		2,681	0.078	3,201	0.061	2,855

Note: for more detailed disclosure on funding, please see Economic Analysis section from Pages 40-43.

Vulcan Managing Director, Dr. Francis Wedin, commented: *"We are very pleased to reach this major milestone for investors in Vulcan and the Zero Carbon Lithium® Project. The PFS has demonstrated robust economics for both the lithium and energy parts of the project, both independently and combined.*

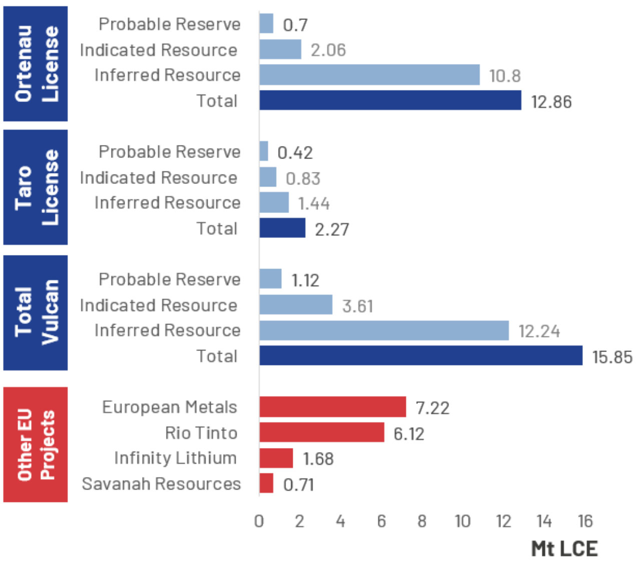
This means that there doesn't need to be a compromise on the ethical and environmental sourcing of battery raw materials, for Europe's current rapid transition to electric vehicles and renewable energy storage. We've shown the potential for zero carbon production of lithium hydroxide, with co-production of renewable geothermal energy, to be highly profitable as well as environmentally friendly. We see commerciality and strong environmental credentials as being critically interlinked, not mutually exclusive. This is why we designed our Zero Carbon Lithium® process and project from the ground up, and this has and will continue to be a key differentiator of our Company. 2021 should be a transformative year for Vulcan, as we commence our DFS, scale up our lithium extraction piloting and advance discussions with European offtakers for our Zero Carbon Lithium® product."

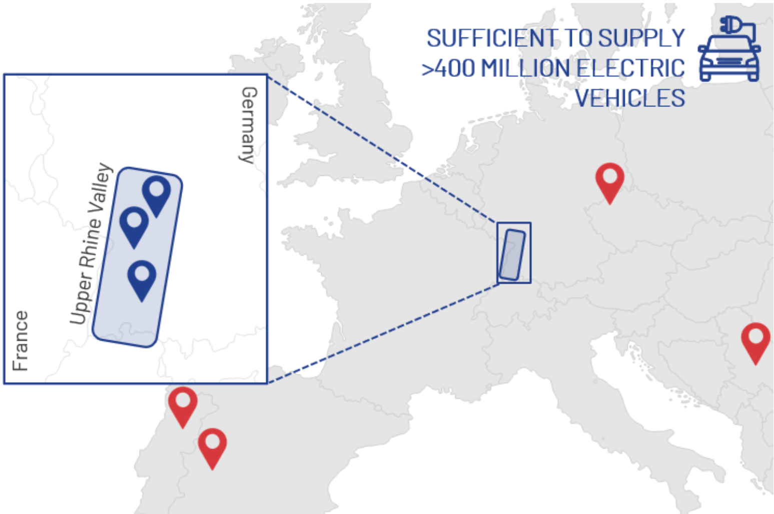
Vulcan is pleased to announce the successful completion of its PFS, which was conducted with world-leading experts in the fields of lithium extraction, chemistry, chemical engineering, geothermal plant engineering and geology. Hatch Ltd. led the lithium processing plant design, engineering and cost estimates. German geothermal experts gec-co and Geo-T lead the engineering studies and cost estimates for the geothermal plant and the sub-surface well design and production study respectively. GLJ Ltd. provided review and sign-off on the Maiden Probable JORC Ore Reserves. APEX Geoscience Ltd. conducted the resource modelling and estimation for the Upper Rhine Valley Project (URVP) Li-brine Indicated Resources used in the PFS as announced to market on November 12, 2020 (Taro Licence) and December 15, 2020 (Ortenau Licence). Laboratory test work was conducted at brine experts IBZ Salzchemie, among other providers. Optiro Ltd. carried out the financial modelling. The PFS was guided by Vulcan's team of in-house experts in DLE, lithium chemistry, chemical engineering and lithium markets.

Geology & hydrogeology, geothermal sub-surface	Mineral resources modelling & estimation	Production studies and Ore Reserve review	Engineering studies for geothermal plant	Laboratory test works & chemical engineering	Process plant design and cost estimates
GeoThermal Engineering	**APEX Geoscience**	**GLJ**	**Gec-Co Global Engineering**	**IBZ Salzchemie**	**Hatch**
GeoThermal ENGINEERING	APEX Geoscience Ltd.	GLJ	gec-co	IBZ - Salzchemie	HATCH
Germany	**Global**	**Global**	**Germany**	**Germany**	**Global**
Consultancy and engineering company for geothermal energy since 2005. Based in **Karlsruhe**, Germany. **From initial project concept to drilling.** **International network of expertise.** Drilling, Financing and Power Plant Operation **Activities across project development, exploration, consulting, and R&D.** www.geo-t.de	APEX provides professional geological consulting, exploration management and Technical Reporting to International clientele. Experienced team of geoscientists to manage and interpret data. www.apexgeoscience.com	GLJ is a premier energy consulting firm located in Calgary, Alberta, Canada supporting clients worldwide. GLJ has a dedicated team of geoscientists, engineers, and business analysts that provide independent reserves and resources evaluations, integrated studies and emerging energy, technology, sustainability and strategic business advisory services. www.gljpc.com	Focused on deep geothermal projects at surface: **power plant, heat stations, drill pads, and permitting.** ~ 25 employees. More than 20 years experience in geothermal. More than **300 years engineering knowledge of Gec-Co's team.** Involved in geothermal projects in high and low enthalpy brines worldwide. www.gec-co.de	Technologies for mineral processing, solution mining. Salt recovery and processing. Extraction of minor constituents from brines. Geotechnical technologies for soil stabilization and immobilization of pollutants. Development of backfill materials / backfill strategies. Realization of in-house testing as well as pilot plant testing in the customers facilities. ibz-freiberg.de	Global network of 9,000 employees over 150 countries. **Leading lithium project engineering company worldwide** Have worked with all the leading producers and many of the new entrants **Over 25 years of experience in lithium** and completed over 50 studies and projects www.hatch.com

Highlights - Project Overview

Project Mineral Resource and Probable Ore Reserves

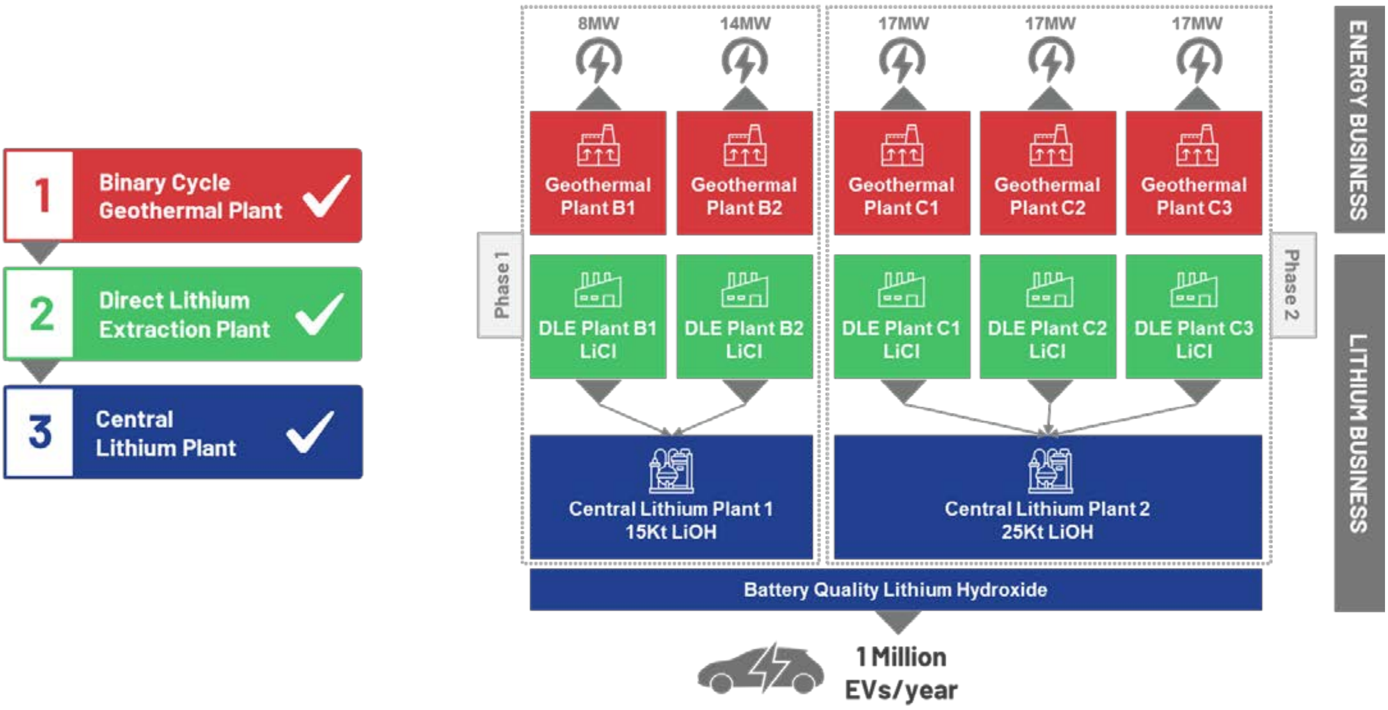




- Very large license package >1,000km²
- 3 exploration permits granted and several applications
- Largest lithium resource in Europe: 15.85Mt LCE

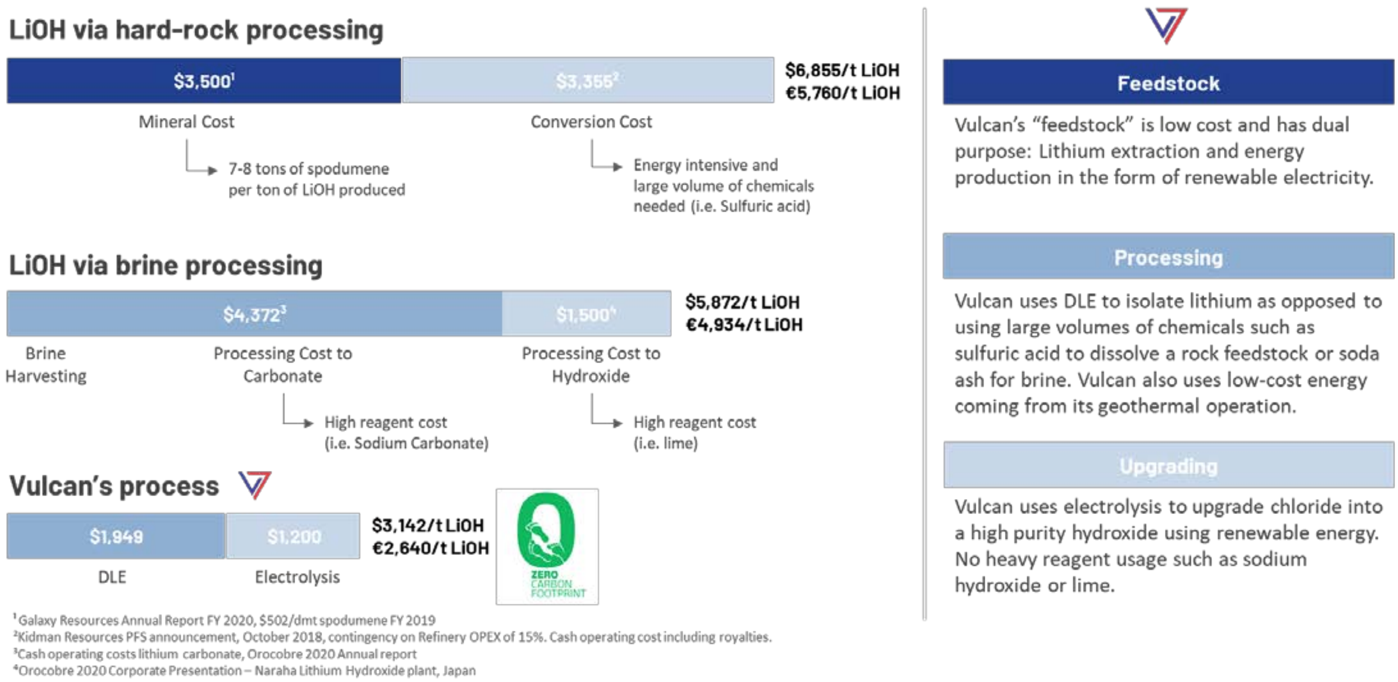
Notes: Vulcan's URVP Li-Brine resource and reserve area in Europe. Mineral resources are not mineral reserves and do not have demonstrated economic viability.
The preceding statements of Reserves conforms to the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) 2012 edition. 100% of the material in the PFS project schedule is included in the Probable Ore Reserves category. The Probable Ore Reserves were calculated assuming the production and processing methods determined for the PFS. Sources for other company data, which have all at the stage of having completed a Pre-Feasibility Study: ASX:EMH 10/2020 presentation, ASX:RIO: 12/2020 release, ASX: INF: 06/2020 presentation, AIM:SAV: 11/2020 presentation. Refer to Appendix 1

Energy Business: Electricity & Heat, Lithium Business: Zero Carbon Lithium®



Highlights – Operating Costs

South American Brine and Australian/Chinese Mineral Conversion Vs Vulcan's Process



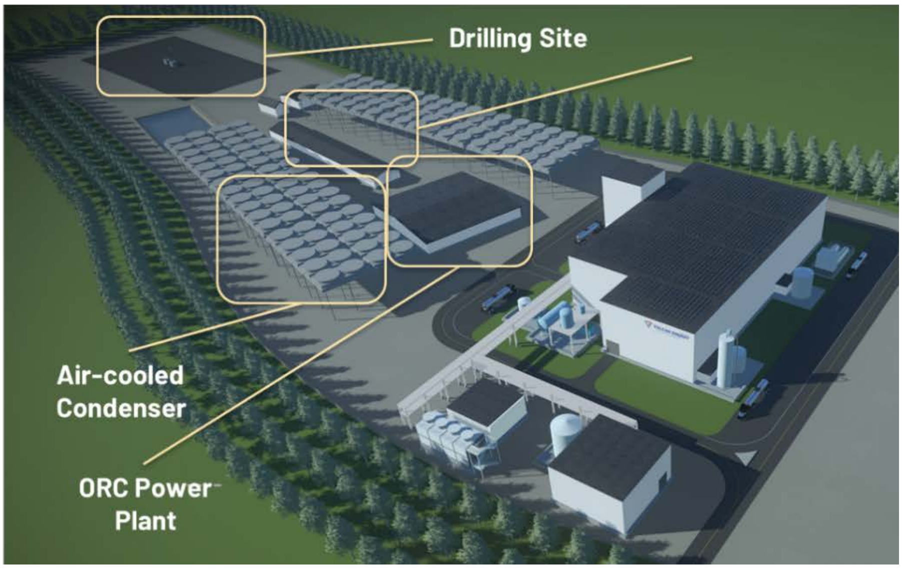
Vulcan notes that the comparison operating cost figures above are actual results from lithium hydroxide projects that are currently in production, whereas the above data for Vulcan's process is based on estimates in the PFS.

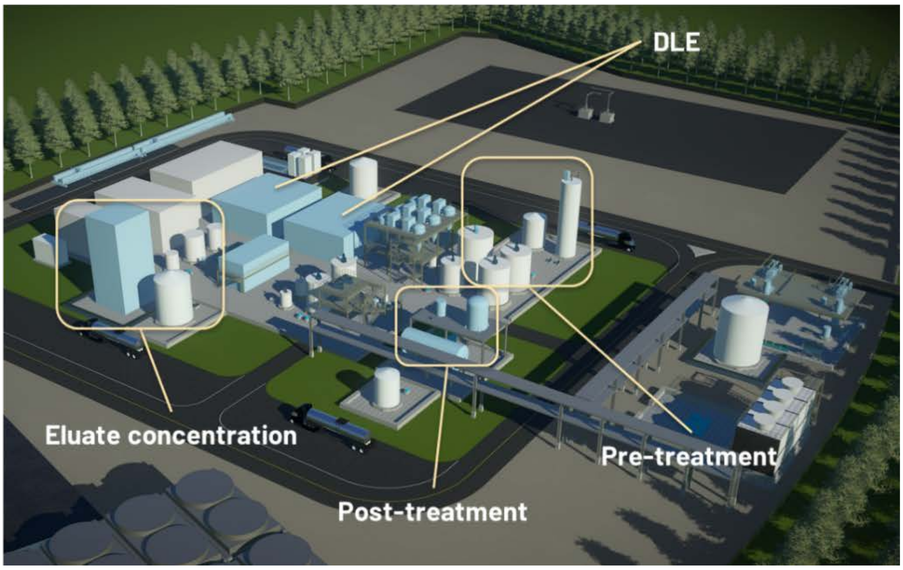
Vulcan's LHM products will potentially have the lowest carbon footprint in the world, as well as the lowest operating costs per tonne of LHM based on current global operations. This is a unique differentiator for the Vulcan project. Vulcan considers that it is appropriate to compare the estimates from the PFS to actual results from projects currently in production because:

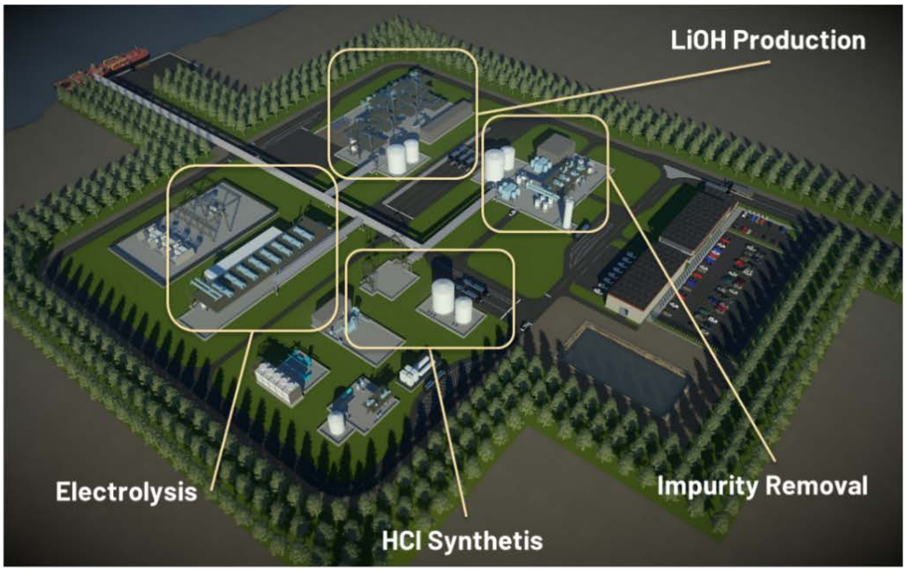
- *Vulcan's process is unique and a comparison to other processes for producing lithium hydroxide is important to enable investors to contextualise the PFS results; and*
- *actual data from projects currently in production is the best available guide to benchmark the PFS results.*

Highlights – Plant Design

Geothermal plant design by gec-co, DLE and lithium refining plant by Hatch.





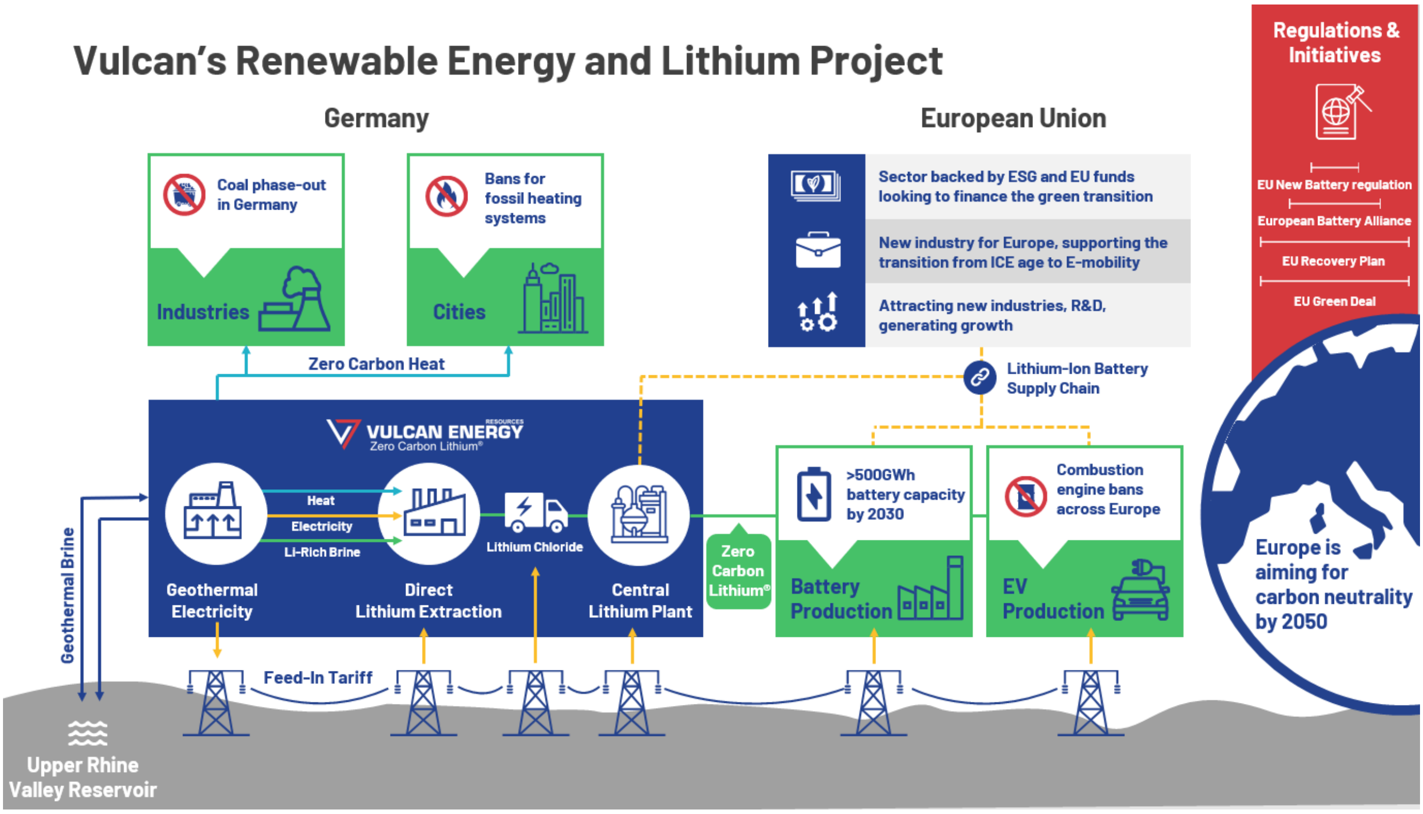


Recent activities by the Company that are pertinent to the PFS (https://v-er.com/investor-centre/):

- German Parliament support for geothermal energy feed-in tariff.
- Ortenau updated JORC Indicated Resource.
- Taro updated JORC Indicated Resource.
- European Commission Regulation on batteries & CO_2 footprint.
- Appointment of lithium, chemistry & automotive experts to the Executive Team.
- Excellent recoveries of over 90% from lithium extraction test work on Upper Rhine Valley brine.
- Securing EU backing support package into the Vulcan Zero Carbon Lithium® project.

About Vulcan

Vulcan Energy Resources is aiming to become the world's first Zero Carbon Lithium® producer, by producing a battery-quality lithium hydroxide chemical product with net zero carbon footprint from its combined geothermal and lithium resource, which is Europe's largest lithium resource, in the Upper Rhine Valley of Germany. Vulcan will use its unique Zero Carbon Lithium® process to produce both renewable geothermal energy, and lithium hydroxide, from the same deep brine source. In doing so, Vulcan will address lithium's EU market requirements by reducing the high carbon and water footprint of production, and total reliance on imports, mostly from China. Vulcan aims to supply the lithium-ion battery and electric vehicle market in Europe, which is the fastest growing in the world. Vulcan has a resource which can satisfy Europe's needs for the electric vehicle transition, from a zero-carbon source, for many years to come.



VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Property Location and Description

The Vulcan Lithium Project is comprised of multiple license areas within the Upper Rhine Valley area of southwest Germany (Upper Rhine Valley Project, URVP). It is strategically located at the heart of the European auto and lithium-ion battery manufacturing industry. Vulcan has acquired exploration rights through direct application to the state mining authorities or earn-in agreements. Vulcan holds two licenses, Mannheim and Ortenau, with 100% ownership. Vulcan has an earn-in agreement with a local company, Global Geothermal Holding UG (GGH), which holds one granted license (Taro)[3], and an MoU earn-in agreement with a geothermal operator (Geothermal MoU Area[4]). In addition, Vulcan has two in-application license areas, designated Ludwig and Heßbach (formerly Rheinaue), through its agreement with GGH. The Taro and Ortenau license areas were the subject of this PFS, shown in Figure 1. Vulcan currently holds a 51% interest in Taro, with the right to 80% interest by spending a further 500,000 Euro on the project. After Vulcan reaching 80%, GGH has the right to co-contribute to retain 20% ownership or dilute to a royalty using industry standard dilution formulas. Vulcan notes that based on this agreement at the present time its shareholders may not have 100% benefit from the project.

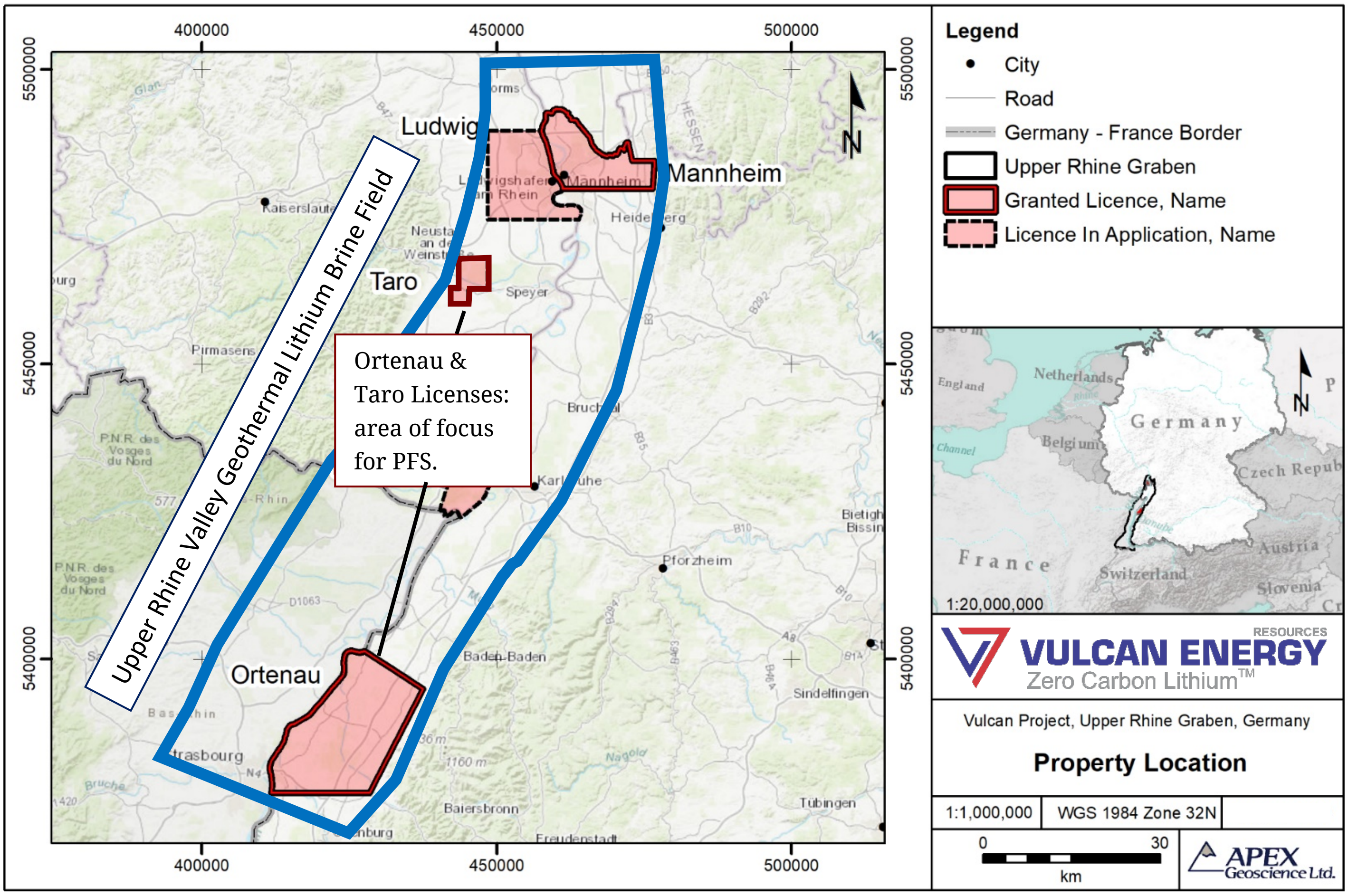


Figure 1: License areas, Vulcan Zero Carbon Lithium® Project

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[3] ASX announcement 10 July 2019
[4] ASX announcement 21 November 2019

Geology and Geological Interpretation

Vulcan's project is located within the Upper Rhine Graben (URG) of southwestern Germany, which is characterized as a roughly azimuth 020º orientated Cenozoic graben that is composed of Permian to Tertiary sedimentary rocks with minor Tertiary volcanism and Quaternary surficial deposits.

The focus of Vulcan's geothermal lithium brine project in the Upper Rhine Valley is on aquifers associated with the Permocarboniferous Rotliegend Group sandstone and the Lower Triassic Buntsandstein Group sandstone, collectively the 'Permo-Triassic strata'. The Permo-Triassic strata underly all Vulcan Property licenses and are characterized as a laterally heterogeneous sandstone unit within a structurally complex rift basin.

The Permocarboniferous Rotliegend Group formed during several URG rift phases with the lower Rotliegend comprised of fluvial-dominated Carboniferous and Permian sedimentary rocks. Subsequent compression of the Variscan Orogen was accompanied by volcanism and marks the end of the syn-rift phase and transition from fluvial-dominated to alluvial and eolian depositional environments.

The Lower Triassic Buntsandstein Group is subdivided into the Lower, Middle and Upper Buntsandstein subgroups as defined by distinct progradational (x2) and retrogradational fluvial sedimentary cycles. The Buntsandstein Group aquifer domain is defined as a confined sandstone aquifer that occurs between the fine grained Upper Buntsandstein Group (Rötton, Plattensandstein) and the fine-grained base of the Lower Buntsandstein.

The Buntsandstein Group aquifer (Ortenau) and Permo-Triassic strata (Taro and Geothermal MoU Area) are the focus of resource models used in this PFS.

Brine aquifers within the Rotliegend Group and Buntsandstein Group may have some degree of hydrogeological communication. This is particularly evident in zones with a high degree of faulting and fracturing in which fluid brine can flow throughout the Permo-Triassic strata and can also penetrate the underlying faulted, fractured and altered granitic basement. These fault/fracture zones can contain hot brine and high fluid flow rates, and therefore, represent prime target areas for geothermal exploration.

Historical and Vulcan-conducted geochemical analysis of the aquifer brine from the Permo-Triassic strata shows the brine has elevated levels of lithium. Because recent German Government policy emphasizes decarbonisation and promotes the development of renewable sources, Vulcan is focused on extracting lithium from the deep-seated aquifers as a co-product of geothermal power production within the Upper Rhine Graben. That is, the geothermal wells have created access points to acquire deep, geothermally heated, lithium-enriched brine associated with the Permo-Triassic aquifers sitting on top of the crystalline basement.

Exploration Summary 2019-2020 (APEX Geoscience Ltd.)

Vulcan conducted a 2019 data compilation and brine sampling program that consisted of: 1) a geological compilation and subsurface review of the Permo-Triassic stratigraphy; 2) an assessment of the hydrogeological conditions underlying the Vulcan Property; and 3) collecting and analysing Permo-Triassic brine samples from the geothermal wells and plant operating at the Geothermal MoU Area or Property-neighbouring geothermal wells to verify the historical Li-brine geochemical results.

The average lithium content from brine collected by Vulcan from 6 geothermal wells located throughout the Upper Rhine Graben and proximal to the Ortenau and Taro licences was 181 mg/L Li (n=13 total metal analyses by ICP-OES). In addition, a detailed assessment of Permo-Triassic aquifer brine at the Geothermal MoU Area production well yielded 181 mg/L Li (n=23 analyses), which is identical to the regional Li-brine value[5]. These brine geochemical results demonstrate that the Permo-Triassic brine in the Upper Rhine Graben has a homogeneous lithium chemical composition in the vicinity of the Taro and Ortenau licences.

During 2020, Vulcan acquired the use of existing 2-D and 3-D seismic datasets at the Ortenau and Taro Licences to formulate robust 3-D geological models of the key strata, and structural fault zones underlying the licences[6]. Historical well data from within and surrounding Vulcan's license areas was used to assist with, and validate, the seismic data interpretation. Vulcan also acquired detailed lithological and downhole geophysical information from a nearby geothermal well, which produces brine from the same geological target unit that underlies Vulcan's licenses (Buntsandstein Group). These data were used to model fault/fracture zones and perform hydrogeological characterization measurements and calculations to gain better knowledge and validate increased porosity, permeability, and fluid flow within URG Permo-Triassic hosted fault zones.

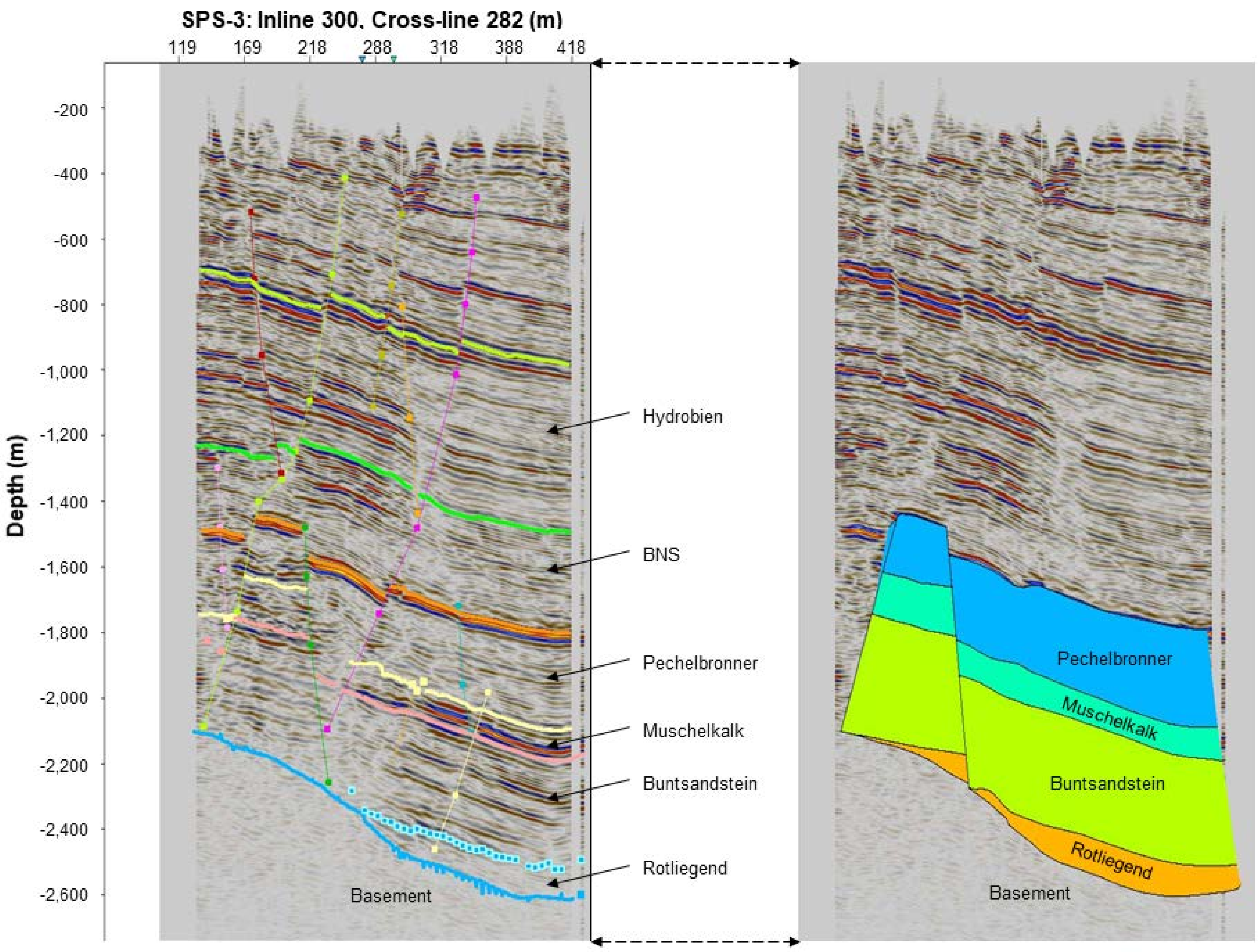


Figure 2:Example seismic profile with interpreted formation top horizons and faults.

[5] See ASX announcement 2 December 2019
[6] See ASX announcements 15 December 2020, 12 November 2020

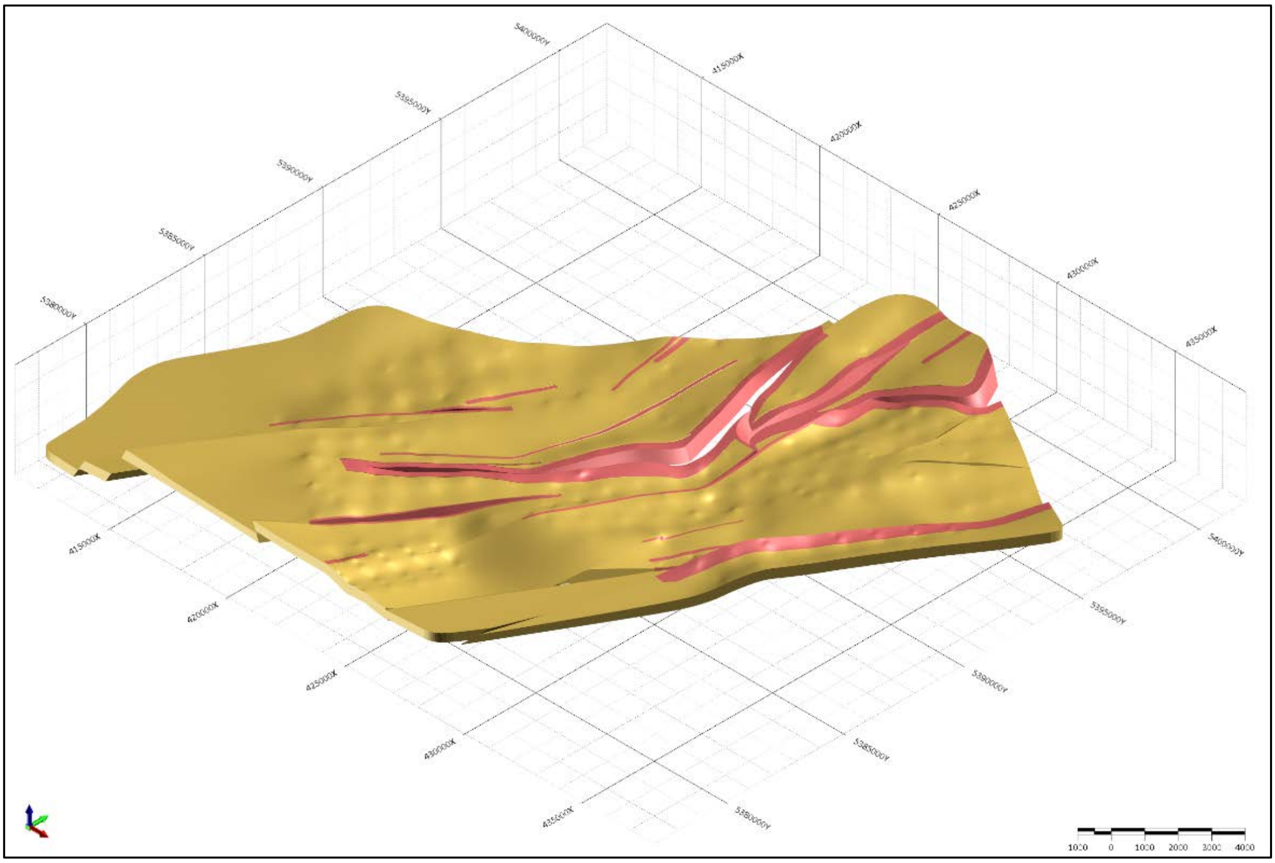
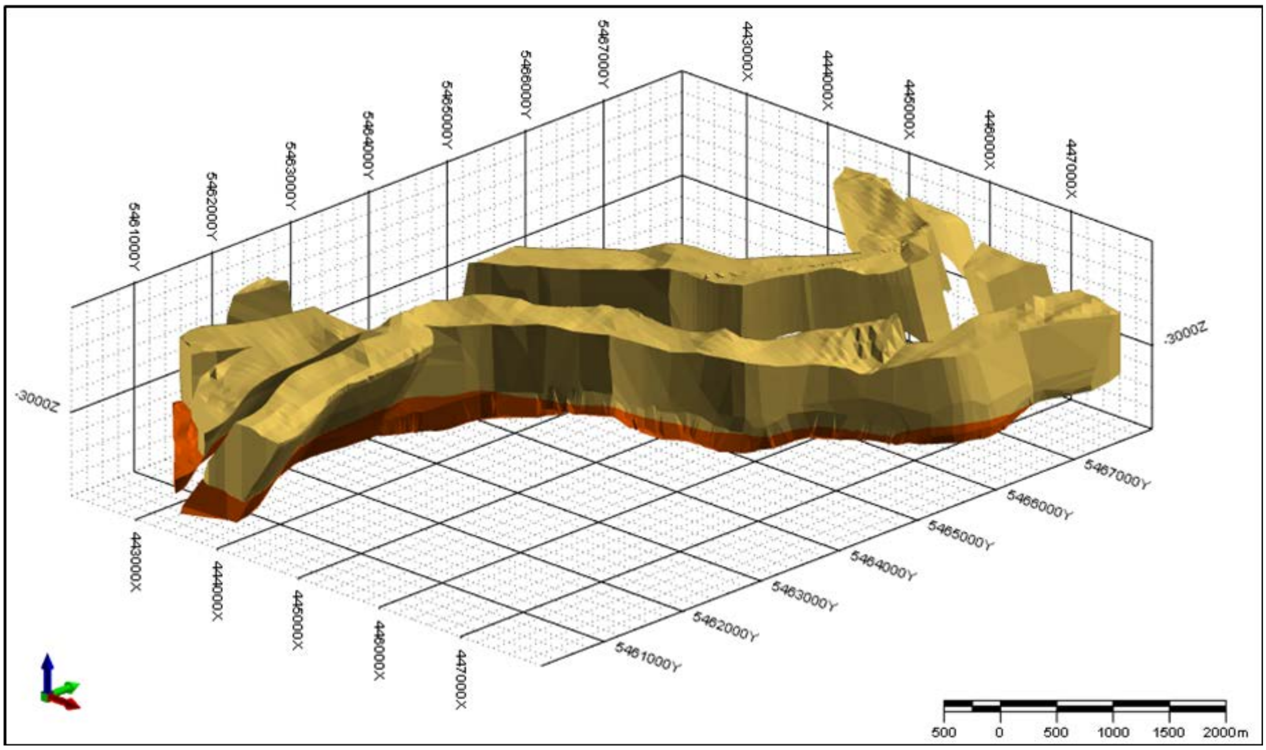


Figure 3: 3-D resource model of Ortenau resource, showing areas of Indicated category (pink; Buntsandstein Group fault zone domain) and Inferred category (gold; all remaining Buntsandstein Group outside of the fault zones).

Figure 4: 3-D image of the Taro Licence geological model wireframed for the Indicated Resource estimation: the Buntsandstein Group (gold) and Rotliegend (reddish-brown) fault zone envelope domains. The inferred resources outside of the fault zones are not shown.



Vulcan URVP Mineral Resource Estimate

Upper Rhine Valley Project Resource Estimations Summary (APEX Geoscience Ltd.)

The URVP hosts a JORC 2012-compliant global resource[7] of 15.85 Mt LCE at a grade of 181 mg/l Li in the Indicated and Inferred categories as shown in the table below. The PFS was focused solely on Indicated Resources, from the Ortenau and Taro licenses. The Ortenau Indicated Resource estimation occurs within the Buntsandstein Group aquifer fault zones. The Taro Indicated Resource estimations occur within fault zones and fault zone envelopes within the Buntsandstein and Rotliegend groups. Additional resource modelling and estimation detail was included in ASX announcements dated November 12, 2020 (Taro Licence) and December 15, 2020 (Ortenau Licence).

Table 1: Vulcan's combined Upper Rhine Valley Project Li-brine Indicated and Inferred mineral resource estimates. Only the Indicated Resource estimations were used in this PFS.

URVP Resources	**Aquifer Volume (km³)**	**Brine Volume (km³)**	**Avg. Li Conc. (mg/l Li)**	**Avg. Porosity (%)**	**Contained Elemental Li Resource Tonnes**	**Contained LCE Million Tonnes**
Ortenau Inferred Resource estimation	117.974	11.208	181	9.50	2,029,000	10.80
Ortenau Indicated Resource estimation	17.001	2.142	181	12.60	388,000	2.06
Taro Inferred Resource estimation	15.924	1.497	181	9.5 (Bunt) 9.0 (Rot)	271,000	1.44
Taro Indicated Resource estimation	8.419	0.861	181	12.6 (BFZ) 9.5 (BHRE) 12.1(RFZ) 9.0 (RHRE)	156,000	0.83
Geothermal MoU area Indicated Resource estimation	8.322	0.749	181	9.00 (P-T)	136,000	0.72
Total URVP Indicated Resources used in PFS	25.42	3.003	181	/	544,000	2.89
Total URVP Indicated and Inferred Resource	**167.64**	**16.457**	**181**	**/**	**2,980,000**	**15.85**

Note 1: Mineral resources are not mineral reserves and do not have demonstrated economic viability. Note 2: The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs). Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 1,000 unit). Note 3: The total volume and weights are estimated at the average porosities cited in the table. Taro resource abbreviations: Bunt – Buntsandstein Group; Rot – Rotliegend Group; P-T – Permo-Triassic; BFZ – Buntsandstein fault zone; BHRE - Buntsandstein host rock envelope; RFZ – Rotliegend fault zone; RHRE – Rotliegend host rock envelope. Note 4: The Vulcan Li-brine Project estimation was completed and reported using a lower cutoff of 100 mg/L Li. Note 5: In order to describe the resource in terms of industry standard, a conversion factor of 5.323 is used to convert elemental Li to Li_2CO_3, or Lithium Carbonate Equivalent (LCE). 6: The Mineral Resources that underpin the PFS results are reported inclusive of any reserves. 7: There has been no change to this Mineral Resource statement since publication.

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[7] See ASX announcement 15 December 2020

Lithium Plant & Processing[8]

Vulcan is developing a combined geothermal energy and lithium brine project from multiple locations in the Upper Rhine Valley, Germany. The project includes, at each brine extraction site, a Geothermal Power Plant for the production of renewable-sourced electricity. Co-located on the same sites are Direct Lithium Extraction (DLE) Plants for the extraction of lithium. The lithium chloride solution from the DLE Plants is then sent to a Central Lithium Plant (CLP) where the solution is purified and converted to produce battery grade lithium hydroxide monohydrate (LHM).

Multiple DLE and Conversion Plant capacity scenarios have been investigated as part of the PFS conducted by Hatch, which defined the process and layout as well as evaluated the capital cost, operating cost, schedule, and risk and opportunities. The design was based on inputs from Vulcan and their Geothermal Plant engineering firm gec-Co, testwork by vendors and Vulcan, as well as experience of Vulcan, vendors, and Hatch.

Process Description

The core of the process is a sorbent based, direct lithium extraction (DLE) system.
The principal steps in the process include:

- Drilling of geothermal production wells and extraction of deep-seated aquifer brine;
- Within the Geothermal Plant:
  - Conversion of the heat in the brine to electrical power;
- Within the DLE Plant:
  - Pre-treatment of the brine;
  - Purification of the brine;
  - Extraction of the lithium via a sorbent;
  - Concentration of the lithium chloride (LiCl) product using renewable heat from the geothermal plant and shipment to the central Conversion Plant;
  - Post-treatment of the depleted brine;
- Reinjection of the depleted brine and any evolved gases (via the Geothermal Plant);
- Within the Conversion Plant:
  - Purification of the LiCl solution (sourced from multiple DLE Plants);
  - Electrolytic conversion of the LiCl solution to lithium hydroxide (LiOH) solution, chlorine, and hydrogen gas;
  - Production of HCl solution from hydrogen and chlorine gas;
  - Crystallization and purification of lithium hydroxide monohydrate (LHM) from the LiOH solution;
  - Bleed treatment systems for elimination of impurities and recovery of lithium values;
  - Bagging and shipping.

Preliminary testwork has been performed of brine treatment and of direct extraction with a variety of sorbents[9]. To perform more extensive and longer-term testing, Vulcan will be conducting pilot testing at an existing geothermal well facility to support the subsequent engineering and design phases. Vulcan also has the option to

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[8] Hatch study includes DLE Plant and CLP plant. Brine extraction and reinjection wells, and geothermal plant by Geo-T/GLJ and gec-co respectively

[9] See ASX announcement 3 August 2020

produce LHM using the "traditional route" of a lithium carbonate step first, and will be examining this in more detail in the DFS.

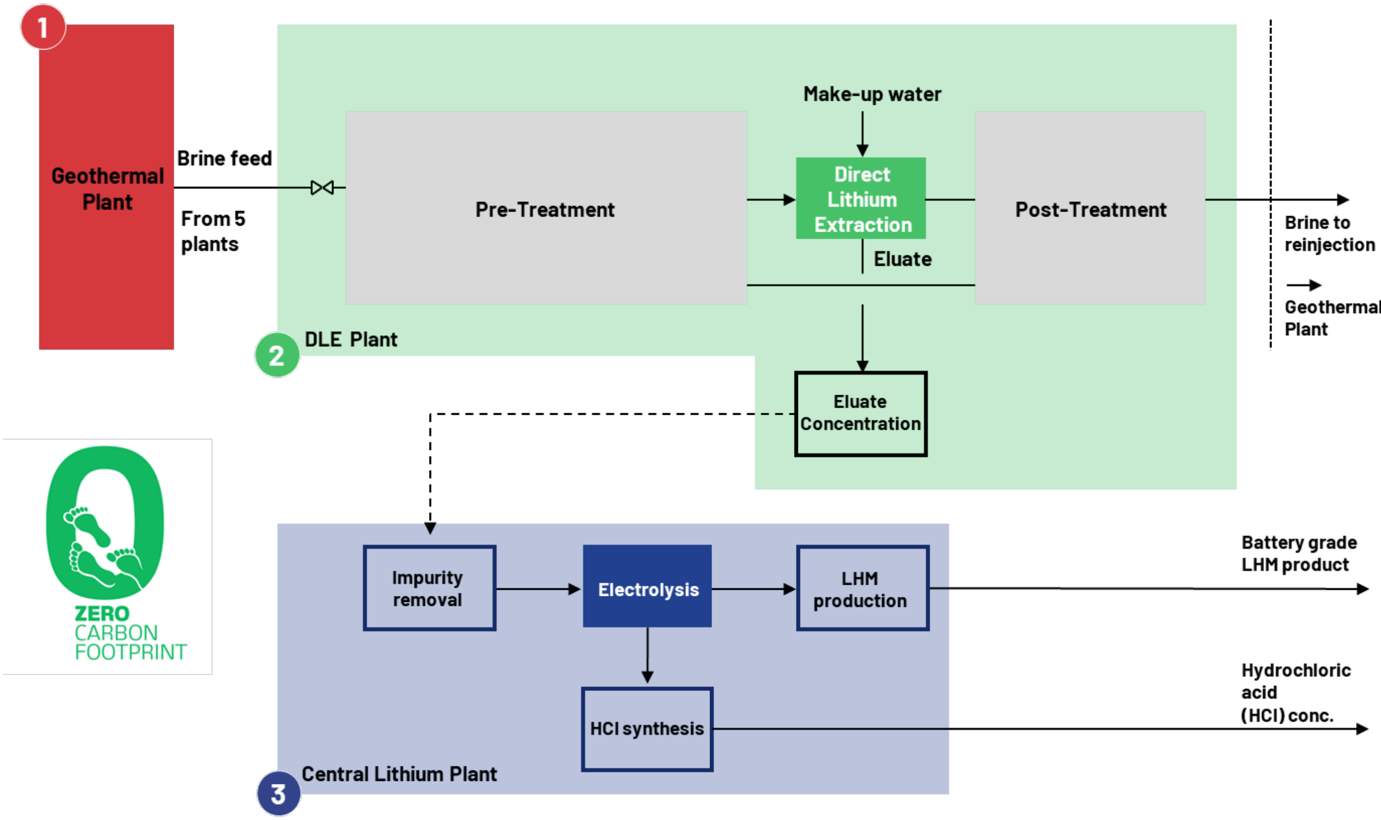


Figure 5: High-level schematic of Vulcan's Zero Carbon Lithium® process, showing (1) Geothermal Plant, (2) DLE Plant, (3) Central Lithium Plant.

Project Design Basis

The key components of the project design basis are summarized in the following tables. The capacity of the 5 DLE plants are given below.

Table 2: Brine Flow per DLE Plant. Note that brine flow rates are assumed based on Vulcan's consultants' interpretation of the structural geology from seismic interpretation of the fault zones in the production study and knowledge of surrounding well performance, and will need to be confirmed once production wells are drilled.

Site	Flow	Units	Comment
Ortenau Geothermal Plant #1 (wells P1-P3)	300	L/s	3 wells, each 100 L/s
Ortenau Geothermal Plant #2 (wells P4-P6)	300	L/s	3 wells, each 100 L/s
Ortenau Geothermal Plant #3 (wells P7-P9)	300	L/s	3 wells, each 100 L/s
Taro Geothermal Plant #1 (wells P1-P3)	300	L/s	3 wells, each 100 L/s
Taro Geothermal Plant #2 (wells P4-P6)	240	L/s	2 wells, each 120 L/s
Total brine production	**1440**	**L/s**	

The brine properties and elemental composition used in the study is found below:

Table 3: Brine Properties and Elemental Composition

Parameter	Value	Unit
Temperature	65	°C
Pressure	22	Bar
Solids	0	%
pH	5.2	-
ORP	100	mV
Density	1.1	kg/L
Composition		
Li	**181**	**mg/L**

Table below outlines the design considerations in terms of plant capacity:

Table 4: PFS Design Capacity

Parameter	Value	Units
Project life	30	years
Design factor, DLE Plant	1.10	-
Design factor, Conversion Plant	1.15	-
Plant availability - DLE Plant	90	%
Plant availability - Conversion Plant	90	%
DLE Lithium Recovery	90	%
Overall Plant Lithium Recovery	88.2	%
Estimated Plant Production	**39,400**	**tpa LHM**

The following additional points were considered as basis for plant design:

- Chemical and compositional changes of the depleted brine, including the dilution of the brine with water, were minimized;
- Minimize the ingress of oxygen in the brine to avoid impacting injection well materials of construction and/or precipitation within the geothermal brine reservoir;
- Minimize the CO_2 emissions, avoid the use of natural gas or other fossil fuels;
- Minimize the generation of residues.

The key mass balance drivers are:

- The brine feed rate and composition in terms of lithium and impurities;
- The recovery, selectivity, and operating parameters of the DLE package;
- The operating parameters and performance of the electrolysis package.

Changes to these values will impact project design and economics.

Figure 6: DLE Plant 3-D Rendering

Figure 7: Conversion Plant 3-D Rendering

Project Economics

Capital costs, operating costs and schedules were developed for a base case. Various other plant capacities were investigated and are scaled from the base case. A summary of the results is provided below. These estimates do not include the geothermal plants (including the wells), infrastructure located beyond the site boundary, nor owners' costs.

Table 5: Overall Summary of Scenarios

Scenario	# of DLE Plants	Total Brine Feed (L/s)	Production (tpa LHM)	CAPEX (M €)	CAPEX (€/ t LHM)	OPEX (M €/ a)	OPEX (€/ t LHM)	Schedule (months to end of construction)
Phase 1 (Taro License)	1 x 240 L/s 1 x 300 L/s	540	**14,800**	**474**	31,994	**46**	3,127	**45**
Phase 2 (Ortenau License)	3 x 300 L/s	900	**24,600**	**700**	28,447	**69**	2,785	**48**
Combined Phases Option (Taro and Ortenau Licenses)	1 x 240 L/s 4 x 300 L/s	1,440	**39,400**	**1,073**	27,238	**104**	2,640	**50**

Compared to other lithium extraction and conversion projects:

- The capital cost is somewhat higher compared to an extraction (mine & concentrator, or evaporation ponds in a salar) plus refinery project;
- The operating cost are comparable to the lowest found globally, due to the cheap raw material (brine) and limited reagent consumption; A similarly sized spodumene based project would add 150-250 M USD/a of operating cost depending on the source and the grade of the spodumene, and the negotiated price. Compared to a Lithium Salar project, the operating cost does not include large quantities of reagents but does have substantially higher power costs. The location is generally unfavourable for Salar projects (high elevation, remote) which also adds operating cost;
- The schedule aligns with the project duration for large project benchmarks, with testwork, engineering, procurement and permitting being on the critical path;
- The environmental footprint is excellent due to limited chemical consumption, no fossil fuel consumption, and almost no residues;
- The project opens up new, long term and sustainable, lithium resources, located in Europe.

The following items could significantly impact the operating costs if they change:

- Brine quantity or composition
- Extent of brine treatment required prior to the DLE
- DLE Li recovery, selectivity and/or operating parameters
- The price, amount and/or useful life of the sorbent

- The price of power
- The price of water

Production Study & Reserves

In accordance with Listing Rule 5.9.1, the following information is supplied

Material assumptions and the outcomes from the preliminary feasibility study	• The material assumptions and the outcomes from the preliminary feasibility study are included in the body of this release, with key assumptions outlined below. • Site selection – Both DLE and Conversion Plant sites remain to be finalised. Several potential sites have been identified, which have been used in this study. The PFS assumes a flat greenfield site with services at the site boundary and no piling or blasting required. • DLE - testwork at a vendor was used to determine expected lithium chloride concentrations, while the vendors' benchmarks were used to determine likely operating parameters, recoveries, and sorbent life. • Water consumption and supply – The DLE water consumption is based on vendor benchmarks • The Ortenau and Taro resource estimation processes assume average matrix and fracture porosities and geochemical values from wells collared outside the licenses. • The financial model has been generated in euro (€) terms with the majority of key inputs (operating and capital cost and power, acid and steam prices) also provided in € terms. The main exception to this is the lithium hydroxide (LiOH) price which was provided in US$ terms. € terms were maintained through the financial model with conversion to the euro undertaken for the LiOH price. • The financial model incorporates the ability to apply exchange rates (EUR:US$) on either a flat or spot basis over the life of the model or to apply a forecast exchange rate profile. Although model outputs are reported in € terms, the financial model is currently set to convert US$ to € using exchange rate forecasts provided Vulcan. Mining industry practitioners typically undertake financial modelling using real NPV terms, projecting constant costs and metal prices in real

	terms. The resultant cash flows are then discounted by a real risk-adjusted discount rate. This study has conformed with this practice. • A discount rate of 6% has been applied to the cashflow in line for the geothermal business, comparable with discount rates used by others in the geothermal industry as advised by Vulcan's geothermal consultants gec-co. A discount rate of 8% has been applied to the cashflow in line for the lithium businesses, comparable with discount rates used by others in the lithium industry and as directed by Vulcan. Lithium hydroxide (LiOH) prices are based on forecasts by Canaccord for battery grade lithium hydroxide (min 57.5% LiOH) provided by Vulcan. • CAPEX and OPEX costs for lithium processing were provided by Hatch Ltd., and for the geothermal plant operation by gec-co GmbH, to a PFS level of accuracy, in this case 30%. • Brine production flow rates are based on assumptions from a detailed study of seismic data, structural interpretation and neigbouring production wells, and will need to be confirmed wen production wells are drilled.
Criteria used for classification, including the classification of the mineral resources on which the ore reserves are based and the confidence in the modifying factors applied	• The classification of the Mineral Resources on which the Ore Reserves are based is 100% in the Indicated Category for both the Ortenau and Taro projects. Inferred Resources were not used in the Production Study. • Only Probable Ore Reserves are declared for the Ortenau and Taro licenses. No Measured Resource is present in the current Mineral Resource model. Indicated Mineral Resource material was converted to Probable Ore Reserves where that material was within the final reservoir design and was scheduled for processing after application of the Modifying Factors. The Probable Ore Reserves have been classified as Probable by conversion of Indicated Resource material above the 100 mg/l Li cut-off grade within the final reservoir model. The key to the accuracy of the Probable Ore Reserve is

	the underpinning Indicated Mineral Resource that is considered to be of sufficient confidence to allow production planning studies to be completed. For more detail, please see JORC Table 1, Section 3 in the Appendix of this release.
The mining method selected and other processing assumptions, including the recovery factors applied and the allowances made for deleterious elements	• The production method selected involves the drilling of deep geothermal wells between 2 and 5km deep depending on location, and pumping of hot, mineralised brine to the surface, as is standard practice in the Upper Rhine Valley geothermal brine field. • No Inferred Resources were included in the production study, which is based on 100% Indicated Resources. 90% recovery rates are assumed from lithium recovery from the lithium processing plant, in line with the Hatch study. Assumed recovery rates of the brine from the target reservoir are in the range of 30-65% depending on location, with no recharge effect assumed. The Hatch processing study has made allowances for the removals of any elements which may have a deleterious effect on lithium processing. For more detail please see the body of this release.
The basis of the cut-off grade or quality parameters applied	• A lower cutoff of 100 mg/L Li is used in this Li-brine resource estimation. It is the opinion of the Resources Competent Person that this cutoff is acceptable because: 1) confined aquifer deposits traditionally have lower concentrations of lithium (in comparison to unconfined lithium-brine salar and hard rock lithium deposits), and 2) numerous commercial projects are developing direct lithium extraction methods using low lithium concentration source brine. For more detail, please see JORC Table 1, Section 3 in the Appendix of this release.
Estimation methodology	• The workflow implemented for the calculation of the Vulcan lithium-brine resource estimations was completed using: the commercial mine planning software MicroMine (v. 20.5). • The resource is calculated using a volumetric approach. Critical steps in the determination of the Taro and Ortenau lithium-brine resources include:

	o Definition of the geology, geometry and volume of the subsurface Buntsandstein Group domain aquifers underlying the Ortenau Licence. o Definition of the geology, geometry and volume of the subsurface Buntsandstein Group and Rotliegend Group domain aquifers underlying the Taro Licence. o Hydrogeological characterization and an historical compilation and assessment of mean porosity within the URG Permo-Triassic strata. o Determination of the concentration of lithium in the Permo-Triassic brine aquifers based on Vulcan's brine sampling programs. o Demonstration of reasonable prospects of eventual economic extraction are justified. o Estimate the in-situ lithium resources of Buntsandstein Group brine underlying the Ortenau Licence using the equation: Lithium Resource = Total Volume of the Brine-Bearing Aquifer X Average Effective Porosity X Average Concentration of Lithium in the Brine. For more detail on estimation methodology, please see JORC Table 1, Section 3 in the Appendix of this release.
Material modifying factors, including the status of environmental approvals, mining tenements and approvals, other governmental factors and infrastructure requirements for selected mining methods and for transportation to market.	• Both licenses used in this study are in good standing. Both are exploration licenses and Vulcan will need to apply for production drilling permits and, afterward, operational permits in order to operate the project. • The project has excellent infrastructure and connectivity to potential customers, both for lithium chemicals production and energy generation. • Certain zones within the license areas have environmental and social considerations, which have been taken into account as Modifying Factors in the Production Study underpinning the Probable Reserves. Areas where, because of environmental or social designation, project permitting is likely to be more complex, have been omitted as potential production areas.

The Production Study and Maiden Probable Ore Reserve Estimate over the URVP was conducted by Geothermal Engineering GmbH (Geo-T) and reviewed and signed off by GLJ Ltd. This production study introduced additional parameters to identify and define the extractable volumes of lithium resources and to discuss the feasibility of lithium and geothermal energy production. Temperature assessments indicate that the Buntsandstein (both licenses) and Rotliegend (Taro only) intervals of the Taro and Ortenau license areas are viable targets for geothermal energy production. Brine lithium concentration estimates are based on wells and geothermal energy installations in the vicinity along the Upper Rhine Valley. A value of 181 mg/l Li was used for the calculation of the potential of lithium recovery from geothermal fluids, based on the Vulcan's Mineral Resource estimates[10]. Estimates for lithium production from geothermal wells were conducted with appropriate modifying factors.

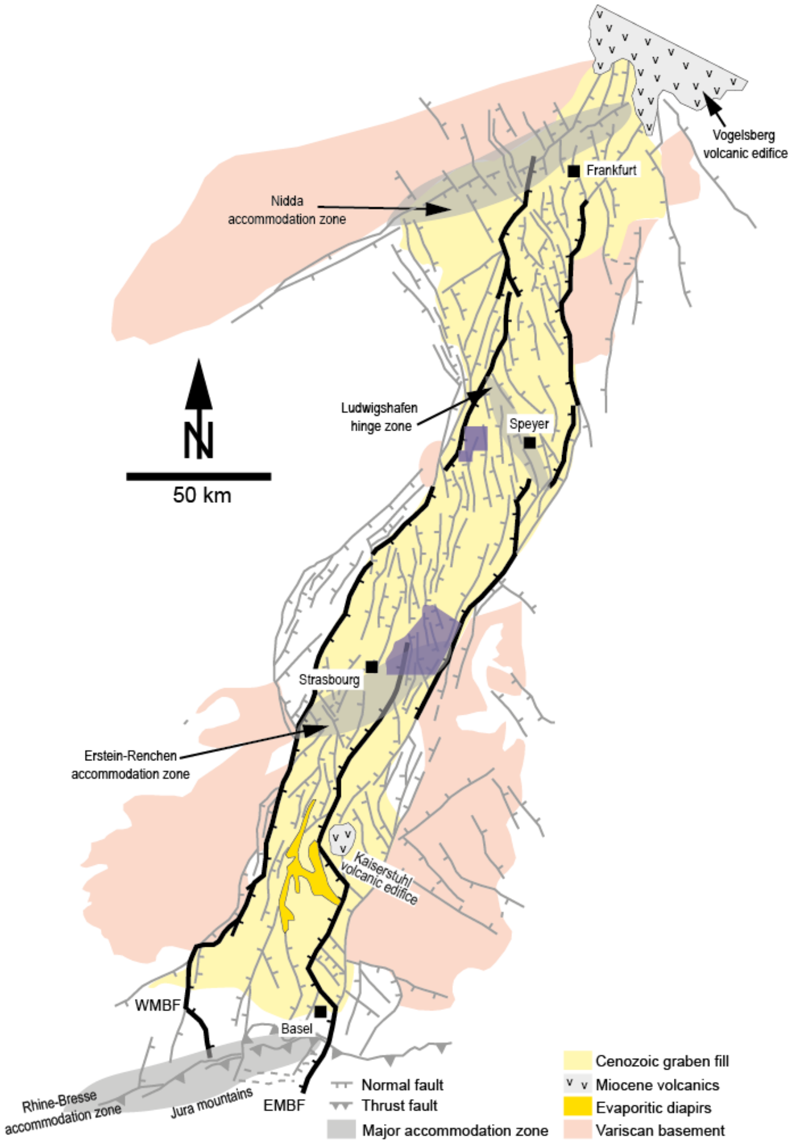


Figure 8: Location of the Taro and Ortenau license areas (purple; Taro is the northern area) within the regional geology of the URG showing major URG units (modified from Grimmer et al., 2017).

At Taro, the average geothermal gradient is estimated at 6 K/100 m. For a hydraulic active fault zone with upward heat convection, the gradient is assumed to decrease to values less than 3 K/100 m. Surface and subsurface

[10] See ASX announcement 15 December 2020

information were merged to identify ideal locations for drill sites. For the assessment of possible surface locations modifying factors, including distance to residential areas, presence of conservation areas and present land use and infrastructure were applied. Principal subsurface information is based on the interpretation of Vulcan's purchased 2D and 3D seismic surveys, resulting in a detailed structural subsurface model. This displays the extent, orientation and volume of the fault zone within the Buntsandstein unit as the primary Li-brine reservoir.

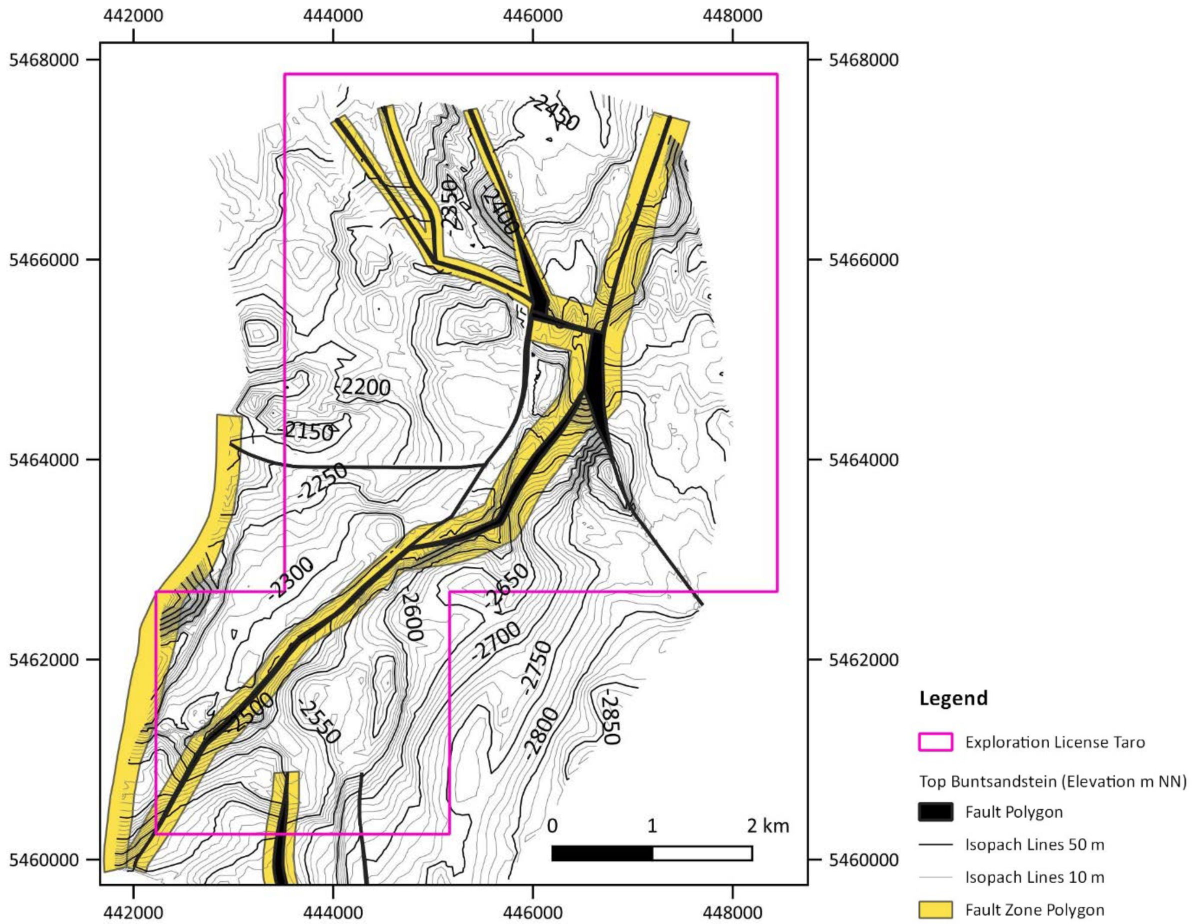


Figure 9: Taro license area, showing structural map of the top Buntsandstein unit with major fault polygons and fault zone polygons based on 3D-seismic data.

Applying different well path design criteria, target points within the fractured reservoir layer were selected. Finally, well paths for five doublets (producer-injector pairs) were designed. These should be drilled from two drill sites, Taro A in the northern part with three doublets and Taro B in the southeast with two doublets. The sizing of the sites is suitable to host the DLE plant to minimize environmental impact and optimize the use of area. The wells have been designed to target potential high flow rate fault zones, using the detailed 3D seismic data, within the Buntsandstein and Rotliegend units, with double-completion of the wells within the fault zones to maximise potential flow rate, based on Geo-T's interpretation of the fault zones and understanding from surrounding wells including the Geothermal MoU Area.

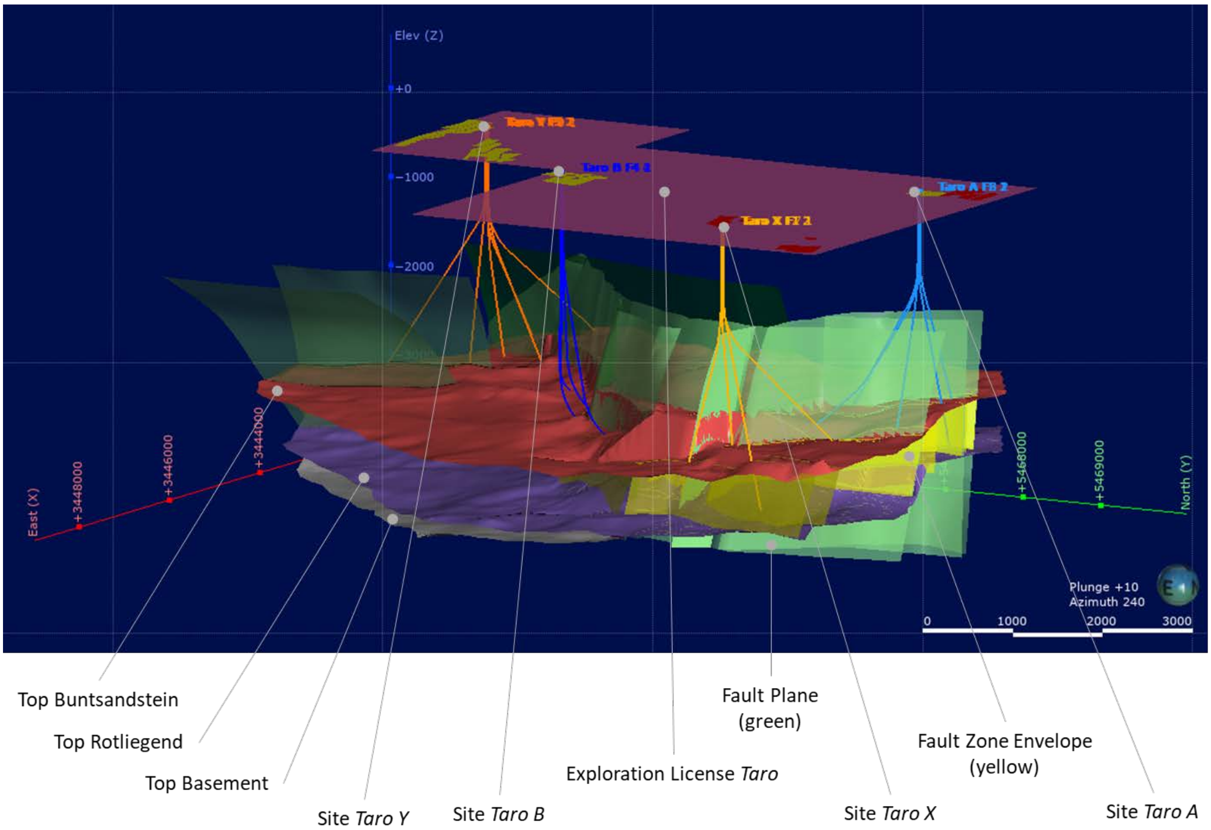


Figure 10: Overview of the 3D model of the Taro license area showing the fault system and top and base of the mapped Buntsandstein unit. In addition, all planned (and optional) well cluster are displayed.

The base case calculation for a single doublet production predicts a daily LCE production of 1.52 t/d (averaged), while the lower limit (low case) is 0.88 t/d and the upper limit (high case) is 1.97 t/d. Based on the assumption that 5 doublets can be configured and installed, a total production over 30 years of approximately **420 kt LCE in the base / mid case** is forecasted. Based on the forecast, the calibrated reservoir model which is used to simulate a brine extraction system allow an extraction of 14,000 tons per annum LCE from Taro, after application of lithium plant recovery parameters and other modifying factors. The input parameters for the base case calculation are given in Table 6.

Table 6: Taro key parameters, modifying factors and production target. The brine flow rate is an assumption based on seismic interpretation of geology and structures and knowledge of surrounding wells and will be confirmed once production wells are drilled at Taro.

Taro Production forecast (30-year production) – Summary – Mid/Base case	
Doublets	5 (2 drill sites)
Flow rate	100 – 120 l/s
Li concentration	181 mg/l
	w/o recharge factor / Li decline
Lithium extraction efficiency / recovery	90%
Well / facility performance	95%
Total daily Lithium Production per doublet (averaged)	1.52 t / day

Total daily LCE Production per doublet (averaged)	7.6 t / day
Total LCE Production (30 years)	**420,846** t

As mentioned above, the lower and upper ranges are limited by different flow rates, the number of doublets, and the efficiency of the well and facility performance.

Temperature assessments indicate that the Buntsandstein interval of the northern and central part of the Ortenau license area are viable targets for geothermal energy and lithium production. The best estimate of regional average *gradT* is 4.26 K/100 m using all available well data inside and in close vicinity of the license area Ortenau. For a hydraulic active fault zone with upward heat convection, the gradient is assumed to decrease to values less than 3 K/100 m.

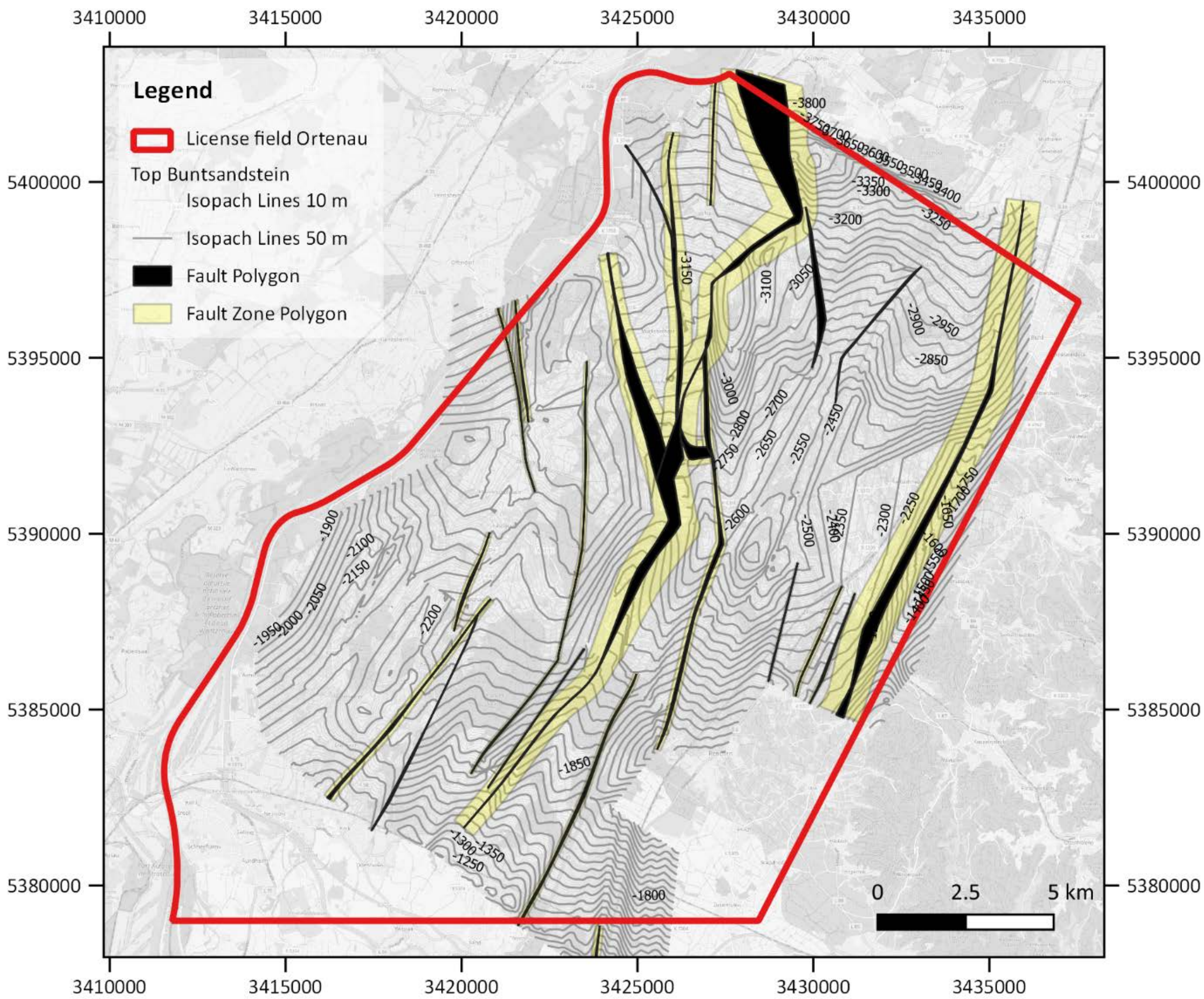


Figure 11: Ortenau license area. Structural Map of the top Buntsandstein unit with major fault polygons and fault zone polygons based on 2D-seismic data.

At Ortenau, surface and subsurface information were merged to identify ideal locations for potential future drill sites. For the assessment of possible surface locations modifying factors as distance to residential areas, presence of conservation areas and present land use and infrastructure were applied. Principal subsurface information is based on a structural subsurface model derived from the interpretation of 2D seismic lines. Finally, three sites were selected, which can host 6 deviated wells. The wells are designed to intersect the fault zones of tectonic active faults within the Buntsandstein unit. Two wells are designed to intersect the same fault zone, forming a well doublet of one production well and one injection well. As with Taro, the wells have been designed to target potential high flow rate fault zones within the Buntsandstein unit, with double-completion of the wells within the fault zones to maximise potential flow rate, based on Geo-T's interpretation of the fault zones and understanding from surrounding wells including the Geothermal MoU Area.

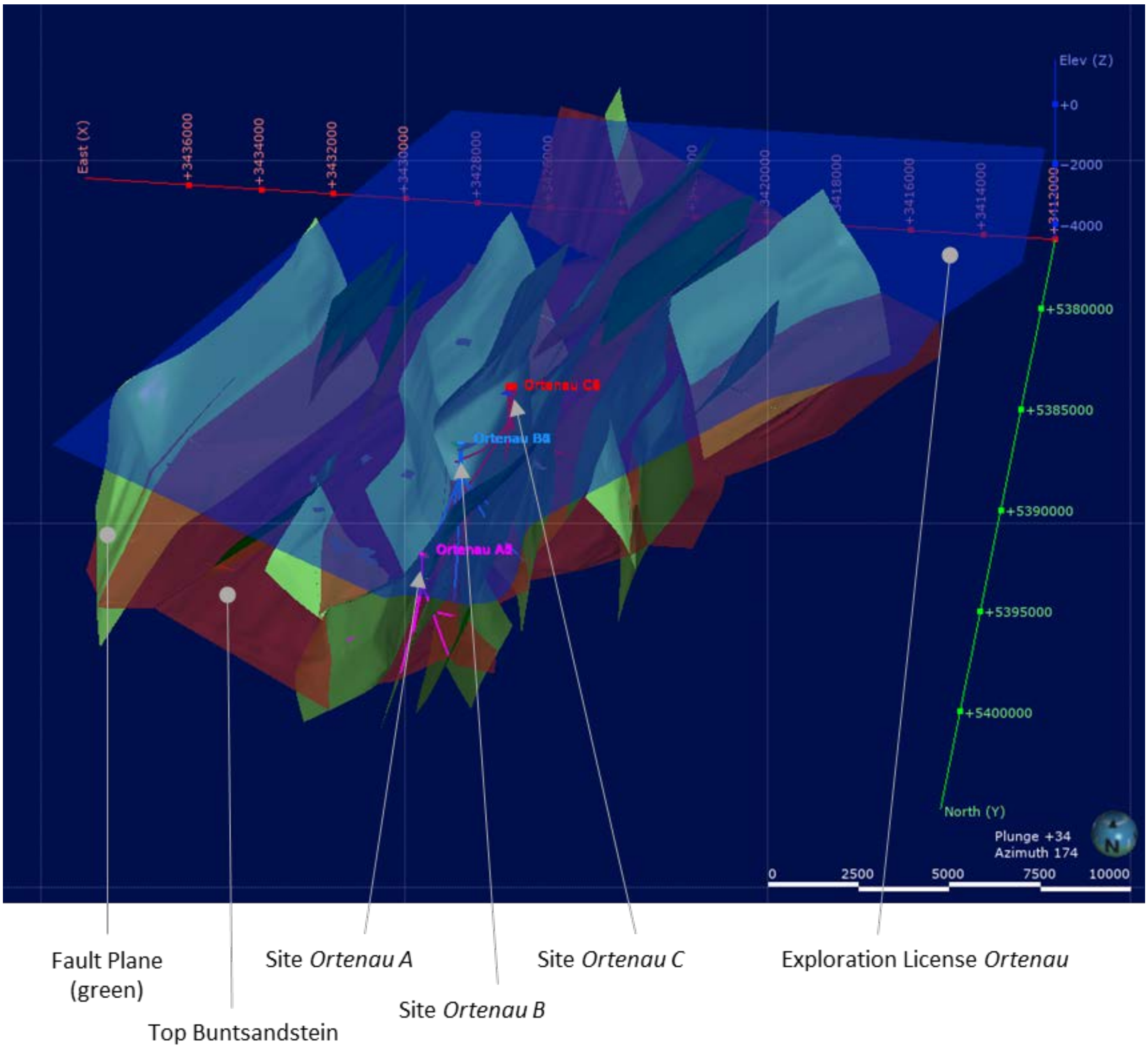


Figure 12: Overview of the 3D model of the Ortenau license area showing the fault system and top and base of the mapped Buntsandstein unit. In addition, all planned (and optional) well clusters are displayed.

The base case calculation for a single doublet production predicts a daily LCE production of 1.41 t/d (averaged), while the lower limit (low case) is 0.88 t/d and the upper limit (high case) is 1.97 t/d. Based on the assumption that 9 doublets can be configured and installed, a total production over 30 years of approximately **701 kt LCE in the base / mid case** is forecasted. Based on the forecast, the calibrated reservoir model which is used to simulate a brine extraction system allows an extraction of approximately 23,500 tons per annum LCE at Ortenau, after application of the modifying factors including lithium recovery from the lithium plant. The input parameters for the base case calculation are given in Table 7.

Table 7: Ortenau key parameters, modifying factors and production target. The brine flow rate is an assumption based on seismic interpretation of geology and structures and knowledge of surrounding wells and will be confirmed once production wells are drilled at Ortenau.

Ortenau Production forecast (30-year production) – Summary – Mid/Base case	
Doublets	9 (3 drill sites)
Flow rate	100 l/s
Li concentration	181 mg/l
	w/o recharge factor / Li decline
Lithium extraction efficiency / recovery	90%
Well / facility performance	95%
Total daily Lithium Production per doublet	1.41 t / day
Total daily LCE Production per doublet (averaged)	7.5 t / day
Total LCE Production (30 years)	**701,409 t**

Comparing production forecasts over 30 years and the estimated lithium resources of the fault damage zone and the associated host rock envelope (defined as Indicated Resources) allows the conclusion that the presented development plan with five doublets at Ortenau is a feasible scenario. Depletion and recharge effects have been considered but not applied in this study, and will be examined in more detail as part of future studies. Brine recovery rates necessary to sustain lithium grades over the life of projects with depletion/recharge are considered to be realistic, as the doublet systems will cover most of the (important) fault damage zone areas.

Classification	Million Tonnes LCE	Grade (Li ppm)
Proven	-	-
Probable - Taro	0.42	181
Probable - Ortenau	0.70	181
Total	**1.12**	**181**

Table 8: URVP Maiden Ore Probable Reserve estimate

Scheduling

The Production Targets from Ortenau and Taro led to the development of a Maiden Probable Ore Reserve Estimate, which is shown in Table 8. 100% of the material in the PFS project schedule is included in the Probable Ore Reserves classification, with no Inferred Resources within the schedule. Both Taro and Ortenau are assumed to operate concurrently for a thirty-year production life. The Probable Ore Reserves were calculated assuming the production and processing methods determined for the PFS.

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

Geothermal Plant Engineering & Design, Environmental, Social & Permitting Considerations

Gec-co GmbH was retained to conduct a study of possible production sites within the geologically conducive areas defined by Geo-T in their production study (i.e. areas within reach of potentially productive fault zones with heat and lithium potential), to design the geothermal plants for Vulcan's project areas, and to provide CAPEX/OPEX estimates for these geothermal plants. As part of this, Gec-co conducted a geographical and permitting study of potential exclusion areas, which included: settlement areas, conservation areas (including Natura 2000), national parks and national nature monuments, biosphere reserve and landscape protection areas, protected landscapes, biotopes, water protection areas, flooding zones and areas of exclusion based on noise protection. After applying these filters to the potential project areas, Gec-co defined a shortlist of potential project locations for the geothermal wells and plant, and DLE plant, and used these areas as a basis for the geothermal plant design.

For the establishment and operation of a geothermal energy plant in a permitted area, a *Hauptbetriebsplan* (main operating plan) pursuant to § 52 (1) BBergG must be submitted for approval. The plan must be drawn up by the operator and must be approved by the competent mining authority.

The main operating plans must include a description of the scope, technical implementation and duration of the intended project, and proof that the conditions for approval of the plan are met. A written approval of an operating plan must be granted if the requirements pursuant to § 55 BBergG are met. The fulfilment of which must be demonstrated in the main operating plan. Some criteria, pursuant to § 55 BBergG, are:

- § 55 (1) 1, BBerg: The necessary authorisation for the exploration or extraction of mineral resources has been granted.
- § 55 (1) 3, BBerg: The necessary precautions are taken against risk of life, risk to health, for the protection of tangibles, employees and third parties in the company, in particular by means of measures corresponding to the generally recognised rules of safety.
- § 55 (1) 5, BBerg: The protection of the surface is ensured in the interest of personal safety and public transport.
- § 55 (1) 6, BBerg: The generated waste is properly used or disposed.
- § 55 (1) 9, BBerg: The exploration or extraction is not likely to have harmful effects on the community.

For the geothermal-lithium operation, there are certain main permits and regulations which need to be complied with in view of the *Hauptbetriebsplan* (main operating plan). For deep geothermal plants, the provisions of the *Bundesberggesetz (BBergG)* (Federal Mining Act), the *Wasserhaushaltgesetz (WHG)* (Water Resources Act), the water laws of the state, the *Baugesetzbuch (BauGB)* (Building Code), and the federal or state building regulations must be complied with. Special provisions, such as those of fisheries law or radiation protection law, may be added. The main focus will be on the German *Baugesetzbuch BauGB* (building code), which represents the most important law of building planning in Germany. The *Umweltverträglichkeitsprüfung* UVP (Environmental Assessment/EA) is based on the *Umweltrecht* (Environmental Law) as the determining law for the site selection to examine potential impacts on the environmentally protected assets. In this context, any "Natura 2000" areas would also be considered according to the *Bundesnaturschutzgesetz BNatSchG* (Federal Act for the Protection of Nature). Gec-co has conducted potential site selection to avoid such areas.

Additional impacts on the environment are examined according to the *Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge* (Act on the Protection against Harmful Environmental Effects caused by Air Pollution, Noise, Vibrations and Similar Processes), commonly known as *Bundes-Immissionsschutzgesetz BImSchG* (Federal Emission Control Act). Vulcan and its consultants have commcenced work on the processes required to obtain the permits required for its planned renewable energy and lithium operations. The process for permitting geothermal plants in the Upper Rhine Valley in Germany is a well-trodden path. On the DLE side, since this will be the first combined DLE-geothermal project in Germany, the application process will have to be undertaken in close consultation with the authorities. For the chemical plant, a simpler process is envisaged, given Germany is a major chemicals producer. To find suitable site locations for the Geothermal and DLE plants within the License Areas, many different criteria must be considered. According to the BauGB described, there are two legal ways to define a plant site: Within an urban land-use planning zone or according to § 35 BauGB. The first option would mean that the local authority has defined a zone, where the plant site can be located. This could be either an industrial zone or a special zone with special license. Because suitable locations within the existing zones are difficult to find and the designation of new zones by the authority requires detailed information, the site selection process is carried according to § 35 BauGB for a new plant site. The second option would mean that the plant site is located outside the Urban area.

The site selection is made by means of a preliminary study, where suitable site locations are evaluated. This evaluation was completed and comprises several steps: First, geological studies are conducted for the License Areas by GeoT. This Geological Exploration Area defines the available drill zones and forms the basis for the further evaluation process. The next step is to determine the non-restricted area according to the UVPG. After eliminating all protected areas, the remaining region is broken down into different areas to give a more precise view on the local situation. The areas are then evaluated based on their infrastructure. In a last step, precise site locations can be defined and further evaluated. To give a more precise insight into the evaluation process and understand the restrictions behind all the criteria, a Criteria Catalogue has been developed.

To determine suitable site locations for the conversion plant, a research based on the land-use plans of the municipalities and cities next to the rhine river was done. In this study, just locations inside existing industrial zones were considered and several suitable locations were found, including the favoured location at a chemical park outside of Frankfurt.

An Organic Ranking Cycle (ORC) style plant was used for the geothermal plant design. In regions with geothermal reservoir temperatures above 110 °C geothermal electricity generation usually becomes feasible. In the Upper Rhine Graben region, reservoir temperatures range between 130°C and 200°C, which makes them suitable for geothermal power generation. With the DLE plant operating at 65°C, there is a minimum brine temperature difference of 70°C available to supply the energy required for the lithium extraction process, thus enabling the production of Zero Carbon Lithium®. At these moderate water temperatures, direct drive of turbines through the brine by means of flash evaporation lacks efficiency. Instead, electricity is generated via a binary cycle technology, also referred to as ORC. When employing this technology, the thermal energy of the brine is transferred to a secondary working fluid in a heat exchanger. Due to the low boiling point of the ORC working fluid, it evaporates, and the steam phase drives a turbine. The operational temperature of the ORC is significantly lower than the temperature of the geothermal fluid. The efficiency of such binary plants is usually between 8-17 %, depending on the brine temperature.

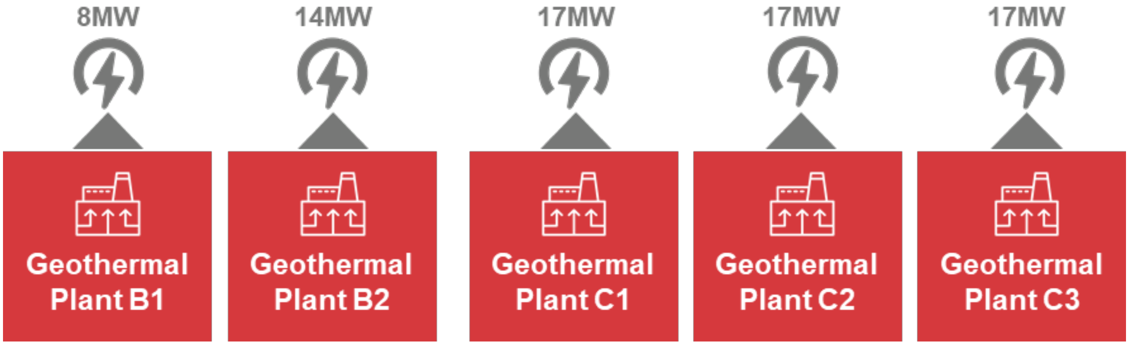


Figure 13: Layout and potential capacity of planned geothermal plants in Vulcan's Taro (B1+B2) and Ortenau (C1-3) license areas

For designing the source plant, the volume flow and temperature of the brine are important factors. All plant parts are designed for a volume flow of 300 l per second. This defines the size of the drilling sites, pump house, Operational building, filter house and DLE plant. The design of the power plant and the air-cooled condensers in particular are dependent additionally on the brine temperature. The potential brine temperature in the region of the Upper Rhine Graben is up to 200 °C. As the geological structures and brine temperatures vary, brine temperatures in the Taro License Area of 165 °C in the south, 150 °C in the middle and 130 °C in the north have been considered in consultation with GeoT. Hot temperatures are expected in the North of the Ortenau region, therefore temperatures of 165 °C have been considered. The design was aligned with existing engineered geothermal plants. The variation of the temperature is assumed to have no big impact on the size of the power plant. The used layout is based on a two-stage ORC configuration.

The number of air-cooled condensers for the power plant is defined by to the required cooling capacity. The required cooling capacity arises from the spread of geothermal potential and total output power of the power plant. Out of the cooling capacity demand, the condenser surface was defined according to our experience. The chosen air-cooled collectors for the layout come as double units, the so-called bays. The condenser surface of one bay is about 160 m^2. Due to the relation between the brine temperature and the electric power the surface of the condensers is strongly dependent on the brine temperature. Due to the needed steam for the DLE process the brine temperature is reduced. The air-cooled condensers are the main emitting equipment regarding noise. Therefore, the location of them must be investigated properly. To ensure the noise protection for nearby Urban Areas, noise protection walls can be built. The filter and pump house were designed aligned to existing plants. The filter and pump house includes filters and cooling water pumps needed for the geothermal system.

The integrated operational building includes the control room for the ORC power plant and the brine cycle. All relevant measurement parameters are detected and processed by the control system to ensure a safe, fully automated plant operation. The control room can be extended by the control system for the DLE plant. The other parts of the operational building are: The operation room, rooms for middle and low voltage switch gear, transformer rooms, workshop/store, sanitary and changing facilities and a social room.

To get a brine volume flow of 300 l per second, 3 production and 3 injection wells were assumed. According to our experience, one production well has an average brine volume flow of 100 l per second. Therefore, six wells must be drilled to realize that amount of brine flow (including re-injection wells). In the project duration perspective, it is beneficial to drill two wells at the same time. Therefore, the layout will consider two separate drill sites, giving enough space to realize this setup. Another promoting factor for having two drill sites is the better reachability of different aquifers. The design of each drill site aligned to the standard of the European market. The drill site is mainly separated in two parts, the inner and outer drill site. The drill sites come with one brine basin. This basin is needed for the production tests of the wells.

The layout design of the DLE plant was provided by Hatch and included into the plot plans.

For the arrangement of the plant parts, some rules should be considered. The ORC power plant should be placed next to the air-cooled condensers to realize short, equally long piping and minimize the energy loss. To work properly, the air-cooled condensers need a sufficient clearance to higher buildings and trees. This shall guarantee a protection from pollination and a good air flow. The weather in Germany is mostly influenced by western streams, therefore a north-south alignment of the air-cooled condensers is beneficial for the air flow behaviour. To optimize the ventilation and piping, the bays were arranged in two rows on each side of the power plant. The air-cooled condensers and the ORC power plant need to be accessible by road, therefore a bypass road is attached to those plant parts. The appearance of the tall condensers can be perceived as bothersome. Therefore, other buildings can be arranged as sight protection.

The filters within the filter house secure the plant from solids out of the production well and the small underground cracks from clogging. Due to the split-up drilling sites, the Filter building should be placed between them to reduce piping. Usually, the pump building is placed next to the filter house in proximity to the power plant to reduce piping.

The operational building is placed in the middle of the locations. This gives a good overview of the operation room and shorter distances of the control room to the connected plant parts.

The drill sites should be placed in a sufficient distance from each other. Another limiting factor are the falling radii of the drilling masts. To guarantee an interference-free construction, those radii should be outside all other plant parts. The brine basin should be placed next to one drill site.

The layout of the DLE plant is used as a place holder within the assembling process. The size and shape of the DLE plant is variable and can be adjusted to the site location if necessary. The bypassing roads needs to follow European standards.

All plant parts are designed to have enough buffer for changes for the further engineering process. Therefore, the chosen locations are large scaled as well. The assembling of the equipment within the site locations are optimised due to short piping and cable length.

A base case design size of 300l/s cumulative brine flow, from three production well doublets, was used for the geothermal plant design, which was scaled for each site depending on predicted brine flow and temperature. Based on the anticipated heat at each site from the Geo-T study, potential power production was estimated for each site. Due to higher anticipated heat in the Ortenau license (C1-3), Ortenau has higher anticipated power production potential than Taro. For geothermal projects, plant sizing is finalised once production wells are successfully drilled. The overall view of the plant design is shown in Figure 14. The DLE plant (7) is the highest building on the site, followed by the air-cooled condensers (2). The buildings 1, 3, 4 and 5 contains the technical equipment of ORC power plant, filters, pumps and operational equipment. The buildings occur as standard commercial buildings. The inner drill sites (6) are countersunk into the ground while the wellheads rise a few meters above ground. All brine pipes are marked in red, having white pipe supports every 6 to 8 meters.

To buffer the expansion of the pipes for different temperatures, expansion bends are placed in specific intervals. Based on the plant designs, CAPEX and OPEX for the geothermal part of the business was estimated by gec-co, shown in Figure 15. Production well drilling and land acquisition costs were included in this study.

The Renewable Energy Law (EEG) guarantees the tariff for the electricity feed-in into the grid for 20 years plus the year of commercial start. There is no obligation to deliver a certain amount of electricity into the grid. The electricity produced is fed into the grid and be will be paid accordingly. Operators of EEG-supported power generation plants have a special right to have their plant connected to the power grid. They sell the electricity to the grid operators. These are obliged to give preference to electricity from renewable energy sources and must expand their power grids sufficiently to be able to transmit the subsidized electricity from the producer to the consumers. The purchase prices for electricity from the various energy sources are also set out in the EEG and differ considerably depending on the type of energy, like wind, photovoltaic, biomass, geothermal, etc. The four German transmission system operators compensate each other for the quantities of EEG electricity they accept and the feed-in tariffs they pay. This way, each transmission system operator bears a relatively equal burden. This equalization is intended to avoid the burden for a single transmission system operator with numerous EEG plants. The grid operators sell the EEG-supported electricity on the European Energy Exchange (EEX). The difference between their income and expenditure from this electricity trade is offset by the EEG law. The purchase, remuneration and feed-in of electricity from renewable energies are therefore regulated by law. However, the utility companies that supply electricity to the end consumers are free to use any type of electricity. The tariff regarding EEG 2021 for electricity based on geothermal energy is 25,2 ct€/kWh up to a total installed geothermal electric power of 120 MWel. The current installed geothermal electric power at report preparation is 38 MWel. Based on the projects currently under development and the experience of the last years, the threshold can be expected to be reached earliest in 2026. After reaching of the threshold of 120 MWel the tariff will be reduced by 0.5 percent per year. The first degression is thus expected to be seen in 2027.

Revenues for the geothermal part of the business are shown in detail under the “Economic Analysis” section. For the full geothermal energy production profile (Phase 1 and 2, Ortenau and Taro), €157m per annum revenues are calculated, with net operating cash flow of €114m per annum and a post-tax NPV of €470m, with post-tax IRR of 13%. For Phase 1 (Taro), revenues from geothermal of 46m per annum are expected, with net operating cash flow of €31m per annum, post-tax NPV of €99m and post-tax IRR of 11%. For Phase 2 (Ortenau), 111m of annual revenue is expected, with €83m per annum net operating cash flow, €371m post-tax NPV and 15% post-tax IRR.

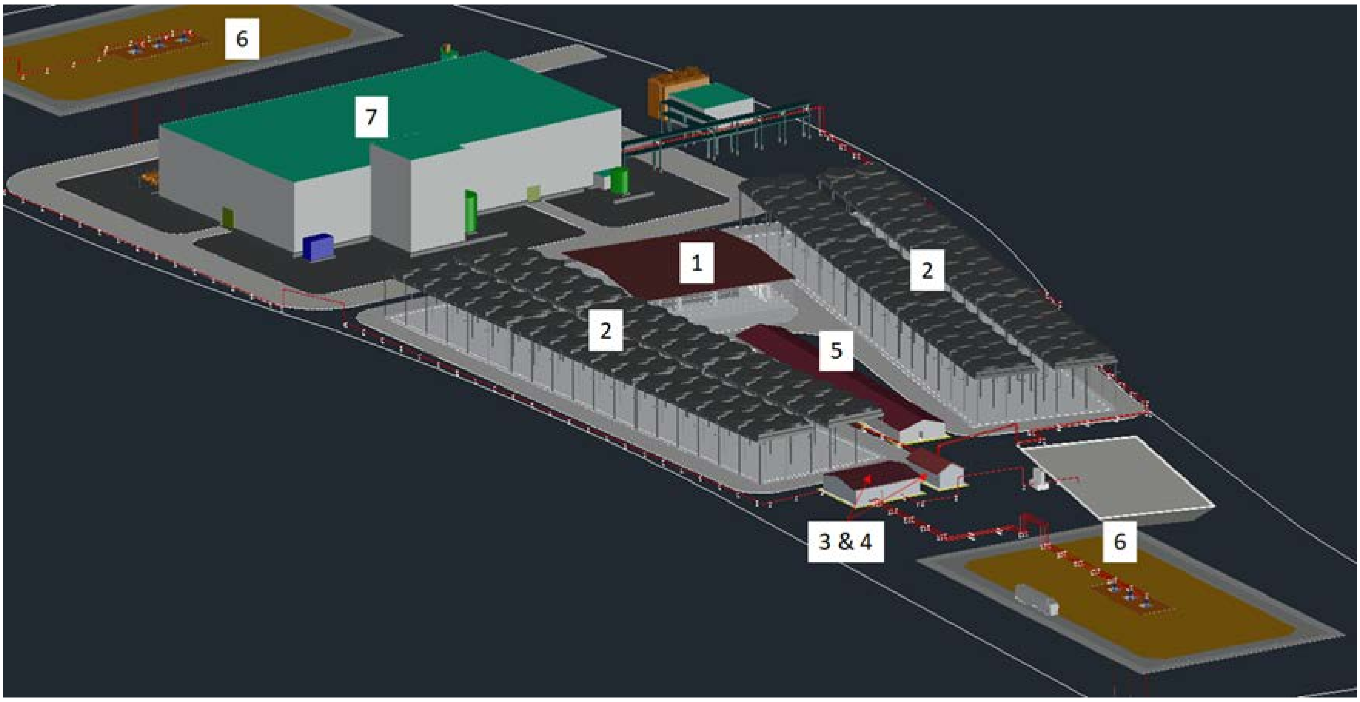


Figure 14: 3D overall view of one of the geothermal-DLE plant locations.

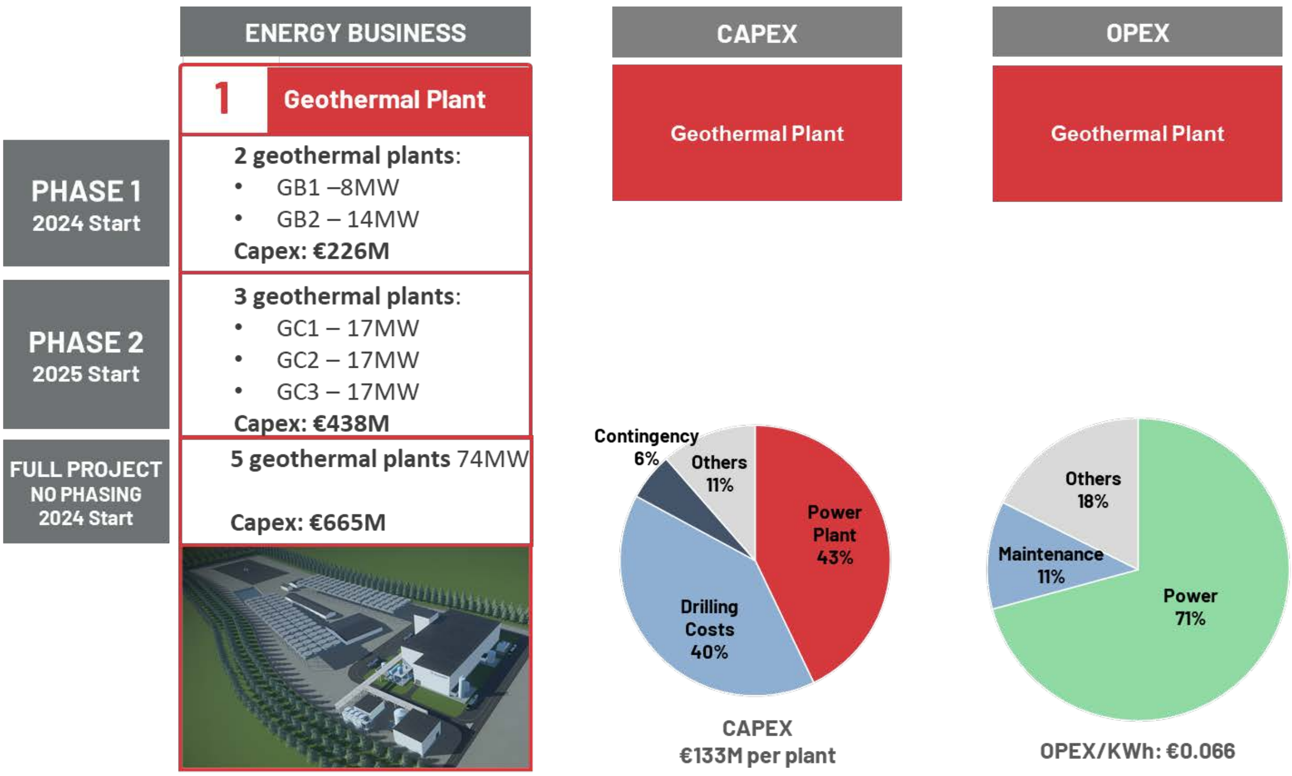


Figure 15: CAPEX and OPEX estimates for geothermal plants, based on gec-co study

Market Studies & Contracts

Lithium Market

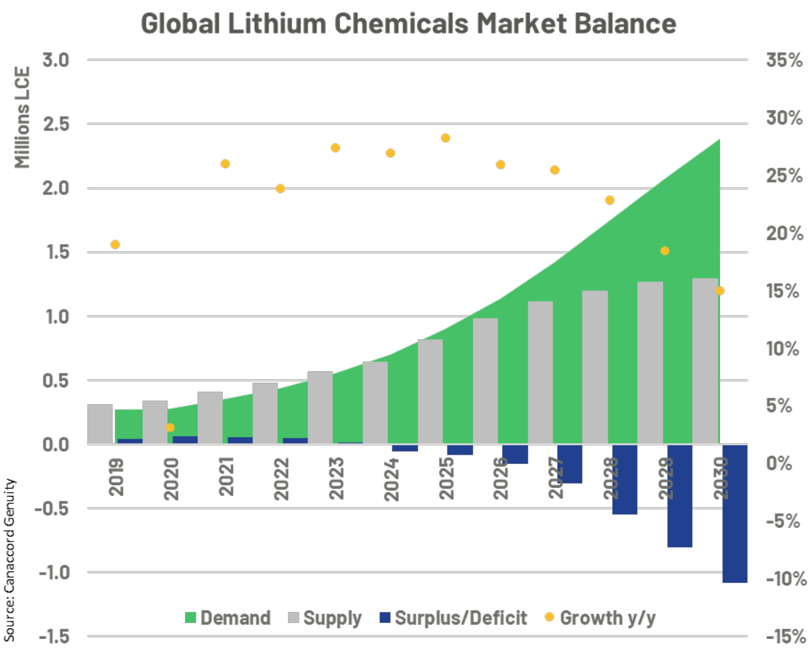
Global Demand

Following Covid19, lithium demand growth trends have varied across regions. There is now more investment in Electric Mobility in Europe than in China. Registrations of petrol and diesel cars in Europe fell one-third year-on-year during the summer whilst EV sales were up almost two-thirds over the same period. Demand has surged as government subsidies have been increased across the EU to power green recovery post Covid19. Chinese EV sales are recovering slower than in Europe but are supported by the extension of government subsidies and sales numbers have shown positive results during the last few months.

Medium to long term fundamentals remains strong for electric mobility and energy storage with growth rates expected to average almost 25% per year during the next 10 years. The consensus amongst analysts is that lithium demand will reach 1 million tons globally by 2025 whilst estimates are more varied for 2030.

Global Supply

The overall lithium chemical market has been in an oversupply situation during the last couple of years leading to a price correction for lithium carbonate and lithium hydroxide. Lower prices led large capacities to be curtailed, especially spodumene mines in Australia and conversion plants in China and planned capacity has been cancelled or postponed. This capacity decrease combined with a massive reduction in investment in new capacity might be an adequate answer to the short-term situation but will create significant supply deficit in the market in the medium to long term. Many analysts have called the bottom of the cycle and expect the market to reach deficit in 3 to 5 years with insufficient supply to feed growing demand powered by electric mobility and energy storage. Lithium prices will need to increase substantially to provide better margins and expected returns for additional investment. In the case this doesn't happen, it will tighten the market further and prices will eventually spike, much higher.



Similarly to the global lithium market, lithium hydroxide is expected to go short starting in 2023.

Demand for lithium hydroxide is growing much faster than lithium carbonate which is putting additional pressure on the supply side.

Lithium Hydroxide vs Lithium Carbonate

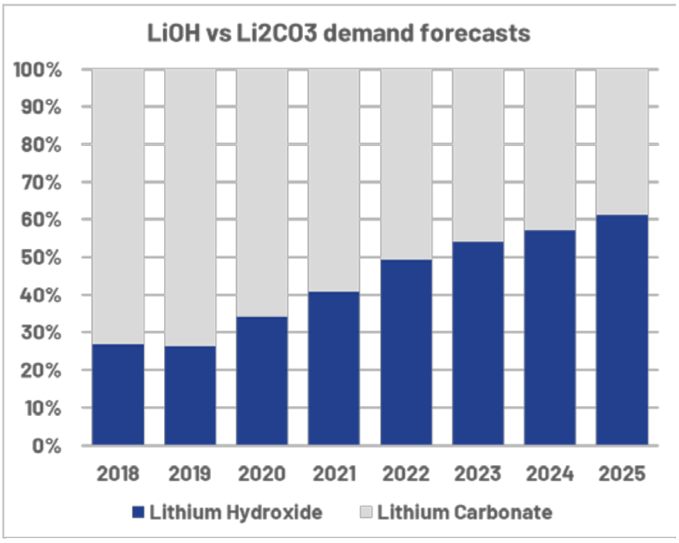
The costliest part of a battery cell is its cathode where lithium, nickel, cobalt and other chemicals are used. The cathode technology is rapidly evolving in order to better suit the E-mobility market. There are a number of different types of cathode technologies including LFP, LMO, NCA, etc. but the one set to dominate the industry is NMC (Nickel, Manganese, Cobalt). According to UBS, NMC based cathode will represent more than 73% of the E-mobility sector by 2025. NMC cathodes are themselves evolving and producers are reducing their cobalt content and increasing nickel usage in order to improve the energy density of the battery and move away from controversial cobalt. This is in turn leading to a shift in product requirements because those nickel-rich cathodes need lithium hydroxide and not carbonate. Lithium hydroxide is forecast to take over lithium carbonate before the mid-2020s.

In Europe, cathode markers and battery producers are targeting the production and consumption of nickel-rich cathodes and therefore almost entirely require lithium hydroxide. This would be different in China where LFP cathodes are still in demand and use more lithium carbonate. However, Europeans producers are targeting more premium and longer-range vehicles and batteries needing nickel-rich cathodes.

Lithium demand in Europe

Electric Vehicles

There is now more investment in Electric Mobility in Europe than in China. Post Covid19 governments and the EU have put together a range of plans and incentives to support the auto industry and more especially Electric Mobility. For example, France injected €8bn to fuel the car industry revival and offered a new €13,000 EV incentive, the most generous in Europe. Germany offers up to €9,000 per EV and announced it will force all petrol stations to provide electric car charging. Stronger sales are also expected on the back of stricter vehicle CO2 emissions standards.



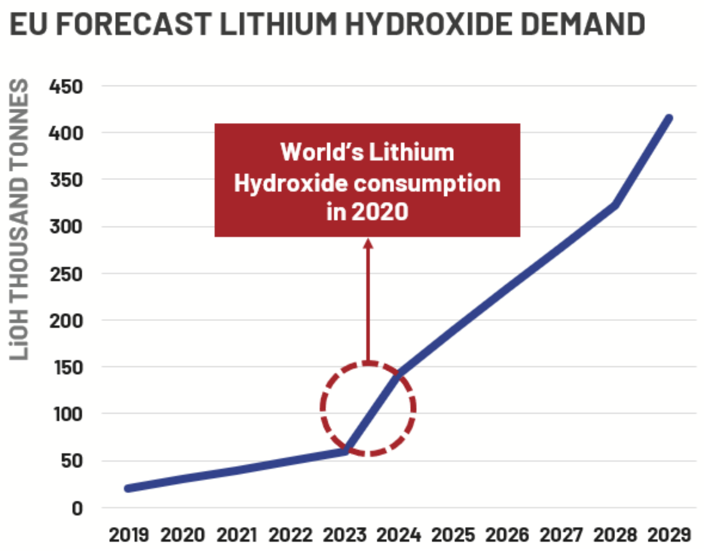
Source: Canaccord Genuity 2020

Lithium-ion Battery & Cathodes

Europe is expected to become the second largest producer of Lithium-ion batteries in the world. The European lithium-ion battery capacity is expected to grow from around 10GWh today to almost 500GWh by 2030, 50 times today's level. Despite Covid19, the EU's battery mega-projects continued to progress; LG Chem secured €500M for its Polish factory expansion, Tesla has advanced the construction of its Gigafactory near Berlin, Daimler announced plans to expand its battery production starting in Germany, etc. On the cathode side, BASF confirmed its cathode production plans in Germany, the EIB signed a €125M loan with Umicore for cathode materials in Poland, Johnson Matthey has started the construction of its cathode plant, also in Poland, and Northvolt commissioned its precursors plant in Sweden.

Lithium

Europe is the world's fastest growing market for lithium hydroxide and will become second in size to Asia. Based on projected lithium-ion battery capacity on the continent, Europe will require almost half a million tons of lithium hydroxide by 2030. As early as 2023/24, Europe will actually need more lithium hydroxide than what is produced globally today.



Adapted from Benchmark Minerals battery Gigafactory data

Lithium supply in Europe

Europe has currently zero local supply of lithium hydroxide.

The EU and the European Commission have publicly stated that Europe needs to develop a strategic value chain for manufacturing EV and lithium-ion batteries in Europe and secure access to raw materials such as lithium.

EU politicians have been very vocal about lithium during the last few months. Thierry Breton, the EU market commissioner, stated that "to meet climate goals, the EU will need 60 times more lithium by 2050" and that the "EU must engage in lithium standards or lose to China". He added that "the coronavirus crisis showed vital supplies are exposed to disruption and Europe is extremely reliant on China to source these vital supplies. Vital supplies range from pharmaceuticals to lithium".

A number of EU initiatives have taken place during the last couple of years to support domestic lithium production:

- Lithium has recently been added to the EU list of **Critical Raw Materials**. The EU action plan for critical raw materials, including lithium, is aiming at developing resilient supply chains for regional industries and develop strategic industrial alliances such as the **European Raw Materials Alliance**.
- The EU is also looking at financially supporting lithium mining, extraction and processing projects with the participation of the **European Investment Bank** (EIB). The EIB last year adopted its new energy lending policy supporting projects relating to the supply of critical raw materials needed for low-carbon technologies in the EU as opposed to financing fossil fuel based projects.
- Other EU organisations such as the **European Battery Alliance** (EBA), which is aiming at creating a competitive and fully integrated battery manufacturing chain in Europe and prevent a technological dependence on Asia, is also stepping up. The EBA's industrial stream is led by European Investment group **InnoEnergy**. InnoEnergy invests European funds into sustainable energy projects. It has invested so far more than €700M in selected projects and facilitated the raise of more than €1.7Bn of funds. In May this year, Vulcan became one of only two lithium projects in Europe to secure both a direct investment and a collaboration deal from this group.
- The new **EU battery regulation** includes mandatory requirements on carbon footprint rules and responsibly sourced materials within lithium-ion battery production and consumption within the EU. From 1 January 2026, lithium-ion batteries will have to bear a carbon intensity performance class label and from 1 July 2027, must comply with maximum carbon footprint thresholds. Manufacturers will have to demonstrate that they are sourcing raw materials in a responsible way through a digital passport tracking all battery materials used in the battery composition.
- The support is also coming from the industry itself with automakers like Volkswagen, who publicly stated that it has set itself the goal of promoting lithium production in Europe and many other industrial players have stressed the importance of sourcing domestically and sustainably.

Lithium Pricing

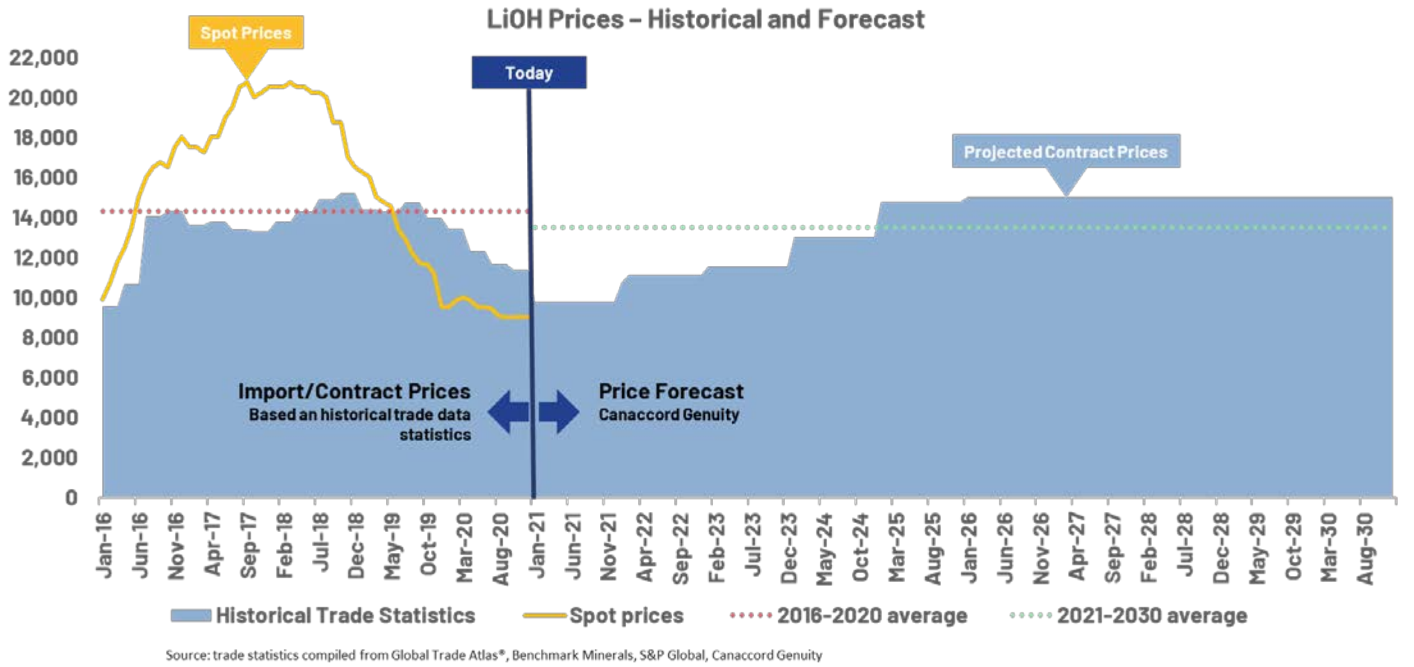
Current pricing environment

Lithium hydroxide imports into Japan and South Korea represents today more than 75% of the global lithium hydroxide trade. It is where a majority of lithium consumption into cathode production takes place and the plants are supplied mostly from China, Chile, the US, and Russia. Cathodes producers don't tend to buy in the spot market as they have established long term supply contract and their validation process takes a long time. A large majority of lithium hydroxide volume arriving in Japan and South Korea are therefore contract based and not spot. Lithium hydroxide import and spot prices have averaged US$13,889/t of LiOH over the last 4 years and have shown much more stability than reported spot prices in China, varying between US$8,000 and $22,000/t over the same period. Vulcan is targeting long term contracts with European off-takers involved in the lithium-ion battery supply chain and requiring battery quality products. The exposure to the spot market for Vulcan is minimal.

Price forecast

Whilst historical prices are easily accessible, forward projections for lithium prices are difficult to assess as the market is emerging and its size remains limited. In this environment, we see both Fastmarkets and Canaccord Genuity as reliable sources of information. Fastmarkets was selected as the preferred Price Reporting Agency (PRA) for the London Metals Exchange (LME) after a comprehensive tender process. The LME has been working towards the development of a lithium pricing benchmark. Fastmarkets has a long-standing track record in the delivery of Fastmarkets' lithium prices with more than 30 years' experience in recording lithium prices that have been used in physical lithium supply deals. Canaccord Genuity has a team of analysts with an excellent track record in the lithium industry and have been providing high quality research papers on the industry for the last several years. Fastmarkets has put together a price forecast for Europe specifically whilst Canaccord is assessing the Asian market. Both follow very similar trends with prices reaching bottom in 2020-2021 and then recovering to healthy levels above $15K/t around 2025-2026 when most analysts expect a significant deficit in the lithium market.

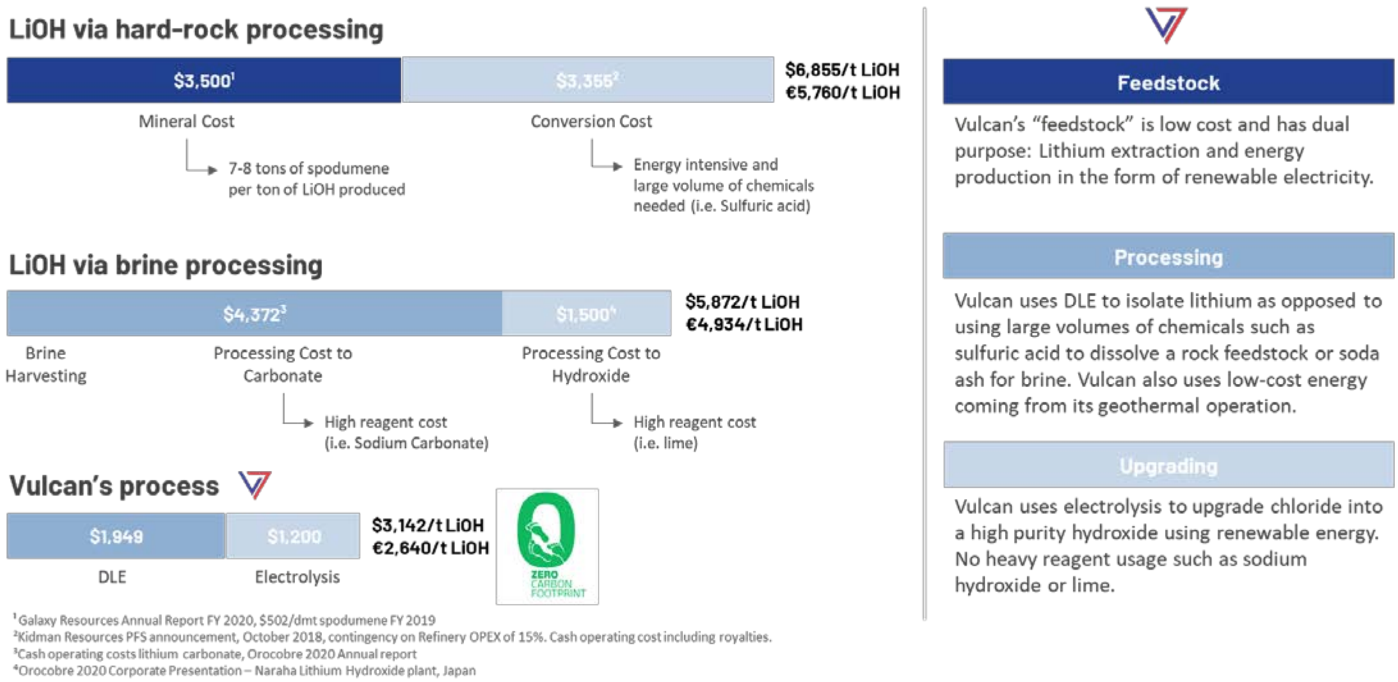
LiOH min 57% US$	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030+
Fastmarkets Europe	15.0	12.2	11.2	11.5	12.8	13.7	14.7	15.7	17.0	17.2	17.2	17.2
Canaccord CIF Asia	14.0	9.5	9.8	10.8	11.6	13.0	14.8	15.0	15.0	15.0	15.0	15.0



We have decided to go for Canaccord's more conservative forecast instead of Fastmarkets. There are three elements that are not factored in this price forecast which will influence pricing positively for Vulcan:

- **Location**: Europe is the fastest growing lithium market in the world and will be second in size to China. Today, there is actually more investment going into electric mobility in Europe than in China. Those electric vehicles require lithium-ion batteries and Europe has become the fastest growing lithium-ion battery production centre in the world. However, Europe is facing a major problem; despite the EU's stated goal to develop a fully integrated supply chain locally, there is currently zero lithium extraction and production here and Europe will have to rely entirely an imported material, most of it coming from China. Sourcing from China poses two majors and obvious issues: supply chain risk and negative environmental impact. On the supply chain side, de-risking supply is crucial for auto and battery makers following rising tensions in international trade but also following events such as Covid19 which showed that Europe is massively dependent on China, as Thierry Breton, the EU market commissioner highlighted "for vital supplies such as pharmaceuticals and lithium". Large automakers such as Volkswagen have stated their intension to be sourcing lithium from Europe. Lithium has also recently added to the Critical Raw Materials list by the European Commission.

- **Environmental impact**: today China accounts for around 80% of lithium hydroxide production. CO2 emissions linked to its production in China are the highest in the world and does not match with automakers' goal to become carbon neutral such as Volkswagen's promise to run a "CO2-neutral production including supply chain". Vulcan is offering a Zero Carbon Lithium® product which will allow auto, battery and cathode makers to secure green raw materials but also to potentially offset heavy CO2 penalties linked to other parts of their supply chain.
- **Carbon Credit:** carbon emissions have a cost and the EU has been implementing carbon pricing schemes to lower from a number of sectors. Although it is yet to implemented, it is possible that Vulcan will be able to generate carbon credit from its low to zero carbon emission process flow sheet.
- **Trademark**: Vulcan Zero Carbon Lithium® is a trademarked brand that will be licensed to Vulcan's customers and allow them to show EV consumers that they are working on improving their carbon footprint by working with suppliers offering greener and more sustainable products.



Vulcan notes that the comparison operating cost figures above area 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. Vulcan considers that it is appropriate to compare the estimates from the PFS to actual results from projects currently in production because:

- Vulcan's process is unique and a comparison to other processes for producing lithium hydroxide is important to enable investors to contextualise the PFS results; and
- actual data from projects currently in production is the best available guide to benchmark the PFS results.

Based on the PFS data, Vulcan's lithium project is expected to sit at the bottom of the global lithium hydroxide cost curve. This can be explained by a number of reasons:

- **Free feedstock**: the largest cost component of a hard rock conversion plant in China is the feedstock – spodumene. Spodumene prices have varied greatly during the last 3 years roughly between $400 and $1,000 per ton, today being at the low end of this range. Around 8.5 tons of spodumene is needed to produce 1 ton of Lithium Carbonate Equivalent (LCE). This would translate today into a feedstock cost of

$3,400 per ton of LCE. Vulcan's feedstock is the brine derived from the geothermal plant and secured at no cost if the project is integrated. If the project is not integrated, a nominal royalty will be paid to the geothermal business.

- **Low reagent consumption**: the largest cost component for a brine operation in South America is reagents. This includes for instance sodium carbonate for the production of lithium carbonate and then sodium hydroxide for its conversion into lithium hydroxide. Depending on the quality of the brine, varying ratios of chemicals are needed to process the solution. Those reagents are not produced domestically and need to be imported, mostly from the United States, 8,000 km and then trucked to plant locations. Vulcan's project uses very little reagents during its DLE processing and its refining of lithium chloride into lithium hydroxide is using an electrolyser which removes the need for reagent addition.
- **Low-cost energy**: the second largest cost component of a hard rock conversion plant is energy. Vulcan's project enjoys low-cost energy and sustainable heat in the form of steam supplied by its geothermal plants.
- **Limited transport**: shipping spodumene from Australia to China or importing reagents from the US or China to Australia and South America is expensive. The Vulcan's project has very limited transport involved in its production process. Its feedstock is provided by pipe by the geothermal plant, the intermediary lithium chloride is trucked or barged within the region and reagents are available domestically.

Economic Analysis

Optiro Pty Ltd. was retained to utilise the gec-co and Hatch capital and operating cost estimates for the production of geothermal energy and lithium hydroxide, respectively, to estimate Vulcan's project economics. The key project assumptions and metrics are provided below. The financial model has been generated in euro (€) terms with the majority of key inputs (operating and capital cost and power, acid and steam prices) also provided in € terms. The main exception to this is the lithium hydroxide (LiOH) price which was provided in US$ terms. € terms were maintained through the financial model with conversion to the euro undertaken for the LiOH price.The financial model incorporates the ability to apply exchange rates (EUR:US$) on either a flat or spot basis over the life of the model or to apply a forecast exchange rate profile. Although model outputs are reported in € terms, the financial model is currently set to convert US$ to € using exchange rate forecasts provided Vulcan. Mining industry practitioners typically undertake financial modelling using real NPV terms, projecting constant costs and metal prices in real terms. The resultant cash flows are then discounted by a real risk-adjusted discount rate. Optiro has conformed with this practice. Weighted average cost of capital (WACC) analysis has not been completed as part of this financial modelling. A discount rate of 6% has been applied to the cashflow in line for the geothermal business, comparable with discount rates used by others in the geothermal industry as advised by Vulcan's geothermal consultants gec-co. A discount rate of 8% has been applied to the cashflow in line for the lithium businesses, comparable with discount rates used by others in the lithium industry and as directed by Vulcan for use by Optiro. The discount rates for the lithium and geothermal parts of the business (6% and 8% respectively) were based on feedback from Vulcan's financial advisors, the extensive resources and geothermal project finance experience of the Board, Vulcan's geothermal consultants in Germany and an industry review. Lithium hydroxide (LiOH) prices are based on forecasts by Canaccord for battery grade lithium hydroxide (min 57.5% LiOH) provided by Vulcan. As part of the financial analysis, Optiro has applied production rates in-line with directions from Vulcan, with potential for phasing applied. This uses brine flow rate assumptions based on seismic interpretation of structural geology and surrounding well performance, which will need to be tested in a production well setting. Phase 1 considers the production of geothermal energy and of lithium chloride through two plants (B1 and B2) whilst lithium hydroxide is produced at a Central Lithium Plant. Phase 2 considers the production of geothermal energy and of lithium chloride through three plants (C1, C2 and C3) whilst lithium hydroxide is produced at a Central Lithium Plant. A two-year construction schedule is applied with first production commencing one year after start of construction using a 25% ramp up. Vulcan's project base case financial model comprises a model start date of 1/1/2023, with a two-year construction period for Phase 1 and 2, and 30-year model life. Phase 1 commences on 1/1/2023 and Phase 2 on 1/1/2024. 0.5% geothermal brine royalty has been assumed to be paid on CLP lithium revenue (when the lithium and geothermal businesses are separated). A project tax rate of 23.99% was applied for the geothermal and DLE businesses, and a project tax rate of 30% for the lithium refinery business, based on feedback from local advisors. Specific selling costs have not been allowed in the financial model. Lithium hydroxide has been assumed to be sold FOB from the mine site. Optiro completed various scenarios considering included a fully integrated project; consideration of geothermal, DLE and lithium refining options only; and consideration of Phase 1 (plants B1 and B2) and Phase 2 separately (plants C1, C2 and C2). This resulted in 30 options in the financial model, with the main scenarios shown here.

Integrated Business

Full project developed at the same time and integrated under one business.

FULL PROJECT
NO PHASING
2024 Start

INTEGRATED BUSINESS

GB1 | GB2 | GC1 | GC2 | GC3
DB1 | DB2 | DC1 | DC2 | DC3
CLP

74MW & 40Ktpy LiOH	
Revenues €M/y	652
Net Op. Cash Fl. €M/y	507
NPV Pre-tax €M	3,443
NPV Post-tax €M	2,250
IRR Pre-tax	26%
IRR Post-tax	21%
Payback (year)	5
CAPEX €M	1,738
CAPEX Geo	*665*
CAPEX DLE	*751*
CAPEX CLP	*322*
OPEX LiOH €/t	2,640

Phase 1 developed first and is an integrated business

PHASE 1
2024 Start

INTEGRATED BUSINESS

GB1 | GB2 | GC1 | GC2 | GC3
DB1 | DB2 | DC1 | DC2 | DC3
CLP1 | CLP2

21MW & 15Ktpy LiOH	
Revenues €M/y	232
Net Op. Cash Fl. €M/y	171
NPV Pre-tax €M	1,114
NPV Post-tax €M	703
IRR Pre-tax	23%
IRR Post-tax	18%
Payback (year)	5
CAPEX €M	700
CAPEX Geo	*226*
CAPEX DLE	*291*
CAPEX CLP	*182*
OPEX LiOH €/t	3,139

Phase 2 developed second and is an integrated business

PHASE 2
2025 Start

INTEGRATED BUSINESS

GB1 | GB2 | GC1 | GC2 | GC3
DB1 | DB2 | DC1 | DC2 | DC3
CLP1 | CLP2

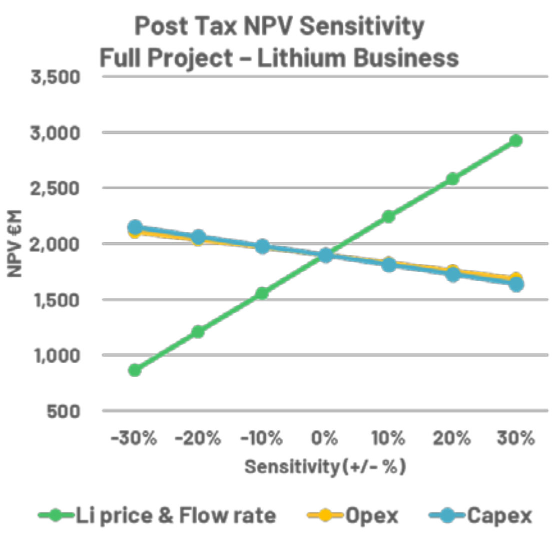
52MW & 25Ktpy LiOH	
Revenues €M/y	420
Net Op. Cash Fl. €M/y	324
NPV Pre-tax €M	2,145
NPV Post-tax €M	1,403
IRR Pre-tax	27%
IRR Post-tax	22%
Payback (year)	6
CAPEX €M	1,138
CAPEX Geo	*438*
CAPEX DLE	*460*
CAPEX CLP	*240*
OPEX LiOH €/t	2,792

Separate Businesses

VULCAN ENERGY RESOURCES
Zero Carbon Lithium®

	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 first, separated in two different businesses: Energy and Lithium.	
	FULL PROJECT - NO PHASING 2024 Start		**PHASE 1 2024 Start**		**PHASE 2 2025 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
	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3	DB1 DB2 DC1 DC2 DC3
	CLP	CLP1	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2	CLP1 CLP2
	40Ktpy LiOH	40Ktpy LiOH	21MW	15Ktpy LiOH	21MW	15Ktpy 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%
Payback (year)	6	4	4	4	7	5
CAPEX €M	665	1,073	226	474	438	700
CAPEX Geo			226		438	
CAPEX DLE		751		291		460
CAPEX CLP	0.066	322		182		240
OPEX €/KWh or LiOH€/t		2,681	0.078	3,201	0.061	2,855

A sensitivity analysis of the lithium component of the Vulcan project has been carried out considering the lithium hydroxide price, brine flow rate, FX, OPEX and CAPEX costs at 5% increments (between +/-15%). Using these sensitivities, the analysis indicates that the project is most sensitive to the items directly impacting revenue (brine flow rate and lithium price). The project is relatively insensitive to operating and capital costs. The project retains a positive IRR and NPV with -30% sensitivity applied to Li price, flow rate, OPEX and CAPEX individually.



LITHIUM BUSINESS	
GB1 GB2 GC1 GC2 GC3	
DB1 DB2 DC1 DC2 DC3	
CLP1	CLP2
40Ktpy LiOH	
LiOH Price	$14,925
LiOH Price	€12,542
Revenues (€M/y)	499
Net Op. Cash Fl.	394
NPV Pre-tax €M	2,803
NPV Post-tax €M	**1,897**
IRR Pre-tax	31%
IRR Post-tax	**26%**
Payback (year)	**4**
CAPEX €M	1,073
OPEX LiOH €/t	**2,681**

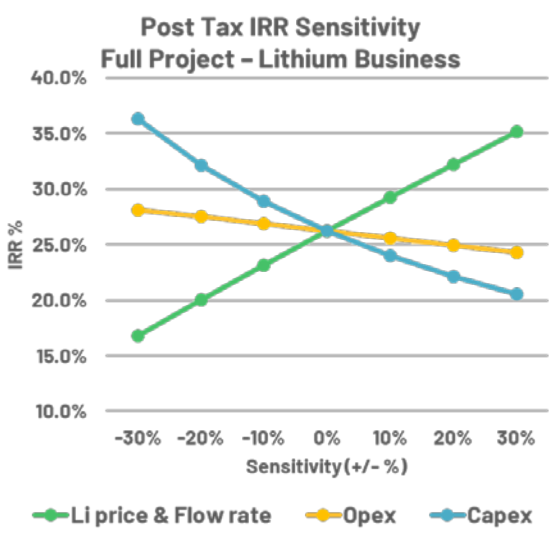


Figure 15: Sensitivity analysis chart on lithium NPV & IRR. Lithium price and flow rate are not aggregated but have the same effect in the sensitivity analysis.

To achieve the outcomes of this study, initial funding in the order of 700m EUR (including contingency) will be required, and a further 1,138m EUR will be required for Phase 2. It should be noted that, as with any project at this stage, the ability to develop the project may depend on the future availability of funding, and while the Company believes it has reasonable basis to assume that future funding will be available and securable, this is not guaranteed. Industry best practice exploration for deep geothermal brine occurs using 2D and 3D-seismic data acquisition, analysis and interpretation, which Vulcan has completed. As stated in the text of this announcement, in deep geothermal brine projects, the first well drilled is also the first production well, so it follows that financing for the production well drilling is expected to occur first, after a definitive or bankable feasibility study is completed. Vulcan Executive Director Dr. Horst Kreuter is an expert on developing and financing deep geothermal projects in Germany and worldwide, including having started the first geothermal development company in Germany, therefore Vulcan's Board has direct experience and has been involved in examples of how the funding process works in this type of project. There are numerous examples of projects financed in this way, prior to drilling, within the same area as Vulcan in the Upper Rhine Valley. Over the past 16 months, the Company has significantly advanced discussions with traditional debt and equity financiers in Europe, including some of the largest European-Union backed, state-owned and private development banks in Europe. This has resulted in written support already being provided by some of these institutions for the provision of senior debt for the project, based on the project progress to date. The Project further benefits from being one of only two lithium projects financially and administratively backed by EU-group EIT InnoEnergy, which is the founder and steward of the European Battery Alliance, that counts among its members the most significant financiers of battery metals, battery and electric vehicle projects in Europe including the European Investment Bank. InnoEnergy has placed Vulcan on its Business Investment Platform, through which it is further assisting Vulcan with conversations with European financiers. The size and location of the deposit, together with other strong project fundamentals, in the middle of large end users associated with European electric vehicles that is driving lithium demand makes the project a strategic asset as evidenced by the large interest shown in the Project by public/private banks, financiers, end users and large lithium specialist companies to-date. An improvement in market conditions since work commenced and a perceived high growth outlook for the global lithium market enhance the Company's view of the fundability of the Project. Based on this, the Board is confident the Company will be able to finance the Project through a combination of syndicated senior debt, export credits, industry related hybrid debt, equity and forward sales at the Project level. The size of the Project will necessitate a syndicate of banks and in the current low interest rate European market the Project represents a higher yield opportunity. The Company is also considering the bond market in view of the increasing market and availability of ESG bonds seeking opportunities which meet ESG criteria and have longer term yields. The Board has relevant experience in funding large scale projects with Mr Rezos, the Chairman, having been involved in funding large scale mining projects and energy projects as a former Investment Banking Director of HSBC Holdings with direct project finance, syndicated debt, export credits, bond and equity experience in multiple jurisdictions, including Europe. Mr Rezos was also a non-executive director of Iluka Resources Limited at the time of funding and developing the large-scale Jacinta Ambrosia and Murray Basin projects. Dr Horst Kreuter, has been involved in developing and funding a number of geothermal projects in Germany. For the reasons outlined above, the Board believes that there is a "reasonable basis" to assume that future funding will be available and securable.

Project Risk and Opportunities

As is normal at this stage of engineering, several risks remain. Key risks that can significantly affect the project outcomes are listed below:

- Site selection – Both DLE and Conversion Plant sites remain to be selected. Several potential sites have been identified, which have been used in this study. The PFS assumes a flat greenfield site with services at the site boundary and no piling or blasting required. The site influences the project scope and can have a considerable impact on both the capital and operating costs due to geotechnical, utilities, environmental, logistics, and social acceptance considerations. To be mitigated with ongoing site selection activities.

- DLE sorbent selection, system configuration and performance – four different DLE sorbents have undergone lab scale testing using untreated and/or treated Upper Rhine Valley brine, and the final sorbent to be used in the commercially facility remains to be selected. Testwork at a vendor was used to determine expected lithium chloride concentrations, while the vendors' benchmarks were used to determine likely operating parameters, recoveries, and sorbent life. Nevertheless, there remains much testwork to be done to clarify the sorbent operating parameters, performance (recovery, concentrations, selectivity, life, and impact of impurities), the overall system configuration, and level of brine treatment required prior to the DLE system. In addition, cost of sorbent, and delivery schedules, remain to be negotiated with vendors. Should the sorbent or the operating parameters change, then the capex, opex and schedule may be materially affected. To be mitigated with further testwork and sorbent vendor negotiations. Vulcan is presently constructing a pilot unit to further test the sorbents and brine treatment. Vulcan is presently in contact with various vendors.
- Limited testwork has been performed at this stage of engineering, with multiple areas relying on benchmarks, simulations, literature, or vendor experience for process definition and costing. To be mitigated with additional laboratory and pilot scale testwork.
- Water consumption and supply – The DLE water consumption is based on vendor benchmarks but must be confirmed for the project specific conditions, the final sorbent selection, and the final DLE system configuration. Methods of reducing water consumption are possible and remain to be investigated. The water supply will depend on the site and local constraints. To be clarified with further testwork and equipment design, and mitigated in site selection.
- Depleted brine composition, reinjection and permitting – to be clarified with further testwork and mitigated via consultation with authorities.
- LiCl electrolysis – Lithium chloride electrolysis to produce LiOH solution is similar to the very common sodium chloride electrolysis (chloralkali process) that is widely used worldwide to produce NaOH and Cl_2 gas or HCl. Nevertheless, there are several key differences in the technology and operation, and there is presently no lithium hydroxide production via electrolysis being performed commercially. To be mitigated with testwork and selection of vendors with appropriate experience. Vulcan also has the lower risk option to produce LHM via the "traditional route", with a lithium carbonate step and then liming.
- Schedule delays – A high level project schedule has been prepared based on typical project durations and the input from Vulcan and gec-co. There are several items that can impact the schedule as follows: (a) extent and duration of testwork, (b) access to brine for testwork, (c) negotiations with technology providers, (d) negotiation for site purchase, (e) permitting durations and requirements given the novel nature of the application and multiple jurisdictions, and (f) financing requirements. To be mitigated by extensive focus on risk mitigation, site selection, testwork, and permitting and financing requirements. An ongoing commitment to these activities is critical to provide data to firm up the process design, provide key sizing data to firm up equipment sizing, and to allow decisions to move the project forward. Sufficiently large owners, consultant, and engineering teams must be mobilized so that risks can be addressed in a timely manner.
- Vulcan's Lithium Brine Project geologically represents an early-stage exploration project. While Vulcan has geological information from wells within its licenses, at present, Vulcan has yet to drill a geothermal production well at the Ortenau and Taro Licences and there are no operating wells that have sampled the Buntsandstein Group and/or Permo-Triassic aquifer brine in these two license areas (Note: there is an active geothermal well accessing Permo-Triassic aquifer brine within the MoU Geothermal area). This is in keeping

with standard practice for deep geothermal projects. Accordingly, one uncertainty relates to the lack of current access to deep-seated subsurface brine within the boundaries of the licenses. This has led to several assumptions in the resource estimation process including Li brine concentration and average porosity of the resource domains. It has also led to the assumption that testwork with neighbouring brines is sufficiently representative. In deep geothermal brine projects in the URG, exploration is typically conducted with seismic data acquisition and interpretation, with the first well drilled as the first production well. Because brine cannot currently be sampled from the Buntsandstein Group and/or Permo-Triassic aquifer underlying the Taro and Ortenau licenses, the Mineral Resources CP relied on geochemical data associated with Vulcan's 2019 URG brine sampling that included, off-licence, but proximal geothermal well locations. In the Mineral Resources CP's experience, confined aquifers in sedimentary basins can have massive spatial extent and with homogeneous to semi-homogeneous lithium-in-brine concentrations. So, it is the Mineral Resources CP's opinion that the Li-brine content of neighbouring wells are a good proxy of lithium in the Permo-Triassic aquifer domains within the URG. Permo-Triassic brine sampled from the MoU Geothermal area were used to verify and support the average lithium value used in the resource estimations. There are, however, always local chemical variations due to numerous geological factors, so this is a risk that will be mitigated by first production drilling of geothermal wells.

- There is a significant amount of effective porosity measurements on Buntsandstein and Rotliegend drill cores, however, none of the wells were collared within the boundaries of the licenses. Consequently, the Ortenau and Taro resource estimation processes assume average matrix and fracture porosities. It is possible that the porosity of any given resource domain is higher, or lower, than the values used because porosity and permeability can be variable in most shoreface depositional settings, particularly those that contain diagenetic and secondary cements. For the Li-brine resources, the Mineral Resources CP has attempted to utilize reasonable and conservative porosity values to define the resource domains and in the resource calculations. Future work should be planned to include drilling the first production well, to confirm the porosity and Li brine concentration assumptions used.
- There is risk and uncertainty associated with exploring for and exploiting fault zones as geothermal and Li-brine reservoirs. For example,
    - The architecture of a fault at depth is difficult to predict due to the heterogeneous nature of sedimentary rocks and the complexity of any fault zone. For example, the fault zone could have a single damage zone or a fault core with damage zones on either side and/or the damage zone could be anisotropic. Again, the design of the production-injection wells could resolve fluid flow issues, but this could prompt additional resources to maximize production from any given fault zone.
    - Numeric reservoir modelling studies in public literature have shown that localized high porosity/permeability can lead to channelling effects such that the geothermal reservoir potentially becomes restricted to only occurring within the fault zone. Thus, the exploitation of fault zones can constitute a trade-off between high permeability and reduced reservoir volumes.

Various opportunities also exist including:

- Optimizing process conditions (and therefor capital cost and operating costs) to improve recovery, simplify process steps, reduce sorbent quantities, reduce steam requirements – to be incorporated via testwork and engineering studies
- Reduce capital cost by optimizing the process conditions; investigating alternative equipment or process steps; optimizing equipment number, size and materials of construction; increasing the vendor base;

combining buildings; modularisation; and/or off-site construction – to be incorporated via testwork, engineering studies (trade-offs), and procurement studies.

To achieve the outcomes of this study, initial funding in the order of 700m EUR (including contingency) will be required, and a further 1,138m EUR will be required for Phase 2. It should be noted that, as with any project at this stage, the ability to develop the project may depend on the future availability of funding, and while the Company believes it has reasonable basis to assume that future funding will be available and securable, this is not guaranteed. Over the past 16 months, the Company has significantly advanced discussions with traditional debt and equity financiers in Europe, including some of the largest European-Union backed, state-owned and private development banks in Europe. This has resulted in written support already being provided by some of these institutions for the provision of senior debt for the project, based on the project progress to date. The Project further benefits from being one of only two lithium projects financially and administratively backed by EU-group EIT InnoEnergy, which is the founder and steward of the European Battery Alliance, that counts among its members the most significant financiers of battery metals, battery and electric vehicle projects in Europe including the European Investment Bank. InnoEnergy has placed Vulcan on its Business Investment Platform, through which it is further assisting Vulcan with conversations with European financiers. The size and location of the deposit, together with other strong project fundamentals, in the middle of large end users associated with European electric vehicles that is driving lithium demand makes the project a strategic asset as evidenced by the large interest shown in the Project by public/private banks, financiers, end users and large lithium specialist companies to-date. An improvement in market conditions since work commenced and a perceived high growth outlook for the global lithium market enhance the Company's view of the fundability of the Project. Based on this, the Board is confident the Company will be able to finance the Project through a combination of syndicated senior debt, export credits, industry related hybrid debt, equity and forward sales at the Project level. The size of the Project will necessitate a syndicate of banks and in the current low interest rate European market the Project represents a higher yield opportunity. The Company is also considering the bond market in view of the increasing market and availability of ESG bonds seeking opportunities which meet ESG criteria and have longer term yields. The Board has relevant experience in funding large scale projects with Mr Rezos, the Chairman, having been involved in funding large scale mining projects and energy projects as a former Investment Banking Director of HSBC Holdings with direct project finance, syndicated debt, export credits, bond and equity experience in multiple jurisdictions, including Europe. Mr Rezos was also a non-executive director of Iluka Resources Limited at the time of funding and developing the large-scale Jacinta Ambrosia and Murray Basin projects. Dr Horst Kreuter, has been involved in developing and funding a number of geothermal projects in Germany. For the reasons outlined above, the Board believes that there is a "reasonable basis" to assume that future funding will be available and securable.

Zero Carbon Lithium®

For and on behalf of the Board

Robert Ierace

Chief Financial Officer - Company Secretary

For further information visit www.v-er.com

Cautionary Statement

Some of the statements appearing in this announcement may be in the nature of forward-looking statements. You should be aware that such statements are only predictions and are subject to inherent risks and uncertainties. Those risks and uncertainties include factors and risks specific to the industries in which Vulcan operates and proposes to operate as well as general economic conditions, prevailing exchange rates and interest rates and conditions in the financial markets, among other things. Actual events or results may differ materially from the events or results expressed or implied in any forward-looking statement. No forward-looking statement is a guarantee or representation as to future performance or any other future matters, which will be influenced by a number of factors and subject to various uncertainties and contingencies, many of which will be outside Vulcan's control.

Vulcan does not undertake any obligation to update publicly or release any revisions to these forward-looking statements to reflect events or circumstances after today's date or to reflect the occurrence of unanticipated events. No representation or warranty, express or implied, is made as to the fairness, accuracy, completeness or correctness of the information, opinions or conclusions contained in this announcement. To the maximum extent permitted by law, none of Vulcan, its Directors, employees, advisors or agents, nor any other person, accepts any liability for any loss arising from the use of the information contained in this announcement. You are cautioned not to place undue reliance on any forward-looking statement. The forward-looking statements in this announcement reflect views held only as at the date of this announcement. This announcement is not an offer, invitation or recommendation to subscribe for, or purchase securities by Vulcan. Nor does this announcement constitute investment or financial product advice (nor tax, accounting or legal advice) and is not intended to be used for the basis of making an investment decision. Investors should obtain their own advice before making any investment decision.

Information included in this release constitutes forward-looking statements. Often, but not always, forward looking statements can generally be identified by the use of forward looking words such as "may", "will", "expect", "intend", "plan", "estimate", "anticipate", "continue", and "guidance", or other similar words and may include, without limitation, statements regarding plans, strategies and objectives of management, anticipated production or construction commencement dates and expected costs or production outputs.

Forward looking statements inherently involve known and unknown risks, uncertainties and other factors that may cause the company's actual results, performance and achievements to differ materially from any future results, performance or achievements. Relevant factors may include, but are not limited to, changes in commodity prices, foreign exchange fluctuations and general economic conditions, increased costs and demand for production inputs, the speculative nature of exploration and project development, including the risks of obtaining necessary licences and permits and diminishing quantities or grades of reserves, political and social risks, changes to the regulatory framework within which the company operates or may in the future operate, environmental conditions including extreme weather conditions, recruitment and retention of personnel, industrial relations issues and litigation.

Forward looking statements are based on the company and its management's good faith assumptions relating to the financial, market, regulatory and other relevant environments that will exist and affect the company's business and operations in the future. The company does not give any assurance that the assumptions on which forward looking statements are based will prove to be correct, or that the company's business or operations will not be affected in any material manner by these or other factors not foreseen or foreseeable by the company or management or beyond the company's control.

Although the company attempts and has attempted to identify factors that would cause actual actions, events or results to differ materially from those disclosed in forward looking statements, there may be other factors that could cause actual results, performance, achievements or events not to be as anticipated, estimated or intended, and many events are beyond the reasonable control of the company. Accordingly, readers are cautioned not to place undue reliance on forward looking statements. Forward looking statements in these materials speak only at the date of issue. Subject to any continuing obligations under applicable law or any relevant stock exchange listing rules, in providing this information the company does not undertake any obligation to publicly update or revise any of the forward-looking statements or to advise of any change in events, conditions or circumstances on which any such statement is based.

Statements regarding plans with respect to the Company's mineral properties may contain forward looking statements in relation to future matters that can only be made where the Company has a reasonable basis for making those statements. This announcement has been prepared in compliance with the JORC Code 2012 Edition and the current ASX Listing Rules.

The Company believes that it has a reasonable basis for making the forward-looking statements in this announcement, including with respect to any mining of mineralised material, modifying factors and production targets and financial forecasts. The following information is specifically provided in support of this belief:

The PFS was completed by independent specialist firms with oversight provided by the Company's in-house team.

As is normal for this type of study, the PFS has been prepared to an overall level of accuracy of approximately ±25% for capital and operating costs. Production targets and financial forecasts disclosed in this announcement are based exclusively on Indicated Resource categories as defined under the JORC Code 2012.

All material assumptions on which the forecast financial information is based have been included in the announcement.

Competent Person Statement:

Information in this release that relates to Exploration Result and Mineral Resource summaries has been prepared and reviewed by Mr. Roy Eccles P. Geol. and Mr. Steven Nicholls MAIG, who are both full time employees of APEX Geoscience Ltd. and deemed to be both a 'Competent Person'. Both Mr. Eccles and Mr. Nicholls have sufficient experience relevant to the style of mineralization and type of deposit under consideration and to the activity which they are undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australian Code for the Reporting of Exploration Results, Mineral Resources, and Ore Reserves (JORC Code). Mr. Eccles and Mr. Nicholls consent to the disclosure of the technical information as they relate to the mineral resource information in this News Release in the form and context in which it appears.

Information in this release that relates to Production Targets and Reserves has been reviewed by Mr. Greg Owen P.Eng., who is a full time employee of GLJ Ltd. and deemed to be a "Competent Person". Mr. Owen has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity that he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the Australian Code for the Reporting of Exploration Results, Mineral Resources, and Ore Reserves (JORC Code). Mr. Owen consents to the disclosure of the technical information as they relate to the Production Target and Reserve information in this News Release in the form and context in which it appears.

Appendix 1: Peer Comparison Data

Company	Code	Project	Stage	Resource Category	Resources M tonnes	Resource Grade (Li2O)	Contained LCE Tonnes	Information Source
European Metals	ASX: EMH	Cinovec	PFS Complete	Indicated & Inferred	695.9	0.42	7.22	Corporate Presentation Released October 2020
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	ASX Announcement Released 22 August 2019
Savannah Resources	AIM: SAV	Barroso	PFS Complete	Measured, Indicated & Inferred	27.0	1.00	0.71	Corporate Presentation Released November 2020

The Company is not aware of any new information or data that materially affects the information contained in the above sources or the data contained in this announcement.

Appendix 2: JORC Tables

JORC Code 2012 Table 1. Section 1: Sampling Techniques and Data.

Criteria	JORC Code Explanation	Commentary
Sampling techniques	• Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling. • Include reference to measures taken to ensure sample representivity and the appropriate calibration of any	• In the Upper Rhine Graben (URG), Germany, O&G exploration is focused dominantly on Triassic-aged reservoirs. In contrast, geothermal wells access hot brine from Permocarboniferous Rotliegend Group and Lower Triassic Buntsandstein Group (collectively, Permo-Triassic) sandstone aquifers/reservoirs overlying the basement. These geothermal wells, however, are limited in the URG. Consequently, Vulcan brine sampling programs were limited to collecting Permo-Triassic brine samples from: o 4 different geothermal wells located throughout the URG (and in the vicinity of Vulcan's Ortenau and Taro Licences) to verify historically reported lithium concentrations. o the Geothermal Plant production well in the Geothermal MoU Area. • Brine can be sampled at the well head, (the hot side of the production circuit) or after the heat exchanger (the cold side of the geothermal production circuit) prior to reinjection of the brine back down into the aquifer. Brine samples taken at the well head require a cooling mechanism (e.g., brine flows through a tube immersed in ice) and a mobile degasser unit to reduce CO_2. No special equipment is required on the cold side of the production circuit.

	measurement tools or systems used. • Aspects of the determination of mineralisation that are Material to the Public Report. • In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	• The brine samples were collected by Geothermal Engineering GmbH as commissioned by Vulcan. • The Mineral Resources CP collected independent brine samples at the Geothermal MoU Area the results of which confirm the lithium-enriched brine mineralization, the Vulcan sampling program analytical results and historical lithium-in-brine analytical results. • The Mineral Resources CP has reviewed the techniques of the regional brine sampling and the Geothermal MoU Area brine sampling programs and found the sampling was conducted using reasonable techniques in the field of brine assaying and there are no significant issues or inconsistencies that would cause one to question the validity of the sampling technique used by Vulcan. • QA-QC work as part of the sampling program included Sample Blanks (deionized water with no lithium) and Sample Standards (a laboratory prepared brine standard that assimilates hypersaline brine with a fixed value of lithium). The Blanks and Standards were randomly inserted into the sample stream. • Vulcan and Geothermal Engineering GmbH maintained chain of custody of the brine samples from the geothermal well sample point to the respective laboratories in Germany (University of Karlsruhe and University of Heidelberg). In addition, 4 brine samples collected by Geothermal Engineering GmbH were couriered to the Mineral Resources CP in Edmonton, Alberta Canada for analysis at a commercial Canadian Laboratory (AGAT Laboratories and Bureau Veritas Laboratory [formerly Maxxam Analytical]). The CP-collected brine samples were also analyzed at the 2 Canadian laboratories. • The Vulcan- and Mineral Resources CP site inspection-collected samples verified the Geothermal MoU Area and historical lithium analytical results and confirmed the Permo-Triassic brine in the URG is enriched in lithium. • The average analytical results of brine from the 4 regional wells were identical to the average results from the Geothermal MoU Area, 181 mg/L Li. This result is an indication of the homogeneous lithium concentration of Permo-Triassic aquifer brine in the sampled portions of the URG (and in the vicinity of Vulcan's Taro and Ortenau licenses)
Drilling techniques	• Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc)	• Vulcan has yet to conduct any drilling in the Ortenau and Taro licenses and is reliant on existing geothermal wells outside of the Ortenau and Taro Licence to access brine chemistry. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license.

	and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	• With respect to drilling information for the Geothermal MoU Area, please refer to the Table 1 information provided in Vulcan's ASX announcement dated 20 January 2020.
Drill sample recovery	• Method of recording and assessing core and chip sample recoveries and results assessed. • Measures taken to maximise sample recovery and ensure representative nature of the samples. • Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	• Vulcan has yet to conduct any drilling and/or drill core sampling at the at the Ortenau and Taro licences and is reliant on existing geothermal wells outside of the Ortenau and Taro Licences to access brine. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • Regional geothermal wells and the Geothermal MoU Area samples were recovered directly from the flowing brine stream within the geothermal facility brine circuit. • The brine sample collection method and sample collection documentation are in accordance with reasonable Li-brine sampling expectations and Li-brine industry standards. • There are 2 historical geothermal wells, or petroleum wells, drilled by companies other than Vulcan that extend deep enough to penetrate Permo-Triassic strata within the Ortenau Licence. The two historical wells were drilled in the southern and northeastern portions of the Ortenau Property, respectively. With respect to brine analytical results, these wells are discussed in more detail in Section 2, Other Substantive Exploration Data.
Logging	• Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and	• Vulcan has yet to conduct any drilling at the Ortenau and Taro licences. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • During 2020, Vulcan commissioned Geothermal Engineering GmbH to reinterpret existing 2-D seismic data in the Ortenau Licence area. This interpretation benefited from a review of historical well logs from two wells. These well logs were created by companies other than Vulcan but benefited the understanding of the subsurface strata underlying Ortenau. That is, the historical well logs helped to orientate the seismic line profiles and confirm

	metallurgical studies. • Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography. • The total length and percentage of the relevant intersections logged.	and validate key stratigraphic marker horizons including the Buntsandstein surface and fault zones that are critical to the Ortenau Licence resource estimation process. • During 2020, Vulcan acquired detailed lithological and downhole geophysical measurements from a geothermal well which is located approximately 18 km northeast of the Taro license and 81 km north of the Ortenau Licence and penetrated through Permo-Triassic strata; the same strata being assessed by Vulcan. Wireline logging runs were performed in the open hole section from 3,155 m MD to approximately 3,294 MD and included: FMI-GR (resistivity image, caliper), DSI-GPIT-PPS-GR (sonic, caliper), LDS-GR (density, photo electric factor), and UBI-GR (acoustic image). The downhole information provided both qualitative (e.g., litho-logs) and quantitative information such as porosity and permeability measurements. These data were used to study and assess the hydrogeological characteristics and variations between, for example, host rock matrix porosity and fault zone fracture porosity. • In addition, the project benefited from oil and gas, and geothermal, log data and seismic profile data that has been compiled into 3-D national geothermal information systems. This work was conducted by state geological surveys and coalitions of German Government and academic working groups and include data and interpretations from geophysical seismic sections and more than 30,000 oil and gas wells, geothermal, thermal, mineral water and mining well boreholes in the Vulcan Project area and URG.
Sub-sampling techniques and sample preparation	• If core, whether cut or sawn and whether quarter, half or all core taken. • If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry. • For all sample types, the nature, quality and appropriateness of the sample preparation technique.	• With respect to the Vulcan 2019 brine sampling programs, 3 aliquots of brine were collected at each sample point for various analytical work that included: o anion chemistry; o trace metal ICP-OES; and o dissolved metal ICP-OES. • Brine was collected from the hot and cold circuit sample points to gain an understanding of whether the geothermal plant cycle has any influence on the lithium concentration as the brine cycles through the plant. • The QA-QC protocol included the random insertion of a sample blank (composed of ionized water with no lithium) and a standard sample (a laboratory created Li-brine standard). • The Sample Blanks and Standard Samples were inserted into the sample stream at each sample site.

	• Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples. • Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling. • Whether sample sizes are appropriate to the grain size of the material being sampled.	• In addition, duplicate samples were collected at each sample site and the duplicate sample geochemical analyses was conducted at numerous laboratories that included independent University and commercially accredited laboratories. All labs had experience with analyzing lithium in brine. • The sample sizes were appropriate for industry standard brine assay testing. • The brine was collected from perforation points within the geothermal production well. The perforation point at each well sampled was assessed using log data and it was confirmed that the wells were producing from Permo-Triassic reservoirs. Accordingly, the Mineral Resources CP can confirm that the brine sample is representative of the brine being drawn from depths associated with the Permo-Triassic aquifer. The Permo-Triassic aquifer is the focus of Vulcan's Li-brine exploration and the resource estimation work conducted at the Ortenau and Taro licences.
Quality of assay data and laboratory tests	• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total. • For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and	• The same brine sample collection, sample handling, analytical techniques, and QA-QC protocols were used for the regional well sampling and the Geothermal MoU Area well sampling programs. • Site Inspection: Data verification procedures applied by the Mineral Resources CP were performed to confirm the Li-brine mineralization at the Geothermal MoU Area. A Permo-Triassic brine sample collected by the Mineral Resources CP during the site inspection was split and analyzed at 2 separate commercial labs in Edmonton, Alberta Canada (AGAT Laboratory and Bureau Veritas Laboratory). The analytical result of the CP collected samples contained a mean value of 180 mg/L Li substantiating lithium-enriched brine in deep URG aquifer. • As per Vulcan's QA/QC, the Company commissioned the University of Alberta to prepare a laboratory prepared Sample Standard by adding a measured amount of elemental lithium to a hypersaline brine concoction. • A sample blank (composed of ionized water with no lithium) and a standard sample (a laboratory created Li-brine standard) were inserted into the sample stream at each sample site. • The resulting data – as they pertain to the Sample Blank and Standard Sample samples – were excellent and show the

	their derivation, etc. • Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.	analytical data were performed with high precision. The results helped the Mineral Resources CP deem the data acceptable for the purpose of estimating a mineral resource. • The lithium content (and trace elements) of the brine samples were analyzed by inductively coupled plasma optical emission spectrometry (ICP-OES), which is a standard analytical technique and industry standard for the measurement of lithium-in-brine. • A split of Vulcan's 2019 samples was sent by courier to APEX and analyzed at AGAT Laboratories in Edmonton, AB Canada. A comparison of the analytical results between the 3 laboratories yields RSD% values of between 1.3% and 9.6%. • It is concluded that there is very good data quality of Vulcan 2019 Li-brine analytical results between the 3 independent labs.
Verification of sampling and assaying	• The verification of significant intersections by either independent or alternative company personnel. • The use of twinned holes. • Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols. • Discuss any adjustment to assay data.	• Vulcan has yet to conduct any drilling or core sampling at the project, and hence, there are no twinned hole information to report. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • Data verification procedures applied by the Mineral Resources CP were performed on key data components as they pertain to the mineral resource estimation. • Analytical brine data were prepared by independent and third-party universities and or accredited commercial laboratories. • Data verification procedures applied by the Mineral Resources CP were performed to confirm the Li-brine mineralization within the Permo-Triassic aquifer. For example, a Permo-Triassic brine sample collected by the CP during the site inspection was split and analyzed at 2 separate commercial labs in Edmonton, Alberta Canada (AGAT Laboratory and Bureau Veritas Laboratory). The analytical result contained a mean value of 180 mg/L Li substantiating lithium-enriched brine in deep URG aquifer. The analytical result is nearly identical to the average analytical results of the regional well sampling and Geothermal MoU Area well sampling (181 mg/L Li). • Accordingly, no adjustments to the assay data were made, or necessary. The analytical results, and the QA-QC measures adopted by Vulcan were satisfactory and the original laboratory data were used in the resource estimation process. • The author has reviewed all geotechnical and geochemical data and found no significant issues or inconsistencies that would cause one to question the validity of the historical Li-brine geochemical data – and Vulcan's 2019 brine geochemical results –

		to verify that the Permo-Triassic aquifer is consistently enriched in lithium in the deep-seated strata and aquifer underlying the URG. • Based on the Mineral Resources CP's experience of measuring lithium in large subsurface, near basement, aquifers – it is commonplace for the reservoirs to have homogenous Li-brine contents, and therefore, the CP is confident to apply an average Li-brine value of 181 mg/L Li to the Permo-Triassic strata underlying Vulcan's Ortenau and Taro licences.
Location of data points	• Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation. • Specification of the grid system used. • Quality and adequacy of topographic control.	• Vulcan has yet to conduct any drilling or core sampling at the project. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • The regional brine samples were collected from established geothermal wells (owned by geothermal companies other than Vulcan). • Brine the Geothermal MoU Area was collected from production well at the plant, as detailed in the ASX announcement on 20/01/20. • The grid system used is UTM WGS84 zone 32N. • The surface Digital Elevation Model used in the three-dimensional model was acquired from JPL's Shuttle Radar Topography Mission (SRTM) dataset; the 1 arc-second gridded topography product provides a nominal 30 m ground coverage.
Data spacing and distribution	• Data spacing for reporting of Exploration Results. • Whether the data spacing, and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and	• Vulcan has yet to conduct any drilling, core sampling or brine sampling at the project. • With respect to the subsurface data, a subsurface interpreted 3-D geological model was used to outline the Permo-Triassic aquifer and fault domains underlying the Ortenau Licence. This was done through the reinterpretation of existing 2-D seismic data that was acquired in 2020 for use by Vulcan. The seismic data included: o The usage of twelve 2-D seismic lines were acquired and consist of 8 northwest to southeast orientated lines with 4 perpendicular southwest to northeast tie lines. The total length of the 12 survey lines is 166.0 km. This length includes the whole length of line 7719 (24.8 km), but only the 15.6 km of the line were acquired (i.e., the portion of the line that is in the Ortenau Licence). The surveys were conducted between 1975 and 1978. o The usage of three 2-D seismic lines were acquired and consist of 2 northwest to southeast orientated lines with 1 perpendicular southwest to northeast tie line. The total

	classifications applied. • Whether sample compositing has been applied.	length of the 3 survey lines is 47.7 km. The surveys were conducted in either 1979 (x2 lines) or 1983 (1 line). • With respect to the 2020 acquired 2-D seismic lines and development of an enhanced 3-D geological model, the seismic data and ensuing model covers 100% of the Ortenau Licence. The distance between the seismic lines ranges from 800 m to 6 km. • Taro Licence: During 2020, Vulcan acquired existing 2009 seismic data, which was composed of a 3-D Seismic Cube and four 2-D seismic lines. The 3-D cube seismic data covers the entire model area. The 2-D seismic profiles include, generally, 3 east-west lines and 1 north-south line. The maximum distance between any of the lines is 2.7 km (east area). The 3-D geological model derived from the seismic information covers 82% of the Taro Licence. • The orientation of the Permo-Triassic strata is generally flat-lying and continuous in the Licence concessions. As the strata are situated within the URG, high-angle faults have created a complex horst and graben structural environment; having said this, the Permo-Triassic strata maintain their lateral continuity despite being juxtapositioned by rift events. • While locally there is minor faulting and slight offsets, the horizontal continuity of the Permo-Triassic sandstone units is tremendously uniform. This statement is supported by knowledge that the Permo-Triassic strata has been mapped for approximately 250 km along the north-northeast strike length of the entire Upper Rhine Graben. • With respect to brine sampling, and using the Geothermal MoU Area as an example, the brine samples were collected from a well that had 2 separate perforation windows to collect the brine, which is then pumped to the surface for geothermal power processing. The perforation windows are 356 m and 147 m thick. Because the sampled product is a brine in liquid-form and pressurized with CO_2, the affect would mean the brine is sampled from a relatively large Permo-Triassic aquifer domain underlying the area. I.e., a representative sample of the overall Permo-Triassic aquifer/reservoir. • With respect to Li-brine concentration, the brine analytical results from both the regional well sampling and detailed sampling at the Geothermal MoU Area is identical with average values of 181 mg/L Li. In addition, these values are comparable to historical and proprietary lithium concentrations that were compiled from throughout the URG. The combination of Vulcan-sampled and historically sampled and analyzed brine shows a homogenous Li-brine in the Permo-Triassic aquifer brine in the vicinity of Vulcan's licences, including the Ortenau Licence.

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		• With respect to spacing between sample points, there were no Li-brine samples collected within the boundaries of the Ortenau and Taro Licences. The closest wells include the Geothermal MoU Area (14 km south of Taro, 44 km north of Ortenau), Landau (11 km southwest of Taro, 50 km north of Ortenau) and Brühl (18 km northeast of Taro, 81 km north of Ortenau) wells.
Orientation of data in relation to geological structure	• Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. • If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	• Vulcan has yet to conduct any drilling and/or core sampling at the project. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • The geothermal wells investigated are highly deviated wells intended to angle into fault zones that enable zones of high fluid flow. At the Geothermal MoU Area, for example, the perforation windows (356 m and 147 m thick) indiscriminately sample Permo-Triassic brine in the liquid form within a large-scale aquifer. Based on the overall dimensions of the Permo-Triassic aquifer and consistent analytical results, no sample bias is expected. • The 3-D geological models at Ortenau and Taro utilized 3-D seismic cube and/or 2-D seismic profile lines that were acquired by Vulcan specifically for the purpose of improving the 3-D geological model. In the seismic interpretation, 7 formation horizons (Taro) and 4 formation horizons (Ortenau) were selected based on the uniqueness of the marker horizons within the seismic profiles. The 3-D geological model at Ortenau utilized 17 2-D seismic profile lines. The 3-D geological model at Taro utilized an existing 3-D Seismic Cube, four 2-D seismic lines. • At Taro, the faults were interpreted by evaluating every tenth inline and crossline (line spacing of approximately 20 m). To interpret fault zones, the faults must have a minimum horizontal extension of 400 m or more.A total of 31 faults were interpreted to penetrate through the Permo-Triassic strata at the Taro Licence. Of the 31 faults, 12 faults were used in the Taro geological model and resource estimation process. • At Ortenau, fault zones were picked only where they could be positively identified in the seismic lines and the faults were correlated in consideration of their offset, dip angle and depth. The Ortenau subsurface is characterized by a complex fault geometry within the URG. A total of 24 faults were used in the Ortenau geological model and resource estimation process. • In the opinion of the Mineral Resources CP, the revised Taro geological model using the seismic data provided a higher level of confidence in the spatial location and orientation of the Buntsandstein, Rotliegend and basement surfaces and fault zones.

- At Ortenau, the base of the Buntsandstein Group could not be clearly identified because the boundary between Buntsandstein and Permian strata overlying the crystalline basement do not exhibit a distinct lithological change in the seismic profiles. To construct the base Buntsandstein surface, Geothermal Engineering GmbH used an average Buntsandstein Group thickness of 375 m based on published thickness data from throughout the Upper Rhine Graben. Because it is not possible to confidently observe laterally continuous reflector bands below the top of the Buntsandstein Group, it was not possible to map the Rotliegend Group, and therefore, the Permocarboniferous strata are not modelled in this Ortenau Licence resource estimation. .

- The 4 marker horizons were validated against litho-logs from the acquired well data drilled in the south and northeast portions of the Ortenau Licence area. It is concluded that there is good agreement between the reinterpreted seismic line data and the in-situ stratigraphy throughout the Ortenau Licence and that these data are reasonable and reliable for designing a 3-D geological resource model.

- Fault zones were delineated in the seismic software, OpendTect, in which the Geothermal Engineering GmbH picked fault zone only where they could be positively identified in the seismic lines and the faults were correlated in consideration of their offset, dip angle and depth. A total of 24 faults were interpreted for the entire Ortenau Licence area. These faults were interpreted to penetrate downwards through the Buntsandstein Group strata at the Ortenau Licence and is therefore used to develop the 3-D geological model for use in the resource estimation process.

- In the opinion of the Mineral Resources CP, the revised Ortenau and Taro 3-D geological model using the acquired seismic data provided a higher level of confidence in the spatial location and orientation of the Buntsandstein and Permo-Triassic surfaces and fault zones.

- Detailed studies of nearby well geothermal data acquired by Vulcan in 2020 helped to understand the hydrogeological characteristics of the fault/fracture zones within the Permo-Triassic strata. The structurally complex fault damage zone typically represents conduits for localised high fluid flow of mineralised brine, due to higher fracture abundancy and high fracture connectivity. The study showed that the fault zone documented within the core contains an additional fracture porosity of 3.1% (i.e., beyond the mean fracture porosity of the Middle Buntsandstein Group). This value is a conservative evaluation of the fracture porosity as distinct fracture corridors

		within the fault damage zone can have fracture porosity's increased by a factor of >10%.
Sample security	• The measures taken to ensure sample security.	• Vulcan's 2019 brine sampling program was conducted by Dr. Kraml of GeoThermal Engineering GmbH. Dr. Kraml collected the samples and maintained their chain of custody from sample site to delivery of the samples to the University of Karlsruhe and University of Heidelberg for analytical work. In addition, Dr. Kraml couriered brine samples to APEX for analytical work at the Canadian Laboratories; during transport, chain of custody was maintained from Dr. Kraml to the courier to the Mineral Resources CP and to the laboratory. • The Mineral Resources CP collected 2 Geothermal MoU Area brine samples. The only time the samples were out of the possession of the CP is during the flight from Frankfurt to Edmonton (in a locked travel bag). The samples were delivered to Canadian independent and commercial laboratories by the CP.
Audits or reviews	• The results of any audits or reviews of sampling techniques and data.	• An audit, or review, of the updated Taro and Ortenau resource estimations has not been completed by an external party to Vulcan. However, a CP that is independent of Vulcan and the Vulcan Property has been involved with all aspects of the project. • The CP assisted with, and reviewed, the adequacy of Vulcan's sample collection, sample preparation, security, analytical procedures, QA-QC protocol, and conducted a site inspection of the Vulcan Property. • In addition, the author coordinated discussion and meetings involving methodologies and interpretation resulting from the exploration work to define the geometry and hydrogeological characterization of the Permo-Triassic aquifer that form the basis of the resource model.

JORC Code 2012 Table 1. Section 2: Reporting of Exploration Results.

Criteria	JORC Code Explanation	Commentary
Mineral tenement and land tenure status	• Type, reference name/number, location and ownership including agreements or	• The Vulcan Project is comprised of 6 separate and non-contiguous Exploration and Exploitation Licences that encompass a total land position of 80,519 hectares within the URG of southwest Germany that include:

	material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings. • The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	o Three granted Exploration Licences: Ortenau, Taro, and Mannheim. o Two in-application Exploration Licences: Heßbach (Rheinaue) and Ludwig. o A single Exploitation Licence: Geothermal MoU Area. • The Ortenau Licence, which is the subject of this JORC Table, is 37,360 hectares and is centered at approximately: UTM 421900 m Easting, 5384900 m Northing, Zone 32N, WGS84. • Vulcan was granted 100% of the Ortenau Exploration Licence by the Baden-Württemberg government office, which is managed by the Freiburg State Office, Council for Geology, Raw Materials and Mining. • The Taro Licence, which is also the subject of this JORC Table, is 3,268 hectares and is centered at approximately: UTM 445690 m Easting, 5464950 m Northing, Zone 32N, WGS84. • The Taro License has been granted to Global Geothermal Holding UG, with which Vulcan has agreement to earn a 51% interest by spending €500,000 within two years of the license grant (Initial Expenditure). After the Initial Expenditure, a Joint Venture will be formed, with Vulcan owning 51% and GGH 49%. Vulcan will then spend a further €500,000 to earn a further 29% (Second Earn-In Expenditure) with two years, to take its Joint Venture interest to 80%. Once Vulcan has spent the minimum amount and has taken its share to 80%, Global Geothermal Holding UG can elect to co-fund the project pro rata or be diluted by an industry-standard formula whilst Vulcan continues to develop the project. Should Global Geothermal Holding UG be diluted below 5%, its share will be converted to a non-diluting 2% net royalty. Vulcan has earned in to 51% of this license. • An Exploration Licence shall accord the holder the exclusive right to: o Explore for the geothermal resources specified in the licence. o To extract and acquire ownership in the resources that must be stripped or released during planned explorations. o To erect and operate facilities that are required for exploring the resources and for carrying out related activities. • Vulcan's Ortenau Exploration licence terminates April 30, 2021, at which time renewed exploration and/or application for Exploitation Licences are required. There is always some risk or

		an uncertainty that government regulations and policies could change between now and future applications. If required, Vulcan can request an Exploitation Licence at Ortenau, which would grant Vulcan the exclusive right to geothermal resources from brine. The application requires advanced modelling of the aquifer production and injection wells. • Vulcan's Taro Exploration licence terminates April 23, 2022, at which time renewed exploration and/or application for Exploitation Licences are required. There is always some risk or an uncertainty that government regulations and policies could change between now and future applications. If required, Vulcan can request an Exploitation Licence at Taro, which would grant Vulcan the exclusive right to geothermal resources from brine. The application requires advanced modelling of the aquifer production and injection wells. • Any future geothermal brine production would require an operating plan and planning approval procedure that complies with the *Act on the Assessment of Environmental Impacts.* • In the URG, increased anthropogenic activity such as hydraulic fracking, gas extraction and enhanced geothermal systems can potentially lead to induced seismicity. Seismic risk can be mitigated by: • Performing regularly actual seismic monitoring, particularly before the implementation of stimulation work; • Ceasing to stimulate the reservoir, or • By reducing production flow rates when seismicity occurs during the operational phase.
Exploration done by other parties	• Acknowledgment and appraisal of exploration by other parties.	• The Upper Rhine Graben is being actively investigated for its geothermal potential by multiple companies (other than Vulcan). • A summary of historical brine geochemical analytical results (n=43 analyses) was evaluated. This includes historical analysis from the Buntsandstein Group aquifer (n=6) and Rotliegend Group-basement aquifer (n=11), which yield 158.1 mg/L and 157.7 mg/L Li. The historical data are presented in referred journal manuscripts and the Mineral Resources CP has verified that the analytical protocols were standard in the field of brine analysis and conducted at university-based and/or accredited laboratories. The historical geochemical information was used as background information and were not used as part of the resource estimation process. • GeotIS and GeORG are essentially digital geological atlases with emphasis on geothermal energy, and offer extensive compilations of well data, seismic profiles, information, and 3-D stratigraphic

		content with emphasis on deep stratigraphy and aquifers in Germany. The raw data – such as seismic data – are not available (as they are owned by the respective energy companies), and hence the data/profiles have been collated and interpreted into the representative geo-dataset information systems. These data were evaluated and used to construct the 3-D geological model used in the resource evaluations. • The Ortenau Licence 3-D Modelling was improved beyond the GeoORG subsurface information through Vulcan's 2020 acquisition of 2-D seismic profile lines that were acquired by Vulcan specifically for the purpose of improving the 3-D geological model. The seismic information and subsequent 3-D geological models were reinterpreted by Geothermal Engineering GmbH as part of Vulcan's 2020 exploration work. • Any artefacts within the model were revised by APEX Geoscience Ltd., under the supervision of the CP, in advance of resource modelling work. • The Taro Licence 3-D Modelling was improved beyond the GeoORG subsurface information through Vulcan's 2020 acquisition of 3-D seismic cube and 2-D seismic profile lines that were acquired by Vulcan specifically for the purpose of improving the 3-D geological model. The seismic information and subsequent 3-D geological models were reinterpreted by Geothermal Engineering GmbH as part of Vulcan's 2020 exploration work. Any artefacts within the model were revised in advance of resource modelling work. • Detailed studies of nearby geothermal well data, which is located 18km northeast of Taro and 81 km north of the Ortenau Licence and was drilled in 2013, were interpreted by Vulcan in 2020 to understand the hydrogeological characteristics of the fault/fracture zones within the Permo-Triassic strata. The dataset included detailed litho-logs and downhole wireline log information that included FMI-GR (resistivity image, caliper), DSI-GPIT-PPS-GR (sonic, caliper), LDS-GR (density, photo electric factor), and UBI-GR (acoustic image). Vulcan commissioned GeoThermal Engineering GmbH to describe and characterize this nearby well data, and more specifically, the Buntsandstein Group's pore space and micro-fractures to develop comparative models for the Permo-Triassic strata underlying the Ortenau Licence.
Geology	• Deposit type, geological setting and style of mineralisation.	• The potential lithium mineralization at Ortenau is situated within confined, subsurface aquifers associated with the Lower Triassic Buntsandstein Group sandstone aquifer situated within the URG at depths of between 2,165 and 4,004 m below surface.

		• The potential lithium mineralization at Taro is situated within confined, subsurface aquifers associated with the Permocarboniferous Rotliegend Group and the Lower Triassic Buntsandstein Group (collectively, the Permo-Triassic strata) sandstone aquifers situated within the URG at depths of between 2,165 and 4,004 m below surface. • The Permo-Triassic strata are comprised predominantly of terrigenous sand facies deposited in arid to semi-arid conditions in fluvial, sandflat, lacustrine and eolian sedimentary environments. • The various facies exert controls on the porosity (1% to 27%) and permeability (<1 to >100 mD) of the sandstone sub-units. Within the Permo-Triassic strata, porosity, permeability, and fluid flow rates are dependent on the fault, fracture and micro-fracture zones that are targeted by geothermal companies in the Upper Rhine Graben. • Lithium mineralization occurs in the brine that is occupying the Permo-Triassic aquifer pore space. • With respect to deposit model, the lithium chemical signature of the brine is believed to be controlled by fluid-rock geochemical interactions. With increasing depth, total dissolved solids (TDS) increase in NaCl-dominated brine. Lithium enrichment associated with these deep brines is believed to be related to interaction with crystalline basement fluids and/or dissolution of micaceous materials at higher temperatures. • The Ortenau License geological model benefits from the reinterpretation of existing 2-D seismic data acquired in 2020 by Vulcan. The seismic reinterpretation mapped, in detail, 4 formation horizons based on the uniqueness of the marker horizons within the seismic profiles. Faults were interpreted by detected as the doubling of a reflector (thrust fault) or as missing reflector (normal fault). A total of 24 faults penetrating through the Buntsandstein Group strata were interpreted for the entire project area. The reinterpreted stratigraphic horizons and faults were used to develop the 3-D geological model for use in the Ortenau resource estimation process. • In the opinion of the Mineral Resources CP, the revised geological model using the seismic data provided a higher level of confidence in the spatial location and orientation of the Buntsandstein Group surfaces and fault zones. • The Taro Licence geological model benefits from 2020 2-D and 3-D seismic data acquired by Vulcan. The seismic interpretation mapped, in detail, 7 formation horizons based on the uniqueness of the marker horizons within the seismic profiles. Faults were

		interpreted by evaluating every tenth inline and crossline (line spacing of approximately 20 m). To interpret fault zones, the faults must have a minimum horizontal extension of 400 m or more. A total of 31 faults were interpreted for the entire project area. Of the 31 faults, 21 faults were found to penetrate through the Permo-Triassic strata at the Taro Licence, and hence used to develop the 3-D geological model for use in the resource estimation process. • In the opinion of the Mineral Resources CP, the revised geological model using the seismic data provided a higher level of confidence in the spatial location and orientation of the Buntsandstein at Ortenau, and Buntsandstein, Rotliegend and basement surfaces at Taro. The fault zones interpretations have a higher level of confidence at both Ortenau and Taro. • The structurally complex fault damage zone typically represents conduits for localised high fluid flow of mineralised brine, due to higher fracture abundancy and high fracture connectivity. The study showed that the fault zone documented within the nearby well core contains an additional fracture porosity of 3.1% (i.e., beyond the mean fracture porosity of the Middle Buntsandstein Group). This value is a conservative evaluation of the fracture porosity as distinct fracture corridors within the fault damage zone can have fracture porosity's increased by a factor of >10%.
Drill hole Information	• A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: o easting and northing of the drill hole collar o elevation or RL (Reduce	• Vulcan has yet to conduct any drilling and/or core sampling at the Ortenau or Taro Licences. The resource study was able to utilize subsurface lithological information from historical wells within the Ortenau license. • There are 2 historical geothermal wells, or petroleum wells, drilled by companies other than Vulcan that extend deep enough to penetrate Permo-Triassic strata within the Ortenau Licence. The two wells were drilled in the southern and northeastern portions of the Ortenau Property, respectively. With respect to brine analytical results, these wells are discussed in more detail in Section 2, Other Substantive Exploration Data. Presently, there are no wells within the boundaries of the Taro Licence. • It is possible that Vulcan will drill a future well at the Ortenau and Taro Licences, at which time, Vulcan may consider the drill program and drillhole information as material for the Company and Vulcan project and disclose the results. • The location and well descriptions of wells that were used to assess the lithium concentration of the brine within Permo-Triassic aquifers within the URG is available in Vulcan's ASX news release dated 20 January 2020.

	d Level – elevation above sea level in metres) of the drill hole collar o dip and azimuth of the hole o down hole length and interception depth o hole length. • If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	
Data aggregation methods	• In reporting Exploration Results, weighting	• Vulcan has yet to conduct any drilling and/or sampling from within its Taro and Ortenau licenses and is reliant on existing geothermal wells operated by companies other than Vulcan to acquire brine samples for analysis.

	averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated. • Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low-grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail. • The assumptions used for any reporting of metal equivalent values should be clearly stated.	• The brine geochemical data presented represent raw laboratory values. I.e., no weighting average or truncation techniques were applied to the data. • The brine samples represent a liquid medium (and not a solid); hence there are no formal data aggregation methods, and the analytical data is representative of the Permo-Triassic aquifer at any given space and time. • Elemental lithium within the updated Ortenau and Taro Licence Li-brine resource estimations were converted to Lithium Carbonate Equivalent ("LCE" using a conversion factor of 5.323 to convert Li to Li_2CO_3); reporting lithium values in LCE units is a standard industry practice.
Relationship between mineralisation widths and intercept lengths	• These relationships are particularly important in the reporting of Exploration Results. • If the geometry of the mineralisation	• Vulcan has yet to conduct any drilling and/or sampling at the Ortenau and Taro Licences and is therefore reliant on existing regional URG geothermal wells operated by companies other than Vulcan to acquire brine samples for analysis. • With respect to the geothermal well data used, all engineering aspects of the wells are documented. Hence, the Mineral Resources CP has a good indication of the true vertical depths of the perforation windows used to sample and pump liquid brine

	with respect to the drill hole angle is known, its nature should be reported. • If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	from Permo-Triassic aquifers to the Earth's surface for geothermal power generation. • As mineralization being sought is related to liquid brine within a confined aquifer, intercept widths are a moot point as the well perforation points would essentially gather mineralized brine from the aquifer at large assuming the pumping rate is sufficient enough to orchestrate drawdown of the brine being sampled.
Diagrams	• Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	• The associated News Releases and previous News Releases capture critical figures that were used in the updated Ortenau and Taro Licence resource estimations. • All map images include scale and direction information such that the reader can properly orientate the information being portrayed.
Balanced reporting	• Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to	• Comprehensive reporting of all Exploration Results is presented in the associated News Release and in the associated Technical Reports. • There are no outlier analytical results in the geochemical dataset used to evaluate the lithium concentration of Permo-Triassic aquifer brine. The Li-brine values are homogenous in the vicinity of Vulcan's resource licences: Ortenau, Geothermal MoU area and Taro licenses. • There are fewer wells to sample in the Ludwig and Mannheim licence areas, and therefore, these licences remain Exploration Targets.

	avoid misleading reporting of Exploration Results.	
Other substantive exploration data	• Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	• A substantive amount of historical data was used to investigate and define the hydrogeological characterization of the Permo-Triassic aquifers. These included over 1,800 and 1,000 Buntsandstein Group and Rotliegend Group porosity and permeability measurements. • Historical geochemical data were used to assess the lithium concentration of Permo-Triassic aquifer brine. A total of 43 historical brine analysis records were compiled. These historical data were verified by Vulcan during their 2019 brine sampling campaigns and it is the opinion of the Mineral Resources CP that: o The Permo-Triassic aquifer has homogeneous concentrations of lithium in the vicinity of the Ortenau, Taro, and Geothermal MoU Area licences. o The verification of historical geochemical results produced a geochemical dataset that is reliable and sufficient for use in the resource estimation presented in this Technical Report. • During 2020, Vulcan commissioned Geothermal Engineering GmbH to: 1) review the acquired seismic information and nearby well data, 2) to conduct hydrogeological characterization studies specific to URG Permo-Triassic fault/fracture zones, and 3) make inferences on potential geothermal well (and Li-brine) production scenarios and their influence on fluid flow within and adjacent to fault/fracture zones. The Mineral Resources CP has reviewed a series internal reports (n=4) and found them to factually prepared by persons holding post-secondary degrees with an abundance of experience and knowledge in the URG and geothermal exploration and exploitation within the URG. This work helped the CP to substantiate and justify the resource estimation domains and wireframes created as part of the updated Ortenau Licence Li-brine resource estimation process. • Two geothermal, or O&G wells, were historical drilled by companies other than Vulcan within the boundaries of the Ortenau Licence. o K 1 was drilled through a Tertiary fault zone located approximately 1,000 m above the Buntsandstein Group prior to the hole's termination 14 m into the upper Buntsandstein Group. The K 1 well was not productive and is now abandoned or plugged. No Buntsandstein

		brine analysis, or porosity and permeability measures, were taken at K 1 (historically or by Vulcan). o The B 1 well penetrated through Permo-Triassic strata and 2 brine samples were historically collected through perforation points located at the end of the well within the crystalline basement as reported by Sanjuan et al., (2016). Significantly, basement-derived brine from the B 1 well has significantly lower Li (average 41.1 mg/L; n=2 analysis) in comparison to the average Permo-Triassic brine documented by Vulcan (181 mg/L Li). The CP has reviewed this discrepancy and found that the B 1 borehole was originally intended to intersect granite; however, the well was drilled into the Omerskopf para- and ortho-gneisses. The resulting brine chemistry is significantly different in comparison to Permo-Triassic brine and/or fractured granite basement domains at the Landau, Insheim, Rittershoffen Soultz, Landau, and Cronenbourg geothermal wells. It is concluded that the lithium concentration of 41 mg/L Li in the B 1 brine sample is in equilibrium with cooler brine with high TDS, Ca, Na, Cl, and Mg, and decreasing Li:Na ratios, and is representative – at least at B-1 – of a brine sample was collected from fluid along subvertical fractures in the gneiss. Any future exploration conducted by Vulcan would target Permo-Triassic strata overlying fractured granite basement terranes.
Further work	• The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling). • Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is	• A further exploration program at the Ortenau Licence is recommended, including 1) acquisition of all appropriate permits and licenses to drill a geothermal well at the Ortenau Licence, 2) a drill program to drill a test production geothermal well, 3) collection of brine assay samples from the well to verify lithium concentrations, 4) addressing modifying factors toward a Feasibility Study technical report, and 5) preparation of a Feasibility Study technical report. • A further exploration program at the Taro Licence is recommended, including 1) acquisition of all appropriate permits and licenses to drill a geothermal well at the Taro Licence, 2) a drill program to drill a test production geothermal well, 3) collection of brine assay samples from the well to verify lithium concentrations, 4) addressing modifying factors toward a Feasibility Study technical report, and 5) preparation of a Feasibility Study technical report.

	not commercially sensitive.	

JORC Code 2012 Table 1. Section 3: Estimation and Reporting of Mineral Resources		
Criteria	JORC Code Explanation	Commentary
Database integrity	• Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes. • Data validation procedures used.	• The review of third-party, government and/or compiled data was conducted by the Mineral Resources CP who – to the best of his knowledge – can confirm the data was generated with proper procedures, has been accurately transcribed from the original source and is suitable for use in the updated Ortenau and Taro resource estimations. • The CP was able to verify the lithium content in Permo-Triassic brine from the MoU Area geothermal well during a September 2019 site inspection. • The CP was involved in designing the brine sampling and analytical protocol and can verify that the brine samples were collected and analyzed using standard industry practice. QA-QC protocol included Blank samples and Standard samples and the analysis was conducted by multiple independent laboratories. The Li-brine concentration results had a high level of precision of reproducibility (see Vulcan's ASX News Releases dated 4 December 2019 and 20 January 2020). • Lastly, based on authors previous experience and research of confined lithium-brine deposits, and sampling and analytical protocols, the CP is satisfied to include these data in resource modelling, evaluation and estimations as part of Vulcan's updated Ortenau and Taro Licence lithium-brine resource estimations. • With respect to the 3-D geological model for Ortenau, the newly acquired existing 2-D seismic data were reviewed by GeoThermal Engineering GmbH on behalf of Vulcan. The reinterpretation included picking distinct seismic reflectors marker horizons for stratigraphic surface picks (including the top of the Buntsandstein Group), and a review and measuring of the vertical displacement of the faulted strata.

		• Once the stratigraphic surfaces and fault zones were picked, dxf files of the 3-D surfaces/faults were reformatted in MicroMine by APEX Geoscience Ltd. Under the direction of the CP, discrepancies, or artefacts, in the picked surfaces and/or fault zones were evaluated against the original seismic data and then corrected. • The 3-D model was then evaluated by the CP for final error checking and validation. In addition to visual checks, APEX validated the model be entering log data from the historical wells into MicroMine along with 3 seismic profile lines (from the north, central and south parts of the Ortenau Licence). • In the opinion of the CP, the Ortenau Licence 3-D subsurface geological model represented a significantly improved geological model in comparison to the previous geological model, which was constructed using the regional URG GeORG cross-sectional data. • Lastly, fault hydrodynamic studies on well log and downhole geophysical measurements from the logged historical well which is in the URG and 81 km north of the Ortenau Licence, enabled the CP to validate the enhancement of porosity and permeability within URG fault zones. • It is the opinion of the CP/QP that the database integrity represented reasonable and valid contributions to conducting mineral resource estimation processes and the author is satisfied to include these data in updated resource modelling, evaluation and estimations at the Ortenau Licence. • With respect to the 3-D geological model for Taro, the newly acquired 2-D and 3-D were reviewed by GeoThermal Engineering GmbH on behalf of Vulcan. The review included checking seismic profile reflectors that were selected for the stratigraphic picks, and a review and measuring of the vertical displacement of the faulted strata, which was very evident on the seismic profiles. Any discrepancies, or artefacts, in the picked surfaces and/or fault zones were evaluated against the original seismic data and then corrected by GeoThermal Engineering GmbH. The 3-D model was then transferred to the CP for final error checking and validation. • In the opinion of the CP, the Taro Licence 3-D subsurface geological model represented a significantly improved geological model in comparison to the previous geological model, which was constructed using the regional URG GeORG cross-sectional data.

		• Lastly, the nearby well data acquired by Vulcan in 2020 enabled the CP to validate the enhancement of porosity and permeability within URG fault zones. • It is the opinion of the CP/QP that the database integrity represented reasonable and valid contributions to conducting mineral resource estimation processes and the author is satisfied to include these data in updated resource modelling, evaluation and estimations at the Taro Licence. • For a summary of the lithium analytical results used in the resource estimation, please see ASX announcements dating 4 December 2019 and 20 August 2020.
Site visits	• Comment on any site visits undertaken by the Competent Person and the outcome of those visits. • If no site visits have been undertaken indicate why this is the case.	• The Mineral Resources CP conducted a site inspection of the Vulcan Property on September 17, 2019. • The site inspection visited 3 of the 6 Vulcan project licences and included a meeting and tour of the Geothermal MoU Area. • The site inspection of the Vulcan Property observed the existing infrastructure at/near the Property licences, including primary and secondary road networks that make the licences accessible and with ease of access to the electrical power grid. • At the Geothermal MoU Area, the CP collected two brine samples and delivered them to the independent and accredited laboratories in Edmonton, Alberta. Both labs routinely process high TDS brine and perform trace element analysis for lithium. The results (mean of 180 mg/L Li) validated lithium-enrichment of the Permo-Triassic aquifer brine.
Geological interpretation	• Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit. • Nature of the data used and of any assumptions made. • The effect, if any, of alternative interpretations on Mineral Resource estimation. • The use of geology in guiding and	• The addition, and reinterpretation, of existing 2-D seismic data significantly increased the Mineral Resources CP's confidence level in the subsurface 3-D geological model. Previously – the Ortenau geological model utilized regional URG subsurface sectional data acquired from GeORG (see Vulcan's ASX announcement dated 4 December 2019). • The interpreted seismic data enabled the CP to create detailed Buntsandstein Group surface, which provided higher confidence in wireframing the Buntsandstein Group domain, and in the calculation of aquifer volume and brine volume for the resource estimation process. The 2-D seismic profiles covered 100% of the Ortenau Licence. • Using the seismic profiles, 4 subsurface stratigraphic horizons were correlated throughout the Ortenau Licence with confidence including the top surface of the Buntsandstein Group. The 4 marker horizons were validated against litho-

	controlling Mineral Resource estimation. • The factors affecting continuity both of grade and geology.	logs from wells drilled in the southern and northern portions of the Ortenau Licence area. • The base of the Buntsandstein Group could not be clearly identified because the boundary between Buntsandstein and Permian strata overlying the crystalline basement do not exhibit a distinct lithological change in the seismic profiles. To construct the base Buntsandstein surface, the CP used an average Buntsandstein Group thickness of 375 m based on published thickness data from throughout the URG and verified the base contact using GeORG cross-sectional information. • In addition, the fault/fracture zones were distinguished in the seismic profiles, and therefore, the nature and positioning of the fault zones in the 3-D geological model were created with a higher level of confidence. The vertical displacement of the fault zones on the seismic profiles enabled the CP to define the activity level of the fault zone: Of the 24 faults, 20 were interpreted to be active. The fault zones were picked only where they could be positively identified in the seismic lines and the faults were correlated in consideration of their offset, dip angle and depth. • The vertical displacement of the fault zone on the seismic profiles was also used to make calculated inferences on the horizontal width of the fault zone in the geological model, which defines the Buntsandstein Group fault zone domain in the resource modelling. • The addition of 2-D and 3-D seismic data significantly increased the CP's confidence level in the subsurface 3-D geological model. Previously – the Taro geological model utilized regional URG subsurface sectional data acquired from GeORG. The detailed seismic data enabled the CP to create very detailed Buntsandstein Group, Rotliegend Group, and basement surfaces, which provided higher confidence in the calculation of aquifer volume and brine volume for the resource estimation process. The 3-D cube and 2-D seismic profiles covered 82% of the Taro Licence. • In addition, the fault/fracture zones were easily distinguished in the seismic profiles, and therefore, the nature and positioning of the fault zones in the 3-D geological model were created with a high level of confidence. The vertical displacement of the fault zones on the seismic profiles enabled the CP to define the activity level of the fault zone and make calculated inferences at the horizontal width of the fault zone in the geological model.

		• Interpretation of a detailed downhole geophysical dataset from the Brühl well enabled the CP to analyze and verify the hydrogeological characteristics, including average fracture porosity and permeability, within URG fault/fracture zones. • Vulcan's 2019 Li-brine sampling and analytical program verified the historical lithium in URG Permo-Triassic brine. The resulting analytical data also provided confidence in the homogeneous lithium concentration of the Permo-Triassic brine in the vicinity of the Ortenau and Taro Licences. • The CP used an abundance of regional porosity information to develop a conservative average host rock matrix porosity value that was used in the resource calculation.
Dimensions	• The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.	• The geometry of the Permo-Triassic strata at the Taro Property has a gentle south-east dip. The top and base surface elevations of the Buntsandstein Group under the Taro Licence is from -2,125 to -3,569 m below sea level (m asl; average of -2,580 to -3,192 m asl) with an average thickness of 611 m. The top and base surface elevations of the Rotliegend Group under the Taro Licence is from -2,898 to -3,796 m asl (average of -3,324 to -3,519 m asl) with an average thickness of 196 m. In the 3-D geological model, the Buntsandstein and Rotliegend groups encompass 100% and 69% of the Taro Licence, respectively. • Taro Exploration Licence is 32.68 square kilometres (3,268 hectares) in size and is centered at approximately: UTM 445690 m Easting, 5464950 m Northing (Zone 32N WGS84). • The Taro Licence is composed of 2 contiguous squares. The larger, northeast square measures 5.0 km east-west by 5.2 km north-south. The smaller, southwest square measures 2.9 km east-west by 2.5 km north-south. • The geometry of the Buntsandstein Group strata at the Ortenau Property has a gentle south-east dip. The top and base surface elevations of the Buntsandstein Group under the Ortenau Licence is from -2,222 to -2,586 m below sea level with an average thickness of 373 m. • In the 3-D geological model, the Buntsandstein Group encompasses 100% of the Ortenau Licence. • The Ortenau Exploration Licence is 373.60 square kilometres (37,360 hectares) in size and is centered at approximately: UTM 421900 m Easting, 5384900 m Northing (Zone 32N WGS84). • The Ortenau Licence is spatially orientated in a northeast-trending direction with the licence corners measuring

		19.7 km and 28.7 km (elongated southwest-northeast direction) and 11.9 km and 16.6 km (width-wise corner orientated west-northwest to east-southeast and east-west, respectively).
Estimation and modelling techniques	• The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used. • The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data. • The assumptions made regarding recovery of by-products. • Estimation of deleterious	• This PFS study utilises Li-brine resource estimates for the Ortenau and Taro Licences at the Vulcan Property. • The workflow implemented for the calculation of the Vulcan lithium-brine resource estimations was completed using: the commercial mine planning software MicroMine (v. 20.5). • The resource is calculated using a volumetric approach. Critical steps in the determination of the Taro and Ortenau lithium-brine resources include: o Definition of the geology, geometry and volume of the subsurface Buntsandstein Group domain aquifers underlying the Ortenau Licence. o Definition of the geology, geometry and volume of the subsurface Buntsandstein Group and Rotliegend Group domain aquifers underlying the Taro Licence. o Hydrogeological characterization and an historical compilation and assessment of mean porosity within the URG Permo-Triassic strata. o Determination of the concentration of lithium in the Permo-Triassic brine aquifers based on Vulcan's brine sampling programs. o Demonstration of reasonable prospects of eventual economic extraction are justified. o Estimate the in-situ lithium resources of Buntsandstein Group brine underlying the Ortenau Licence using the equation: *Lithium Resource = Total Volume of the Brine-Bearing Aquifer X Average Effective Porosity X Average Concentration of Lithium in the Brine.* • A previous maiden Ortenau Licence Li-brine Inferred Resource estimation was prepared by the Mineral Resources CP on November 26, 2019 (see Vulcan ASX announcement dated 4 December 2020). The 2019 resource estimation used regional URG GeoORG subsurface to create the geological model and calculate the aquifer and brine volumes. • During 2020, Vulcan reinterpreted 2-D seismic data and detailed lithological and downhole wireline log data from the Brühl well, which is located approximately 81 km north of the

	elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation). • In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed. • Any assumptions behind modelling of selective mining units. • Any assumptions about correlation between variables. • Description of how the geological interpretation was used to control the resource estimates. • Discussion of basis for using or not using grade cutting or capping. • The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	Ortenau License but penetrates the same Buntsandstein unit of interest. • The detailed seismic data and downhole data enabled the CP to develop a robust 3-D geological model and understand the hydrogeological characteristics of fault zones within the Permo-Triassic strata. Accordingly, the CP has updated Vulcan's lithium-brine resource estimations for the Ortenau Licence. The current resource estimations replace and supersede the November 26, 2019 Ortenau resource report. • A previous maiden Li-brine Inferred Resource estimation was prepared by the CP on November 26, 2019, and thereafter on 31 August 2020. The 2019 resource estimation used regional URG GeoORG subsurface to create the geological model and calculate the aquifer and brine volumes. During 2020, Vulcan acquired 2-D and 3-D seismic data and detailed lithological and downhole wireline log data from the nearby well, which is located approximately 18 km northeast of the Taro Licence. The detailed seismic data and downhole data enabled the CP to develop a robust 3-D geological model and understand the hydrogeological characteristics of fault zones within the Permo-Triassic strata. Accordingly, the CP has updated Vulcan's lithium-brine resource estimations for the Taro Licence. The current resource estimations replace and supersede the November 26, 2019, and August 31, 2020 resources. • The only element being estimated is lithium, and consideration of deleterious elements is beyond the scope of this early-stage project and resource estimate (i.e., is dependent on mineral processing and lithium recovery flowsheets). • During 2020, Vulcan commissioned 3 independent laboratories, or chemical engineering consulting companies, to perform Direct Lithium Extraction adsorption test work on Upper Rhine Graben Permo-Triassic brine to produce lithium chloride concentrates that can be processed into battery chemicals. The analytical results verified the principles of brine pre-treatment techniques and Direct Lithium Extraction operations with initial findings of greater than 90% LiCl recovery from the geothermal brine. Vulcan experimentally demonstrated the removal of transition metals and silica that are expected to be incompatible with common adsorption media. • Two separate geological domains were wireframed for the updated Ortenau Licence resource model and estimations,

and include: 1) Buntsandstein Group, and 2) 24 fault zones within the Buntsandstein Group strata.

- The Buntsandstein Group domain is represented by the upper and lower surfaces within the 3-D model.
- Four separate geological domains were wireframed for the updated Taro Licence resource model and estimations, and include: 1) Buntsandstein Group, 2) Rotliegend Group, 3) 12 fault zones, and 4) a host rock envelope spaced 450 m away from each fault zone (in both directions from the fault).
- The Buntsandstein and Rotliegend domains are represented by the upper and lower surfaces from the 3-D model.
- The dimensions of the fault zone domain correlate with the seismic data, in which:
    - The displacement of the fault zone in the seismic profiles determined whether the fault was ‘active’ or ‘inactive’
    - The minimum and maximum vertical displacement of the fault was measured, and the total displacement was multiplied by a coefficient factor of 1.3 to determine the width of the fault zone in the geological model. The value, 1.3, represents the average ratio of vertical to horizontal displacement in measured outcrop sections in the URG.
    - Hence, the fault zone domains in the resource estimation are believed to be a reasonable representation of any given fault.
- The extent of Buntsandstein Group and Buntsandstein Group fault zone resource domain wireframes were clipped to the boundary of the Ortenau Licence. The wireframes were created by constructing 2-D strings of each wireframe by using the top and bottom of the Buntsandstein stratigraphy and/or observed and calculated width of the fault zone. The 2-D strings were then connected to create a solid 3-D wireframes.
- The volume of the Buntsandstein aquifer domain underlying the Ortenau Licence was calculated using the 3-D wireframes created in MicroMine. The aquifer volume underlying the Ortenau Licence is summarized as a total Buntsandstein Group domain aquifer volume of 117.97 km^3 and a total Buntsandstein Group fault zone domain aquifer volume of 17.00 km^3.
- A brine volume was calculated by multiplying the aquifer volume (in m^3) times the average porosity times the

percentage of brine assumed within the pore space (100% as there is no oil within the Permo-Triassic samples collected by Vulcan and CO_2 gas is in its dissolved state at reservoir pressures).

- A regional mean matrix porosity of 9.5% was used for the Buntsandstein Group aquifer. A fracture porosity value of 3.1% was added for the fault zone domain such that a fault zone porosity of 12.6% was assigned for the fault domain within the Buntsandstein Group aquifer. In the Mineral Resources CP's opinion, the porosity values are conservative.
- The brine volume underlying the Ortenau Licence is summarized as a total Buntsandstein Group domain brine volume of 11.21 km^3 and a total Buntsandstein Group fault zone domain brine volume of 2.14 km^3.
- The dimensions of the host rock envelope domain have been allocated at 450 m on either side of the fault. Justification for this domain is based on an iterative production scenarios in which the placement of production and injection wells stimulates a hydraulic gradient that sequesters brine from the host rock matrix porosity to flow back toward the fault zone fracture porosity zone.
- The extent of all 4 resource domain wireframes were clipped to the boundary of the Taro Licence. The wireframes were created by constructing 2-D strings of each wireframe by using the top and bottom of the Buntsandstein-Rotliegend stratigraphy and/or width of the fault zone and host rock envelope. The 2-D strings were then connected to create a solid 3-D wireframes.
- The volume of the Permo-Triassic aquifer domain underlying the Taro Licence was calculated using the 3-D wireframes created in MicroMine. The aquifer volume underlying the Taro Licence is summarized as:
  - A total Buntsandstein Group aquifer volume of 19.95 km^3, of which, 1.94 km^3 occurs within the fault zone domain and 5.29 km^3 occurs within the host rock envelope.
  - A total Rotliegend Group aquifer volume of 4.39 km^3, of which, 0.23 km^3 occurs within the fault zone domain and 0.97 km^3 occurs within the host rock envelope.
- A brine volume was calculated by multiplying the aquifer volume (in m^3) times the average porosity times the percentage of brine assumed within the pore space (100% as there is no oil within the Permo-Triassic samples collected by Vulcan and CO_2 gas is in its dissolved state at reservoir pressures).
- Regional mean matrix porosities of 9.5% and 9.0% were used for the Buntsandstein Group and Rotliegend Group aquifers (including the host rock envelope domain). A fracture porosity value of 3.1% was added for the fault zone domain such that a fault zone porosity of 12.6% and 12.1% was assigned for the

		fault domain within the Buntsandstein Group and Rotliegend Group aquifers, respectively. In the CP's opinion, the porosity values are conservative. • The brine volume underlying the Taro Licence is summarized as: o A total Buntsandstein Group brine volume of 1.96 km^3, of which, 0.24 km^3 occurs within the fault zone domain and 0.50 km^3 occurs within the host rock envelope. o A total Rotliegend Group brine volume of 0.40 km^3, of which, 0.03 km^3 occurs within the fault zone domain and 0.09 km^3 occurs within the host rock envelope. • The average lithium-in-brine concentration used in the resource estimations is 181 mg/L Li and is based on the average of 23 samples that were analyzed by trace metal ICP-OES analysis at 3 independent laboratories. • No top cuts or capping upper limits have been applied, or are deemed to be necessary, as confined Li-brine deposits typically do not exhibit the same extreme values as precious metal deposits (and this statement is applicable to the Permo-Triassic aquifer Li-brine data in this study). • The lithium resource estimate is then calculated using the equation expressed in this table cell above. • The 3-D geological model, aquifer and brine volume calculations and resource estimations were checked and validated by the CP.
Moisture	• Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	• Not applicable. The lithium resource is a brine-hosted resource.
Cut-off parameters	• The basis of the adopted cut-off grade(s) or quality parameters applied.	• A lower cutoff of 100 mg/L Li is used in this Li-brine resource estimation. It is the opinion of the author that this cutoff is acceptable because: 1) confined aquifer deposits traditionally have lower concentrations of lithium (in comparison to unconfined lithium-brine salar and hard rock lithium deposits), and 2) numerous commercial projects are

		developing direct lithium extraction methods using low lithium concentration source brine.
Mining factors or assumptions	• Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	• It is the author's opinion that geothermal facilities and Li-brine extraction operations are a good fit co-production opportunity. • The Li-brine extraction pilot plant (or commercial operation) could be situated after the heat exchanger, and therefore would not influence the main purpose of the geothermal plant. • Assuming the lithium extraction process causes only small compositional changes to the brine (which has been preliminary shown in the geochemical data assessed in this Technical Report), the lithium-removed brine, as well as any evolved gases, could return to the subsurface aquifer via the reinjection well. Hence it is assumed both companies (geothermal and lithium) are extracting their own commodity of interest with virtually no interference between the two processes. • It is also assumed that Vulcan could drill their own wells at the Vulcan Property's licences. The 3-D geological models completed for each licence shows there is a high degree of faulting with potential for high fluid flow in the Permo-Triassic strata underlying all of the Vulcan Property licences.
Metallurgical factors or assumptions	• The basis for assumptions or predictions regarding metallurgical amenability. It is	• Confined aquifer Li-brine deposits traditionally have lower concentrations of lithium in comparison to unconfined Li-brine salars and hard rock lithium deposits. In addition, the aquifer deposits typically occur in areas where solar evaporation is not an option. Consequently, several laboratories (commercial, academia, independent) are

	always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	attempting to develop modern technology that will beneficiate and recover the Li-brine from these types of deposits in real time. The developers are aware that the technology must incorporate lower source concentrations of lithium and are therefore testing Li-brine at low lithium concentrations. Accordingly, there are several laboratories that are experimenting with rapid lithium extraction techniques and/or conduct test work on low lithium source brine, including starting source levels of approximately 50 mg/L Li. • It is the opinion of the CP that the extraction of lithium from confined brine aquifers has advanced in the last 2-3 years such that the technology is commercially viable. For example, Standard Lithium Ltd. has successfully advanced their LiSTR Direct Lithium Extraction Technology through the bench scale and pilot stages and is proceeding to industrial demonstration scale. • During 2020, Vulcan conducted initial bench-scale mineral processing (DLE) test work on URG Permo-Triassic brine. The analytical results verified the principles of brine pre-treatment techniques and Direct Lithium Extraction operations with initial findings of approximately 90% LiCl recovery from the geothermal brine. Vulcan has also experimentally demonstrated the removal of transition metals and silica that are expected to be incompatible with common adsorption media.
Environmental factors or assumptions	• Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential	• Recent Government policy emphasizes conservation and hence promotes development of renewable sources, such as solar, wind, biomass, water, and geothermal power. It the supposition of the CP that green energy opportunities such as Li-brine projects will be viewed favourably by the German Government. • The Mineral Resources CP relies completely on statements provided by Vulcan that a geothermal Exploration Licence in the region of the mining authority of Rheinland-Pfalz grants the user exclusivity to co-produce lithium from the brine, should a permission to extract lithium be requested. This statement is reportedly reiterated from discussion between Vulcan and the mining authorities. • In the URG, increased anthropogenic activity such as hydraulic fracking, gas extraction and enhanced geothermal systems can

	environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	potentially lead to induced seismicity. Seismic risk can be mitigated by: • Performing regularly actual seismic monitoring, particularly before the implementation of stimulation works, • Ceasing to stimulate the reservoir, or • By reducing production flow rates when seismicity occurs during the operational phase.
Bulk density	• Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples. • The bulk density for bulk material must have been	• Bulk density is not applicable, or necessary to be applied, to the liquid, brine-hosted resource. • The lithium resource was calculated using the volume of the brine bearing aquifer, the average effective porosity, the percentage of brine in the pore space and the average concentration of lithium in the brine.

	measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.	
Audits or reviews.	• The results of any audits or reviews of Mineral Resource estimates.	• Vulcan's Li-Brine Project is an early-stage exploration project. No audits have been conducted on the resource estimations calculated at the Vulcan Li-Brine Project.
Classification	• The basis for the classification of the Mineral Resources into varying confidence categories. • Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data). • • Whether the result appropriately reflects the Competent	• The Vulcan Ortenau Licence Li-brine project has reasonable prospects for eventual economic extraction based on aquifer geometry, delineation of fault zones using re-interpreted seismic data, brine volume, brine composition, hydrogeological characterization, porosity, fluid flow, and advancement of the Company's Direct Lithium Extraction technology. • This lithium-brine Technical Report has been prepared by a multi-disciplinary team that include geologists, hydrogeologists, geothermal specialists, and chemical engineers with relevant experience in the Permo-Triassic brine geology/hydrogeology and Li-brine processing. There is collective agreement that the Vulcan lithium-brine project has reasonable prospects for eventual economic extraction, and the author, Mr. Eccles P. Geol. takes responsibility for this statement. • The updated Taro Licence Li-brine resource estimations are classified as Indicated and Inferred Resources. • Pertinent points to support an Indicated Resource classification at the Taro Licence include: 1) a greater level of confidence in the subsurface geological model because of Vulcan's acquisition of detailed seismic data, 2) acquisition of a detailed downhole geophysical dataset to analyze the hydrogeological characteristics of a fracture zone within a geothermal well, and 3) knowledge of Vulcan's commissioned DLE absorption mineral processing test work and results. The Indicated Resource area is approximately 12.9 square kilometres and represents 39% of the overall Taro Licence.

	Person's view of the deposit.	• The Taro Licence updated Inferred Resource includes all Buntsandstein Group and Rotliegend Group resource area that is not within the Indicated Resource domains (i.e., fault zone or host rock envelope adjacent to the fault zones; or 61% of the Taro Licence). • The updated Ortenau Licence Li-brine resource estimations are classified as Indicated and Inferred Resources. • Pertinent points to support an Indicated Resource classification at the Ortenau Licence include: 1) a greater level of confidence in the subsurface geological model because of Vulcan's acquisition of detailed seismic data, 2) acquisition of a detailed downhole geophysical dataset to analyze the hydrogeological characteristics of a fracture zone within a geothermal well, and 3) knowledge of Vulcan's commissioned DLE absorption mineral processing test work and results. • The Indicated Resource represents a 12.6% portion of the overall Ortenau Licence. • The Ortenau Licence updated Inferred Resource includes all Buntsandstein Group resource area that is not within the Indicated Resource fault zone domain.
Discussion of relative accuracy/ confidence	• Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed	• In the opinion of the Mineral Resources CP, the Ortenau and Taro Licence Li-brine Indicated and Inferred Resource estimations reasonably reflect the Li-brine resource of the modelled Permo-Triassic aquifer at the Taro Licence and Buntsandstein Group aquifer at the Ortenau Licence. • The CP is adequately confident in the continuity of geology, depiction of the fault zones, volume of the Buntsandstein (Ortenau) and Permo-Triassic (Taro) aquifer domain, lithium concentration and reliability of quality, quantity, and distribution of the input data. • As the resource is calculated using a volumetric approach, any changes to the 3-D model, the Permo-Triassic and fault zone wireframes, lithium concentration and/or the porosity will affect the calculated resource estimate. • Risks and uncertainties as they pertain to the Li-brine resource estimations include: o Brine access and supply security. Vulcan is either reliant on current geothermal producers to obtain a continual source of brine or must drill their own wells. o Risks and uncertainties associated with exploration. Because there are no wells producing brine from the

	appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate. • The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. • These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	Buntsandstein Group or Permo-Triassic strata at the Ortenau and Taro Licences, exploration will play a major role in determining the viability of this project. As exploration continues, it will reduce the inherent risks and increase the probability of success. o The resource evaluation in this Technical Report has wireframed 'all' faults within the Buntsandstein Group strata underlying the Ortenau and Taro Licences into fault zone and host rock envelope domains. The reader should be aware that the reality of any geothermal exploration program is that only a portion, or portions, of the fault zones will be targeted with a production well(s) at the Ortenau and Taro Licences. It is possible that additional wells are drilled to expand the production zone but its unlikely that this would sequester Li-brine from all the fault zones modelled in this resource evaluation. o Justification for the host rock envelope domain at Taro is based on iterative production scenarios where the hydraulic gradient and brine flow direction is adjusted through the placement of production and injection wells. In this scenario, dilution factors caused by injecting the spent brine into the hydraulic system are unknown and could influence the timeline of an operational Li-brine extraction program. o Localized high permeabilities can lead to channelling effects such that the geothermal reservoir potentially becomes restricted to only occurring within the fault zone. Thus, the exploitation of fault zones can constitute a trade-off between high permeability and reduced reservoir volumes.

Estimation and Reporting of Ore Reserves (following JORC – Section 4)

Criteria	Explanation	
Mineral Resource estimate for conversion to Ore Reserves	• Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve. • Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.	• The Mineral Resource estimate was undertaken by the Mineral Resources CP as outlined in Sections 1-3 above and takes into account the reasonable potential for eventual extraction, as the specific yield values and permeabilities used for estimation are allocated by unit. Units with lower drainable porosity and low permeability have a lower conversion to Reserves, regardless of the Resource volume they occupy, as less of the material can be extracted over the life of mine. • Ore Reserves are defined based on the Indicated Mineral Resources, with the Resources in question now in the Indicated Category, as required by the JORC Code.

Site visits	• Comment on any site visits undertaken by the Competent Person and the outcome of those visits. • If no site visits have been undertaken indicate why this is the case.	• The Competent Persons have not visited the site due to COVID restrictions. However, the technical team which conducted the Production Study are very familiar with the project, being local to the area.
Study status	• The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves. • The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.	• A Pre-Feasibility Study (PFS) has been completed, with Hatch Ltd., a major international engineering consultancy, leading the lithium extraction section. GeoT conducted a well production study as part of this PFS. The evaluation of brine extraction, DLE and lithium hydroxide production and the associated modifying factors discussed more in detail below support the definition of Probable Reserves. • The PFS has defined a production well field configuration with simulations of brine extraction over the proposed life of mine undertaken to evaluate the evolution of pumping, potential impacts and to develop a production schedule for the project. The schedule is based on the installation of 15 production wells across two license areas (Taro and Ortenau) over the life of the study.
Cut-off parameters	• The basis of the cut-off grade(s) or quality parameters applied.	• A cut-off of 100mg/L Li has been applied to the Resource used in the Production Study.
Mining factors or assumptions	• The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimization or by preliminary or detailed design). • The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc. • The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling. • The major assumptions made, and Mineral Resource model used for pit and stope optimization (if appropriate).	• Indicated Mineral Resources from the Ortenau and Taro licences were converted to Probable Mineral Reserves, based on the results of the PFS and consideration of the modifying factors identified in the PFS. Some site-specific information from the Upper Rhine Valley brine reservoir is available, with some assumptions due to the deep nature of the Resource. • The mining method is dictated by the deposit type, in which brine is hosted in pore spaces between grains of sediments and within natural fault fractures. Deep wells are installed to allow flow of brine to the wells and exploitation of the brine by pumping from the wells, developing cones of depression around the individual wells as brine flows to the wells. • There is no open pit or underground excavation (because the brine is pumped out from wells) and no geotechnical parameters are directly measured. The future change of lithium concentration in wells will be monitored as part of the future monitoring and pumping activities. • No dilution or brine recharge has been factored into this study due to the nature of the deep brine resource and the stage of the study. • The mining recovery conversion from Resources to Reserves is typical of results for lithium brine operations, taking account of losses/recoveries through the recovery method and production plant, and recovery from the sediments hosting brine. • Minimum mining widths are not relevant in the context of this project.

	• The mining dilution factors used. • The mining recovery factors used. • Any minimum mining widths used. • The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to theirinclusion. • The infrastructure requirements of the selected mining methods.	• Inferred Resources are not considered for the purposes of the production plan and Reserves. • The infrastructure required for brine extraction is the establishment of the proposed wellfield and the associated pumps and pipework to allow the brine to be pumped up to the geothermal plant and DLE plant.
Metallurgical factors or assumptions	• The metallurgical process proposed and the appropriateness of that process to the style of mineralization. • Whether the metallurgical process is well-tested technology or novel in nature. • The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied. • Any assumptions or allowances made for deleterious elements. • The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole. • For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?	• The metallurgical process proposed is Direct Lithium Extraction (DLE), using a sorbent-based extraction method, as used by several producers worldwide, including in Argentina and China. This will be followed by lithium hydroxide production using modified chlor-alkali methods. The majority of the proposed equipment is in use in either DLE lithium projects or in the chlor-alkali industry, although the specific sorbent used as a basis for this study, as well as the specific electrolysis technology, is not in commercial use at this time. These technologies are considered appropriate for the production of lithium hydroxide following the required testwork, development and engineering. • Limited metallurgical test work was carried out with bulk brine samples at vendors and at independent laboratories and is considered appropriate for initial indications of performance to support the project. Extensive testwork remains to be performed before or during the DFS to finalize design, equipment selection, process configuration and all performance characteristics. • The test work was carried out by highly experienced lithium brine processing test work company IBZ Geochemie GmBH, supervised by Vulcan's chemical engineering team.
Environmental	• The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterization and the consideration of potential sites, status of design options	• No waste rock characterization studies are needed, due to the well-type lithium brine extraction method proposed. • Consideration has been given to local environmental and social restrictions when reviewing potential well sites. • Environmental permits and studies are being commenced by the company towards the next stage of project development, including production well drilling at Taro and 3D seismic surveys at Ortenau.

	considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.	
Infrastructure	• The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.	• The project is in the Upper Rhine Valley, which is an area extremely well serviced by infrastructure. • A preliminary study has shown potentially available land areas for plant development. • Power, transportation, and highly skilled labor are readily available throughout the area. Water is readily available, although whether the water will be sourced from municipal sources or local shallow groundwater wells will be determined at a site-specific level. • Transportation can be via electric trucks and/or barges on the Rhine to local chemical/industrial parks.
Costs	• The derivation of, or assumptions made, regarding projected capital costs in the study. • The methodology used to estimate operating costs. • Allowances made for the content of deleterious elements. • The source of exchange rates used in the study. • Derivation of transportation charges. • The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc. • The allowances made for royalties payable, both Government and private.	• The project PFS has used costs based on vendor quotations and the extensive knowledge of Hatch and gec-co engineers. • Operating costs were estimated based on the definition of the extraction process, test work which has been undertaken to define the process, vendor inputs, and benchmarks. Vendor quotations were used for reagent and DLE sorbent costs, which together with electricity are the largest component of the project operation costs. Manpower levels are based on Hatch and gec-co experience. Manpower costs are based on published rates. Electricity prices and chemical prices correspond to expected costs for products delivered at the project's location. • The process requires the removal of deleterious elements to specifications for the final high-quality product and has been considered in the estimation of costs. • The lithium hydroxide price has been estimated using experienced industry analyst forecasts, as well as trade statistics collated by Vulcan's in-house lithium market expert, Vincent Ledoux Pedailles. • All costs were estimated in Euros. • Costs of all production supply items have been taken at the proposed plant, thus there is no transport cost to add from the supply side. • Prices for lithium hydroxide considered in the economic evaluation, correspond to CIF Europe prices, with all cost items necessary to transport produced lithium hydroxide to European markets included in the operations costs. These costs include trucking the lithium hydroxide to cathode plants, which are the expected destinations for this product. • Lithium hydroxide is a specialist product and is historically sold under contract, with prices specific to the purity provided by individual producers. The company will be supplying battery quality lithium hydroxide to the specific requirements and specification of cathode manufacturers. • Since no lithium production currently exists in Germany, royalty rates, if any, will need to be discussed with the Mining Authority, and have been provisionally set at zero, based on Section 32-2 of the German Mining Law, which allows for an exemption of royalties, given Vulcan would be "ensuring a supply of raw materials to the market, for

		improving the utilization of deposits or for protecting any other national economic interests".
Revenue factors	• The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc. • The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.	• The head grade has been determined by the resource model which has been developed for the project and is based on regional drilling, geochemistry and seismic data, which was used to produce the Indicated Resources. • Commodity prices are based on forward estimates by experienced industry consultants Fastmarkets and Canaccord. • All costs were estimated in Euros. For lithium pricing, a US-Euro conversion rate of 0.85 has been used in calculations. • Transportation costs are included in the estimation of operating costs (see section above). • Product sale prices and potential penalties are discussed in the previous section. • The operating costs are for lithium hydroxide only and do not include any allowance for by-product credits, except for HCl and renewable energy. Renewable energy produced by the geothermal plant will be sold into the grid at a fixed feed in tariff rate of 0.25 EUR per kWh, in accordance with the German Renewable Energy Law.
Market assessment	• The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future. • A customer and competitor analysis along with the identification of likely market windows for the product. • Price and volume forecasts and the basis for these forecasts. • For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.	• The company is well placed to benefit from the market window caused by the significant increase in demand related to electric vehicle uptake in Europe. • The company is well placed on the cost curve, and will produce a final product, unlike many hard rock competitor companies. The project will fall in the lower part of the cost curve, being competitive with other existing and forecasted new lithium projects. • Canaccord and Fastmarkets average annual prices for lithium hydroxide to remain above $15,000/t long term on both a nominal and real (inflation adjusted) basis. This price level reflects the requirement for producers to invest in new capacity to satisfy future consumption and to incentivise the financing of new projects. • The project will produce battery quality lithium hydroxide, to the specifications of European cathode manufacturers.
Economic	• The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc. • NPV ranges and sensitivity to variations in the significant assumptions and inputs.	• The economic analysis was undertaken by Optiro Ltd., using information compiled for the project by Hatch, GeoT and gec-co. The project economics were estimated with discount rates between 6% for the geothermal operation and 8% for the lithium operation. This was used to evaluate the range in NPV. • Sensitivity analyses are shown in the body of this document. The project is generally resilient to most major factors, and is most sensitive to lithium price and brine flow rate variation.
Social	The status of agreements with key stakeholders and matters leading to social licence to operate.	• In keeping with the stage of the project at Pre-Feasibility level, the company has not concluded any agreements with local stakeholders. As part of the next stage of the company's

		project development activities, the company's stakeholder liaison team has commenced engagement and consultation at local, state and federal levels.
Other	• To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves: • Any identified material naturally occurring risks. • The status of material legal agreements and marketing arrangements. • The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.	• The PFS has identified a number of risk factors, both related to the natural environment and other aspects of the project. The natural risks identified are considered to be manageable, assisted by the extensive experience of the Vulcan team in developing geothermal projects in the Upper Rhine Valley. • Material legal agreements are understood to be in good standing. The properties are granted exploration licenses. Vulcan holds the rights to geothermal energy, brine and lithium in Ortenau, whereas at Taro it holds the rights to geothermal brine, due to differing state application processes from different interpretations of the same federal mining law. Vulcan understands in consultations with the state mining authorities that having the rights to geothermal brine at Taro also give it exclusive rights to lithium, since the lithium is contained within the brine. A separate application has also been submitted for lithium rights. There is no current marketing arrangement in place, but an offtake agreement or similar is likely be negotiated prior to or as part of project financing. Applications will be submitted for production well drilling at Taro, and 3D seismic surveys at Ortenau followed by production well drilling and are expected to be granted in the timeframes anticipated.
Classification	• The basis for the classification of the Ore Reserves into varying confidence categories. • Whether the result appropriately reflects the Competent Person's view of the deposit. The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).	• The Reserves have all been classified as Probable, in keeping with the resources used being all in the Indicated category.
Audits or reviews	The results of any audits or reviews of Ore Reserve estimates.	• The Reserves have been independently reviewed by GLJ Ltd., who provided the Competent Person sign-off.
Discussion of relative accuracy/ confidence	Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical	• The Probable Mineral Reserve is considered to have a reasonable level of confidence based on the original quality of information collected, the local and international experience of the technical team interpreting the information, the continuity of the mineralization and the understanding of the geology, plus the demonstrable amenability to extract by pumping from deep wells in the

	procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate. The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage. It is recognized that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	Upper Rhine Valley. This statement relates to the global Probable Reserve, which is based on the Indicated Resources. • Modifying factors include the permitting of the project by the government, which requires approval of the project EIA. The Competent Persons believe there is a reasonable probability that these will be approved.