VULCAN ENERGY
ZERO CARBON LITHIUM™

ASX Release 13 February 2023

ASX: VUL
FSE: VUL

Fast Facts

Issued Capital: 143,435,301
Market Cap (@$7.16): $1.03B

Vulcan Zero Carbon Lithium™ Project Phase One DFS results and Resources-Reserves update

Vulcan Energy Resources Limited (Vulcan; ASX: VUL, FSE: VUL, the Company)[1] is pleased to announce the results of its Definitive Feasibility Study (DFS) for Phase One of Vulcan's Zero Carbon Lithium™ Project. Vulcan aims to be the world's first integrated lithium chemicals and renewable energy producer with net zero greenhouse gas emissions.

Highlights[2]

Aiming to be the first integrated, renewable heat and power, lithium extraction and lithium hydroxide refining project, to supply the battery electric vehicle industry from Europe, for Europe.

- Targeting 24Ktpa Lithium Hydroxide Monohydrate (LHM) p.a. production from EU, for EU.[3]
- Targeting >300GWh/a renewable power, >250GWh/a renewable heat production p.a.[4]
- >250% increase in estimated $NPV_{8:}$ €3.9Bn pre-tax, €2.6Bn post-tax[5].
- 34% estimated IRR pre-tax, 26% IRR post-tax.
- Targeted >€700Mpa estimated revenues. Targeted EBITDA margin of 84%.
- €1,496M estimated CAPEX, increase broadly in line with larger project and inflation.
- Low estimated OPEX of €4,359/t LHM.
- Targeted 3.5-year payback (Integrated Project). Target start of production end-2025.
- Net zero per tonne estimated LHM carbon footprint: a world first in lithium industry[6].
- Zero Scope 1 fossil fuels. Net water consumption very low.
- Increase in Resources and Reserves relative to Integrated Phase One PFS: largest lithium Resource in EU[7].

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[1] *Given Vulcan is dual listed on the ASX and the Prime Standard of the Frankfurt Stock Exchange, and in order to comply with the continuous disclosure requirements of both listings, this announcement has been released to the platform of the Frankfurt Stock Exchange at the same time as it was released to ASX's Market Announcements Platform.*

[2] *These are targets and may not be achieved. Please refer to disclaimers on pages 66-68, and Risk Factors in Appendix 1. Comparisons are relative to Integrated Phase One PFS for the Project. Refer to assumptions and parameters mentioned elsewhere in this announcement including in Appendix 4. For financial definitions please refer to Glossary.*

[3] *See Ore Reserves section for assumptions. Production capacity fully ramped-up at start of production.*

[4] *See Ore Reserves section for assumptions.*

[5] *Please see Economic Analysis section for full list of assumptions and targets.*

[6] *Based on 20-year average production CO_2 equivalent footprint for Scopes 1, 2 and 3 calculations in Minviro Life Cycle Assessment (02/2023). According to Vulcan's research of public company data disclosed by other lithium companies, there are currently no other net zero carbon lithium projects in operation or development.*

[7] *According to public, JORC-compliant data. See Appendix 2 for comparison information.*

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Compelling economics[8]

- >250% estimated increase for Phase One NPV_8: €3.9Bn NPV_8 pre-tax, €2.6Bn NPV_8 post-tax[9].
- >40% estimated increase in rate of return: 34% IRR pre-tax, 26% IRR post-tax.
- >200% increase in target revenues for Phase One: >€700Mpa revenues estimated, with estimated EBITDA margin of 84%.
- €4,359/t LHM OPEX – potential to be one of the lowest cost lithium operations[10].
- Reduced 3.5-year payback (Integrated Project) targeted.

Larger project. Sustainable, long-term pipeline[11]

- 60% increase in Phase One production target to 24ktpa LHM per annum capacity. Associated increase in CAPEX mostly related to larger project and global inflation.
- Increase in Upper Rhine Valley Brine Field (URVBF) lithium Resource to 26.6Mt LCE; the largest lithium Resource in the EU[12].
- Increase in overall Phase One Proven and Probable Reserves to 0.54Mt LCE, centred around current production wells in core of the URVBF field.[13] Decrease in Reserves in Taro sector, mainly due to shift in production plans to core Lionheart sector where there are operating production/re-injection wells.
- Phase Two DFS to follow, targeting addition of further modular 24ktpa production, consistent with 2021 PFS study[14], updated for new engineering data from Phase One DFS.

World-leading target environmental metrics

- Forecast net zero project Scope 1, 2 and 3 Greenhouse Gas Emissions per tonne LHM carbon footprint. A world-first in the lithium industry[15].
- Zero Scope 1 fossil fuels consumption in lithium production process.
- Net producer of renewable energy from Phase One.

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[8] *Comparisons are relative to Integrated Phase One PFS for the Project. Refer to assumptions and parameters mentioned elsewhere in this announcement.*

[9] *Please see Economic Analysis section for more detailed assumptions, breakdown and analysis. Comparisons are relative to Integrated Phase One PFS published in January 2021. Values from Phase 2 PFS are lower confidence than the DFS and should be treated with caution until they are updated with more recent data. Please see environmental section referencing Minviro LCA report for green/environmental/decarbonisation details.*

[10] *Based on Fastmarkets 2025 onwards projections of lithium market, see economic analysis section.*

[11] *Comparisons are relative to Integrated Phase One PFS for the Project. Refer to assumptions and parameters mentioned elsewhere in this announcement.*

[12] *According to public, JORC-compliant data. See Appendix 2 for comparison information.*

[13] *Subject to receipt of all approvals.*

[14] *See Vulcan PFS ASX announcement "Positive PFS & Maiden JORC Ore Reserve: Zero Carbon Lithium ™ Project" dated 21 January 2021. Values from PFS are lower confidence than the DFS and should be treated with caution until they are updated with more recent data. See disclaimer on pages 66-68.*

[15] *Based on Minviro LCA study, 2021 and 2023 and Fastmarkets market data. Subject to change as project progresses. Please see environmental section referencing Minviro LCA report for green/environmental/decarbonisation details and Technical Assumptions section for more detail.*

- Very low water consumption due to recycling streams engineered into process. Estimate of only 1.36 tonnes of water per tonne of LHM produced, net of products[16].

Leading edge in-house engineering

- >13,000 hrs of Vulcan's first pilot plant (PP1) operation on brine from production wells in the core of Phase One area since April '21 support Direct Lithium Sorption (DLS) process engineering.
- VULSORB™, Vulcan's high-performing in-house lithium extraction sorbent, integrated into DFS.
- Vulcan's second pilot plant (P1A), operates at a higher pressure than PP1 and simplifies overall design and operation, allowing for estimated CAPEX and OPEX savings in DFS, and enhanced environmental performance. Further test work to be integrated into bridging phase of engineering.

Clear project execution plan

- The Project will be delivered under a single integrated projects group, providing a consistent approach to delivery and overall accountability.
- Phase One project moving into bridging engineering with Hatch Ltd., contract strategy and delivery model in place, early engagement of key technology and equipment suppliers.
- Vulcan now has ~280 personnel in-house; increased focus on execution capability/operations readiness, clear ramp up plan in place.
- Sustainable procurement framework and responsibilities assigned to assess, manage, and report on environmental and human rights impacts.
- Extensive stakeholder engagement strategy implemented by Vulcan's comms and ESG team including regular monitoring, multiple communication channels and local Info Centres. Strong support for the Project from various levels of government including EU, federal and regional.
- Lithium extraction Demonstration Plant approval in place and under construction, planned to start up mid-year to train operations team, prior to targeted start of Phase One commercial production[17] end-2025.
- Development well drilling targeted to start-up mid-2023 to increase brine flow from producing core of Phase One area.

Multi-pronged financing process under way

- BNP Paribas advising debt financing process which has initiated. Non-binding Letters of Intent (LOI) received from European Export Credit Agencies which is a positive step in the debt financing process.
- Discussions with strategic funding partners under way, with Vulcan assessing options to source Phase One equity requirements at a project level and/or parent level.
- Vulcan's binding lithium hydroxide offtake agreements with Stellantis, Volkswagen, Renault, LG Energy Solution and Umicore[18] support stability for financiers during payback period.

[16] *Subject to change as Project progresses. Vulcan figures internal and calculated together with Hatch study as part of DFS. Industry peer comparison study from Vulcan research of public company data, and as per the Minviro LCA study, 2021.*

[17] *Vulcan's start of production date is a target. Whilst Vulcan judges it to be achievable, it is subject to multiple factors beyond Vulcan's control, such as approvals.*

[18] See relevant ASX announcements.

Vulcan Managing Director and CEO, Dr. Francis Wedin, commented: *"I would like to thank our whole Vulcan team and our consultants for the monumental effort in getting our Phase One, Zero Carbon Lithium™ Project DFS completed successfully. Our Project consists of commercially well understood methods or processes with commercial analogues from other industries, but this is the first time these processes from the lithium chemicals and renewable energy industries have been combined to produce a unique, net zero carbon, zero scope 1 fossil fuels project development. It is an exciting project to work on, combining multi-disciplinary, international scientific, engineering and commercial teams, passionately driven by the desire to provide sustainable, decarbonised lithium and renewable energy supply from Europe, for Europe.*

"The Phase One DFS, backed up by technical data from our operating commercial geothermal wells and plant, and our operating lithium extraction pilot plants, shows compelling financial results, as well as world-leading target environmental metrics. Simply put, we are showing that with the right engineering, choosing a sustainable lithium production process can be a more profitable route than legacy methods.

"The work doesn't stop here, it starts here, as we target start of production by end-2025 and ramp-up thereafter. This is a tight timeframe, and we recognise the significant challenge ahead of us as a growing company. To this end, we are rapidly transforming towards being a project execution and operations company. We have an exciting time ahead of us, with start-up of demonstration plants to train our operations team, start of development drilling for new production wells, and of course Project financing. It is shaping up to be a very exciting year for Vulcan, and the Zero Carbon Lithium™ Project, and I look forward to continuing to share the journey with our team and our stakeholders."

Vulcan Deputy CEO, Cris Moreno, commented: *"What a fantastic achievement by the Vulcan team to complete the DFS."*

"We are in a race to get to net zero and Vulcan is playing its part in disrupting and decarbonising two traditionally carbon-intensive industries, in energy and battery raw materials. Our Zero Carbon Lithium™ Project in the Upper Rhine Valley Brine Field marries geothermal energy and lithium production in an innovative and circular manner, allowing us to be fossil fuel-free in our process and ensure we deliver net carbon neutral, domestically sourced energy and lithium from Europe, for Europe."

"Our Vulcan team has done a terrific job to deliver such a comprehensive and positive DFS result for our Phase One Project. Vulcan Energy is transitioning quickly from a development company to an integrated project execution and production company and aims to continue to build on its German-centric delivery model, with on the ground leadership and close collaboration with key technology and execution partners to help deliver its Phase One Project safely, with quality, on time and within budget. "

About Vulcan

Founded in 2018, Vulcan's unique Zero Carbon Lithium™ Project aims to decarbonise lithium production, through developing the world's first net carbon neutral, zero fossil fuels business, with the co-production of renewable geothermal energy on a mass scale. By adapting existing technologies to efficiently extract lithium from geothermal brine, Vulcan aims to deliver a local source of sustainable lithium for Europe, built around a net zero carbon strategy with strict exclusion of fossil fuels. Already an operational renewable energy producer, Vulcan will also provide renewable electricity and heat to local communities.

Vulcan's combined geothermal energy and lithium resource is the largest in Europe[19], with license areas focused on the Upper Rhine Valley, Germany. Strategically placed in the heart of the European electric vehicle market to decarbonise the supply chain, Vulcan is rapidly advancing the Zero Carbon Lithium™ Project to target timely market entry, with the ability to expand to meet the unprecedented demand that is building in the European markets.

Guided by our Values of Integrity, Leadership, Future-focused and Sustainability, and united by a passion for environmentalism and leveraging scientific solutions, Vulcan has a unique, world-leading scientific and commercial team in the fields of lithium chemicals and geothermal renewable energy. Vulcan is committed to partnering with organisations that share its decarbonisation ambitions and has binding lithium offtake agreements with some of the largest cathode, battery, and automakers in the world. As a motivated disruptor, Vulcan aims to leverage its multidisciplinary expert team, leading geothermal technology and position in the European EV supply chain to be a global leader in producing zero fossil fuel, net carbon neutral lithium while being nature positive. Vulcan aims to be the largest, most preferred, strategic supplier of lithium chemicals and renewable power and heating from Europe, for Europe; to empower a net zero carbon future.

[19] *According to public, JORC-compliant data. See Appendix 2 for comparison information.*

Listing Rule 5.8

Item	Location of information in announcement[20]
Geology and geological interpretation	Geology and Exploration, P.15-19
Sampling and sub-sampling techniques	P.18-19 and P.74-75, P.78
Drilling techniques	P.75-77
The criteria used for classification, including drill and data spacing and distribution. This includes separately identifying the drill spacing used to classify each category of mineral resources (inferred, indicated and measured) where estimates for more than one category of mineral resources are reported	P.80-81, with maps on P.13, P.14 and P.21
Sample analysis method	P.19, P.78
Estimation methodology	P.19-24. P.95-98
Cut-off grade(s), including the basis for the selected cut-off grade(s)	P.22, P.98
Mining and metallurgical methods and parameters, and other material modifying factors considered to date	P.25-29, P.98-99

Listing Rule 5.9

Item	Location of information in announcement
Material assumptions and the outcomes from the preliminary feasibility study or feasibility study (as the case may be). If the economic assumptions are commercially sensitive to the mining entity, an explanation of the methodology used to determine the assumptions rather than the actual figure can be reported	Phase One DFS Model Assumptions and Parameters P.72-73. Outcomes: P.39-59
The 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	P.27-29, P.102
The processing method selected and other processing assumptions, including the recovery factors applied and the allowances made for deleterious elements	P.29-34, P.104-105
The basis of the cut-off grade(s) or quality parameters applied	P.25-29, P.103
Estimation methodology	P.27-29
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	P.29, P.59-61, P.103-105

[20] As required by the Listing Rules of the ASX.

Listing Rule 5.16

Item	Location of information in announcement
All material assumptions on which the production target is based. If the economic assumptions are commercially sensitive to the mining entity, an explanation of the methodology used to determine the assumptions rather than the actual figure can be reported	Phase One DFS Model Assumptions and Parameters P.72-73
A statement that the estimated ore reserves and/or mineral resources underpinning the production target has been prepared by a competent person or persons in accordance with the requirements of the JORC Code.	Mineral Ore Reserves Section, P.29.
The relevant proportions of: • Probable ore reserves and proved ore reserves; • Inferred mineral resources, indicated mineral resources and measured mineral resources; • An exploration target; and • Qualifying foreign estimates, Underpinning the production target.	Mineral Ore Reserves Section, P.28.

Listing Rule 5.17

Item	Location of information in announcement
All material assumptions on which the forecast financial information is based. If the economic assumptions are commercially sensitive to the mining entity, an explanation of the methodology used to determine the assumptions rather than the actual figure can be reported	Phase One DFS Model Assumptions and Parameters P.72-73
The production target from which the forecast financial information is derived (including all the information contained in rule 5.16)	Phase One DFS Model Assumptions and Parameters P.72-73
If a significant proportion of the production target is based on an exploration target, the implications for the forecast financial information of not including the exploration target in the production target	N/A – none of the production target is based on an Exploration Target.

Summary

Vulcan Energy Resources Ltd. ("Vulcan", "the Company") has conducted a Definitive Feasibility Study ("DFS") on the Phase One planned commercial development of its Zero Carbon Lithium™ Project ("the Project"), which is a combined geothermal energy (heat and power), lithium extraction and lithium hydroxide refining Project in the Upper Rhine Valley Brine Field ("URVBF"). The URVBF, a hot, deep sub-surface geothermal brine field, is enriched in lithium, and Vulcan's Project is developing dual production of renewable energy and lithium from the same deep brine source. Vulcan aims to produce approximately 24,000 tonnes per annum (tpa) lithium hydroxide monohydrate (LHM) from its Phase One development, as well as over 300 GWh of power and over 250 GWh of renewable heat production.

The DFS was conducted on the sub-surface geology, field development planning, Resource and Reserve estimation, surface piping infrastructure, and geothermal plant, Lithium Extraction Plant (LEP), and Central Lithium (hydroxide) Plant (CLP) engineering and design. Vulcan's in-house team of geologists and reservoir engineers lead the sub-surface work, with review, audit and sign-off of Resources and Reserves by energy industry specialists GLJ Ltd., partnered with lithium brine specialists Groundwater Insight. Vulcan's in-house engineering team led the work on the surface piping and geothermal plant design. Hatch Ltd. led the work on the LEP and CLP engineering and design, guided by Vulcan's in-house lithium chemistry and chemical engineering team, and backed up by thousands of hours of test-work from Vulcan's lithium extraction pilot plants, as well as laboratory test-work both internally and externally.

The purpose of the DFS is to provide the Company with a decision tool to move the Project to the next phase of development, through bridging engineering, to execution and construction.

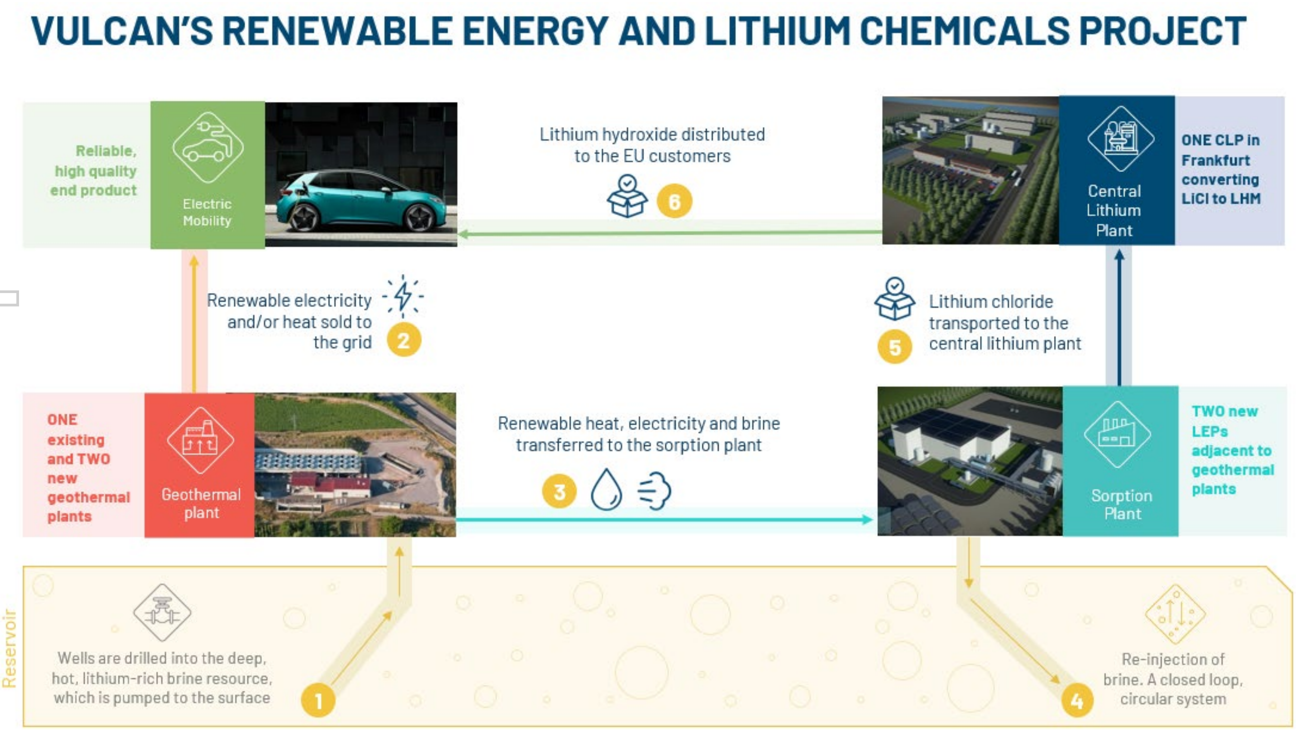

Figure 1: Vulcan's Zero Carbon Lithium™ Project and associated circular lithium extraction process.

Phase One targeted production:

- Target of 24,000tpa of Lithium Hydroxide Monohydrate (LHM) production[21].
- Target of >300GWh of renewable power and >250GWh of renewable heat produced each year[22].

Why?

- Vital project for Germany, the EU auto industry, and the European energy transition.

Where?

- In the Upper Rhine Valley Brine Field, in Rhineland-Palatinate for geothermal and lithium extraction, and in Frankfurt for lithium conversion.

When?

- Targeted start of construction in H2 2023 (drilling to increase geothermal brine production)
- Targeted start of lithium production in late 2025[23].

How?

- Growing team: ~280 in-house personnel working for Vulcan.
- Project financing planned to commence through debt and equity.
- Integrated execution plan using VUL expertise together with multiple experienced partner companies.

Figure 2: Rendering of Vulcan's planned Lithium Extraction Plant (LEP).

[21] *Based on Phase One production target of 24ktpa and 307,000MWh of power from DFS.*
[22] *Based on Phase One production target of 24ktpa and 307,000MWh of power from DFS.*
[23] *Start of production is a target date and will be subject to regular review depending on a number of factors including permitting and equipment supply chains.*

Location and Description

The area for DFS Phase One comprises the Lionheart zone which consists of three licence areas, and the neighbouring Taro zone which comprises two licence areas. Lithium chloride (LiCl) production from wells in this area will be transported to a Central Lithium Plant (CLP), at a site at the Höchst Chemical Park near Frankfurt (Figure 4 & Figure 5), to which Vulcan has secured exclusive access. Within the Phase One district, Vulcan holds a 100% interest in the operating Insheim geothermal license, including the operational geothermal wells and plant, and 100% interest in the Taro and Kerner exploration licenses. It has a brine offtake agreement in place to access brine from the geothermal wells and plant in the Landau-South permit, as well as a Joint Venture Agreement to develop another project area in Landau-South. It also has an agreement to develop the Rift North license neighbouring Insheim, subject to a production royalty.

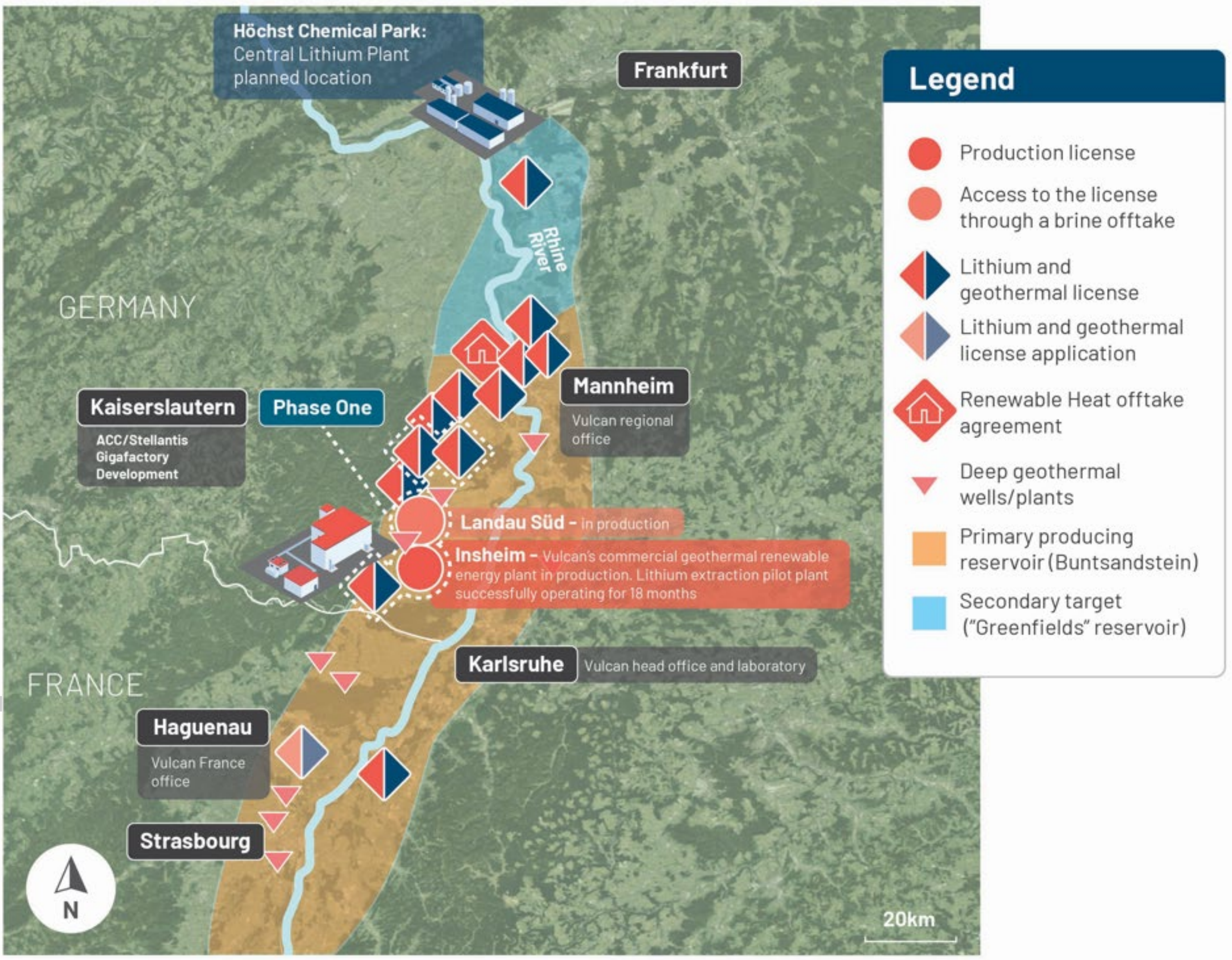

Figure 3: Overview of Vulcan's Zero Carbon Lithium™ Project area, showing Phase One[24].

[24] Please see Appendix 5 for further details on the licence area.

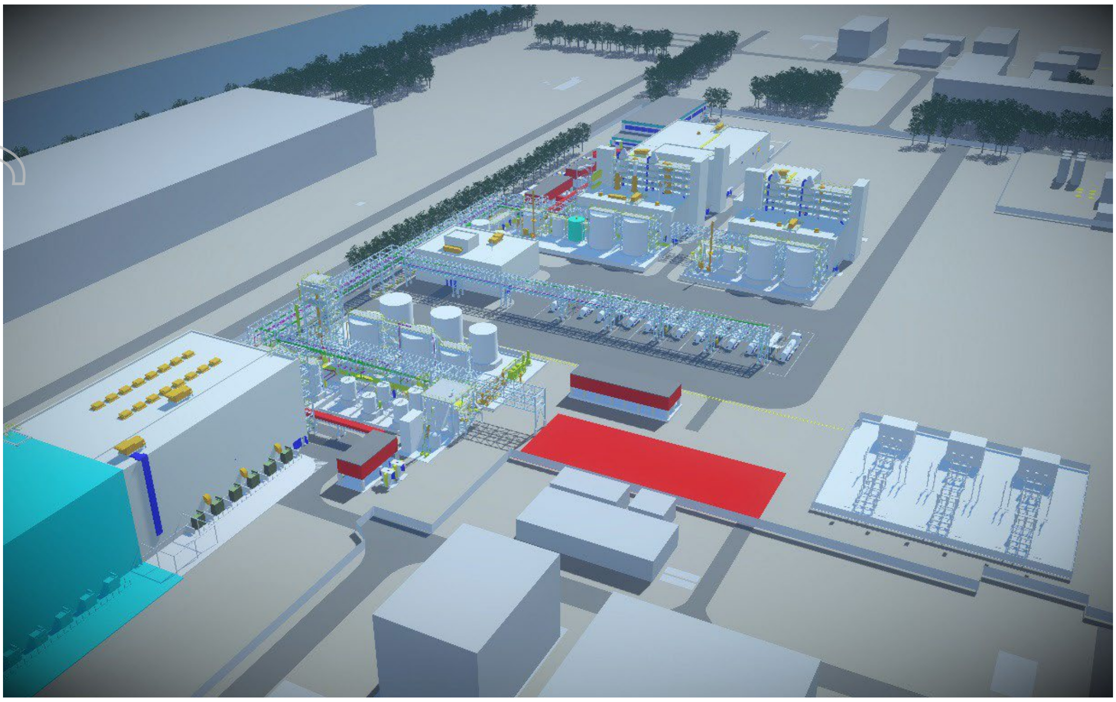

Figure 4: Site design for Vulcan's Central Lithium Plant located in Frankfurt (Höchst Industrial Park). Close to 100,000sqm secured, enough for significant expansion.

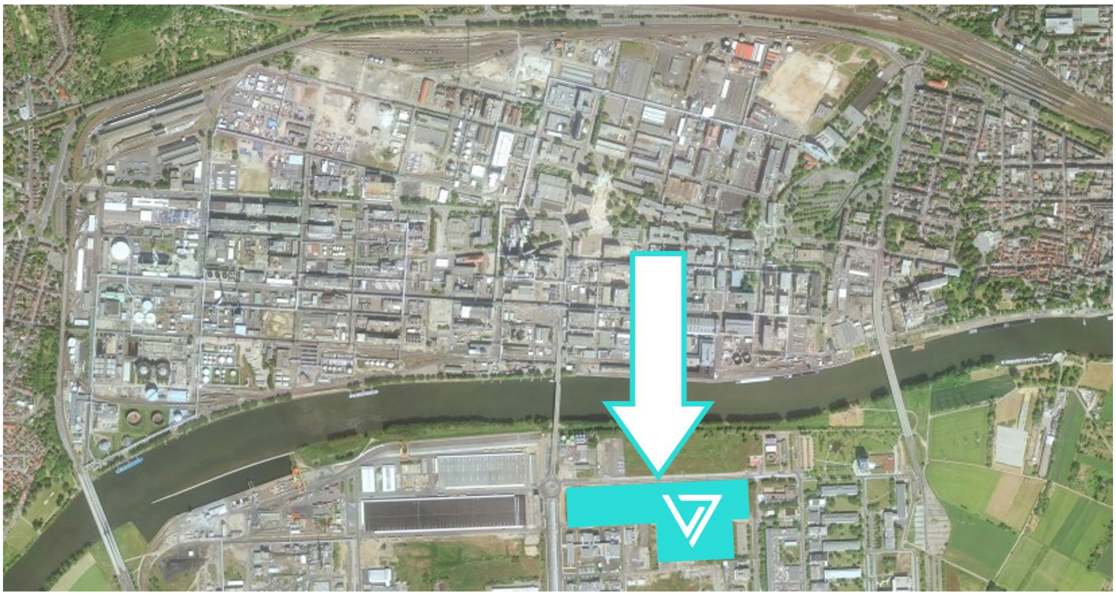

Figure 5 Aerial view of Vulcan's planned Central Lithium Plant located in Frankfurt (Höchst Industrial Park).

The region for the Project is in the Upper Rhine Valley (URV) (Figure 3) which extends into three countries: Germany, France and Switzerland. The area is located centrally in Europe and is highly developed with many rural and urban centres which are interconnected via roadways, freeways and railways. The Rhine River dominates the region as a major shipping route, and access to both sides of the river is possible, with many bridges. The soil and climate of the Rhine River system make it an attractive area for agriculture including vineyards, corn and other crops. The climate is typically warm, temperate, and wet with annual temperature around 11.2 ºC and about 871 mm of annual precipitation. There are well developed industrial areas for automotive manufacturing, chemical industry and related service sectors, including the Opel manufacturing plants owned by one of Vulcan's lithium offtakers, Stellantis.

Figure 6: Location of Upper Rhine region in Germany. Source: (http://maps.geopotenziale.eu/, n.d.)

The URV is a graben system containing a consistent geothermal lithium reservoir which, within Vulcan's Phase One development area and based on Vulcan's data, has an average lithium grade of 181 mg/l Li (see Mineral Resource section). The deep subsurface reservoirs targeted for lithium brine production are well explored in the region and have sufficiently high temperatures to support geothermal production in co-production with lithium recovery. There is a long history of deep geothermal well development in the URVBF, dating back to the 1980s, with many wells being developed for either hydrocarbon potential or geothermal potential (Figure 7). Many of the wells historically drilled in the URVBF have been shallower for the purpose of oil and gas production. Notable geothermal work includes R&D projects at Bruchsal, Germany and Soultz, France, which have tested various geothermal power generation technologies with deep geothermal source wells. Within the planned development area, Vulcan already has deep geothermal wells operating at the commercial geothermal energy plant at Insheim, and the same at Landau South where it has agreements with the license owner.

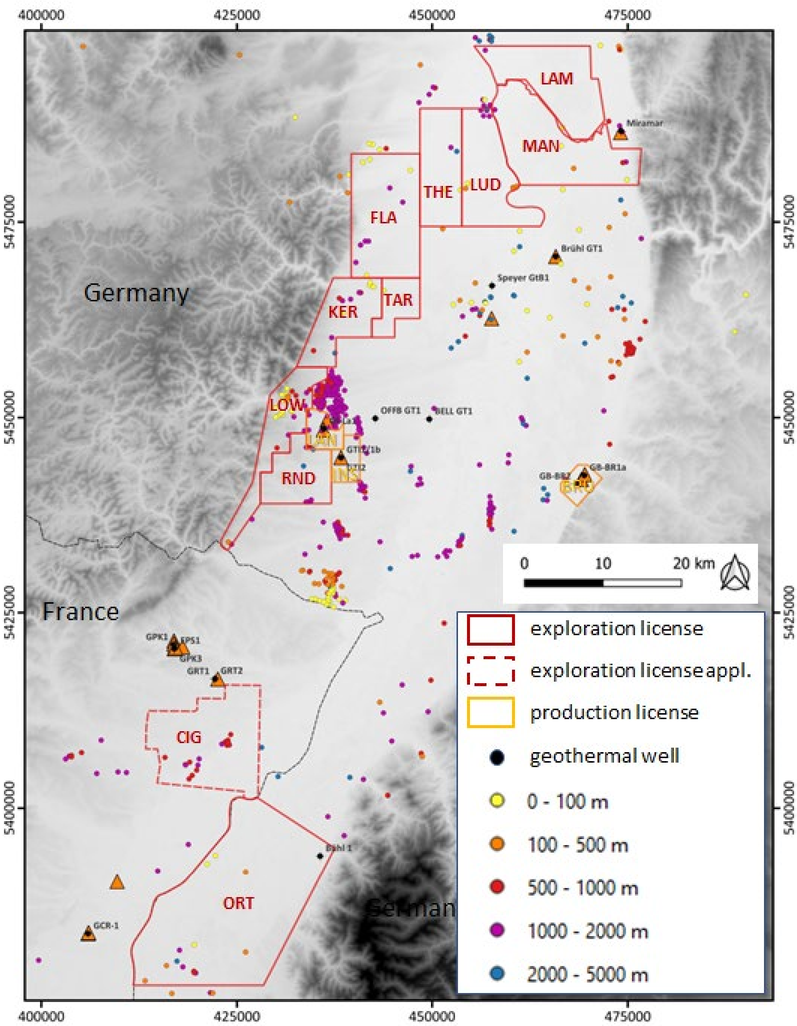

Figure 7. Summary of all deep wells drilled in the Upper Rhine Graben, showing Vulcan's licenses and location of wells relative to licenses used in resource study. Source: GeORG Mapviewer at: (http://maps.geopotenziale.eu/, n.d.) and GeotIS at (www.geotis.de, n.d.)

The DFS and Mineral Resource and Reserve update includes discussion of multiple Vulcan licence areas including those that are planned for Phase One, with additional licence areas potentially planned for future development. An overview of licence locations and details is provided in Figure 8. In addition to the Phase One group of licences, Vulcan also holds 10 additional licences in the URV, for a total secured licence area of 1,583km^2. The Company has also applied for an additional 155 km^2 of licences in the same region. Vulcan has acquired the geothermal brine and lithium rights (licences) through direct application to the respective mining authorities of the German states of Rheinland-Pfalz, Baden-Württemberg, and Hessen. All exploration licences were granted pursuant to the German Federal Mining Act (Bundesberggesetz 'BBergG') for the purpose of commercial exploration of mining-free mineral resources: geothermal brine and lithium. Vulcan has acquired the lithium exploration and geothermal production licence at Insheim with 100% ownership.

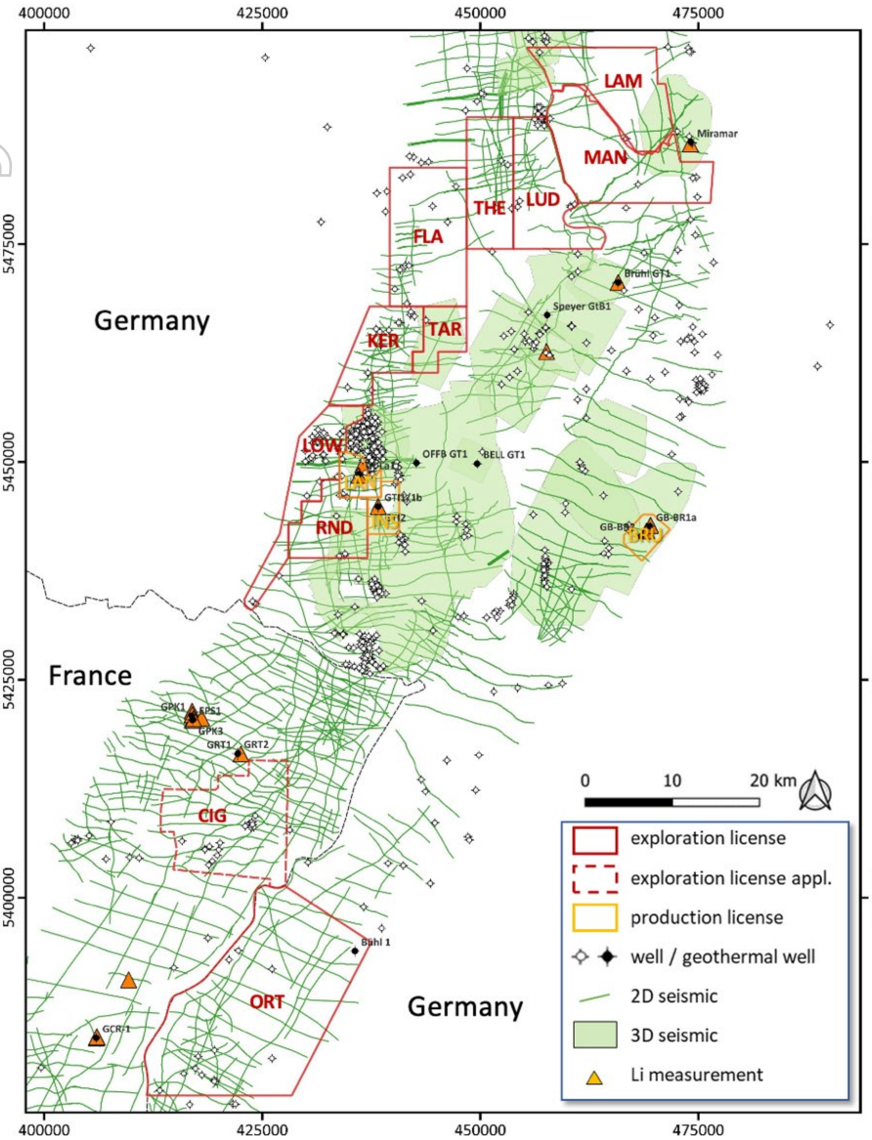

Figure 8. Overview Map of Vulcan licensed areas in the Upper Rhine Valley, showing well and seismic survey locations used in this study. Existing seismic data sets and well penetrations within the Upper Rhine Valley Brine Field, Germany. LAM: Lampertheim, MAN: Mannheim, LUD: Ludwig, THE: Therese, FLA: Flaggenturm, TAR: Taro-Lisbeth, KER: Kerner, LOW: Löwenherz, INS: Insheim, LAN: Landau-South, RND: Rift North, CIG: Cigognes, ORT: Ortenau. Other Vulcan licenses to the north not shown.

Figure 9. Aerial photograph of Vulcan's Natürlich Insheim Geothermal Plant.

At Insheim, Vulcan operates the existing geothermal plant named Natürlich Insheim (Figure 9), which has the capacity to produce up to 4.8 MW of renewable power. There are two operating wells located at this plant, one for production of the 165°C hot brine and one for reinjection of cooled brine. The wells were drilled between 2009 and 2010. The plant has been in operation since 2012. There is a second geothermal plant in the region at Landau-South for which Vulcan has secured an offtake agreement for brine production with Geox GmbH (the operating company). The plant and wells have been in operation since 2007. Vulcan has entered into a 51:49 (in Vulcan's favour) Joint Venture agreement with the owners of the Landau-South license to develop a new geothermal project in the same Landau-South license as the current Landau plant, which will also supply Vulcan's Phase One operations with brine for lithium extraction. Vulcan has an agreement to develop new geothermal projects on the RND exploration license in return for a production royalty.

Vulcan plans to develop the licence areas in a phased approach. Phase One will be developed first, followed by Phase Two which will be a further development in step out areas. It should be noted that Vulcan's DFS deals solely with Phase One. PFS data from Phase Two is now over two years old, and should be treated with caution.[25] Subsequent Phases are planned to follow to fully leverage the large licence area that Vulcan has secured. The Project plans for multiple central surface facilities for geothermal operations to be fed from multi-well pads. Lithium extraction will be conducted in two stages, starting at geothermal facility-based Lithium Extraction Plants (LEPs) and proceeding to a single facility near Frankfurt, the Central Lithium Plant (CLP). LHM product will be produced and marketed from the CLP.

The Phase One area is well located, close to existing road infrastructure and within relatively flat valley terrain. The Phase One area is mixed land use with rural, urban, agricultural, industrial, and park land. Vulcan has been diligent in ongoing planning development with consideration of existing land uses in consultation with local communities and landowners.

Geology and Exploration

The roughly 020° orientated Cenozoic Upper Rhine Graben (URG) in west-central Europe forms part of the European Cenozoic Rift System (ECRIS) that extends from the North Sea, the Netherlands, western Germany, northern Switzerland, eastern France and down to the Mediterranean Sea. The URG extends from Frankfurt (Main) in the north to Basel in the south as a seismically active, morphologically distinct graben structure with a roughly 300 km long, 30 to 40 km wide lowland plain that drops from 200 m a.s.l. in the south to below 90 m a.s.l. in the north. It is surrounded by morphologically well-defined hills and mountains including: the Black Forest, the Vosges Mountains, Odin's Forest and the Palatinate Forest. The Rhine River flows through the valley formed by the URG and acts as a natural political and administrative boundary between Germany, France and Switzerland.

The URG can be subdivided into southern (Basel – Strasbourg), central (Strasbourg – Speyer) and northern (Speyer – Frankfurt) segments, each approximately 100 km long. Vulcan's licences are located within the northern and western part of the central segment. Due to its long history of hydrocarbon exploration and exploitation, the subsurface of the URG has been intensively investigated. Active geothermal power plants (Soultz, Rittershoffen, Landau, Insheim, Bruchsal) are exclusively located in the

[25] Refer to disclaimer on pages 66-68.

central segment. A geothermal district heating project was also established in Riehen (Switzerland) at the southernmost termination of the URG.

The focus of Vulcan's Zero Carbon Lithium™ Project in the URG is on aquifers associated with the Permo-carboniferous Rotliegend Group sandstone, the Triassic Buntsandstein Group sandstone, and the Middle Triassic Muschelkalk Formation, which is composed of carbonate sediments, collectively the 'Permo-Triassic strata (Figure 10). The Permo-Triassic strata underly all Vulcan Property licences and are characterized as a laterally heterogeneous sandstone unit within a structurally complex rift basin. The Middle Triassic Muschelkalk succession, however, is only present from the Taro licence area towards the south in the URG.

The 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 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 Subgroup and the coarse-grained to conglomeratic base of the Lower Buntsandstein. The Middle Triassic Muschelkalk represents the marine sedimentation that succeeds the fluvial deposition of the Buntsandstein. It consists of argillaceous dolomites and sandstones as it represents a marine transgression. Towards the top of the Muschelkalk, evaporitic sediments dominate which provide a top seal for the reservoirs of interest.

The Permo-Triassic strata that include the Rotliegend, Buntsandstein, and Muschelkalk Groups are the focus of the resource models for Taro, part of Kerner, and the Lionheart development area, and Ortenau. Only the Buntsandstein Group strata have been considered for the Northern licence areas that include Mannheim, Ludwig, Therese, Flaggenturm/Fuchsmantel, and the western part of Kerner.

Brine aquifers within the Rotliegend Group and Buntsandstein Group are considered to 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 and the overlying Muschelkalk zone. These fault/fracture zones generally contain hot brine and exhibit high fluid flow rates. Consequently, they are a prime target for geothermal development.

Historical and Vulcan-conducted geochemical analysis of the aquifer brine from the Permo-Triassic strata shows the brine is enriched with lithium. In line with recent German Government policy emphasising decarbonisation and promoting 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 URG. That is, the geothermal wells represent potentially cost-effective access points to acquire deep, geothermally heated, lithium-enriched brine associated with the Permo-Triassic aquifers overlying the crystalline basement.

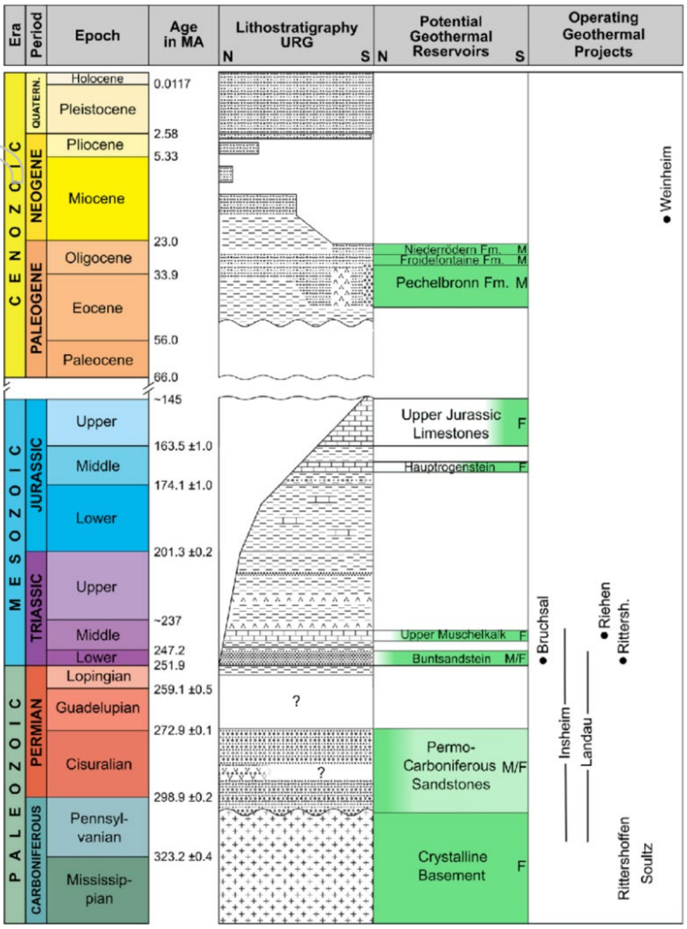

Figure 10. Stratigraphic chart for the Permo-Triassic strata in the URVBF

Lithium is a silver-grey alkali metal that commonly occurs with other alkali metals (sodium, potassium, rubidium and caesium). The atomic number of lithium is three and the atomic weight is 6.94, making it the lightest metal and the least dense of all elements that are not gases at 20º C (it is solid at 20º C, with a density of 534 kg/m^3). Lithium has excellent electrical conductivity (i.e., a low electrical resistivity of 9.5 mΩ•cm), making it ideal for battery manufacturing where lithium ions move from the negative electrode to the positive electrode during discharge and back when charging. Lithium imparts high mechanical strength and thermal shock resistance in ceramics and glass.

The average crustal abundance of lithium is approximately 17-20 parts per million (ppm) with higher abundances in igneous (28-30 ppm) and sedimentary rocks (53-60 ppm). Resource estimates and production quantities of lithium are often expressed as Lithium Carbonate Equivalent (LCE). The deep lithium-enriched brines of the URVBF originate from geothermal water-rock interaction in the deep subsurface. The lithium enrichment process consists of the following components:

- Recharge of meteoric water with no lithium.
- Downward flow of recharge water, to depth in the URG.
- Water interaction with micaceous, lithium-bearing basement rocks below the pre-rift sediments in the URG (high lithium concentrations) basement rocks.
- Upward flow of enriched brine (through fractures) into Rotliegend and Buntsandstein reservoirs.

- Natural seismicity maintaining the fracture permeability (i.e., self-sealed fractures are frequently reopened).
- Prevention of significant upward loss of enriched fluid by a low permeability top seal.
- Ongoing replacement (via recharge on the URG flanks) of any reservoir fluid that may be lost due to leakage through the upper seal (i.e., reservoir remains charged with lithium-enriched brines from basement).
- Ongoing convection of radiogenic heat from the crust maintains high temperature in the Rotliegend/Buntsandstein reservoir.

Enrichment of the deep URG waters with lithium is consistent with deep basin waters elsewhere in the world. For example, this process is known to occur to varying extents worldwide, at locations that include: the Cambrian Siberian Platform (Russia), the Devonian Basin (Michigan), the Mississippian–Pennsylvanian reservoirs (Illinois Basin), Paradox Basin (Pennsylvania), Triassic strata of the Paris Basin (France), and Jurassic Smackover strata from the Gulf Coast (Arkansas and Texas).

In the case of the Buntsandstein Group and Permo-Triassic aquifers in the URG, the deep-seated, lithium-enriched brine can be cost effectively recovered from the confined aquifer via in-production and newly developed geothermal wells. Direct lithium sorption technology would be used to recover the lithium. The brine would be returned to the aquifer via reinjection wells, with no interruption in the geothermal plant operational cycle.

The URG is one of the most intensively investigated continental rifts worldwide. Consequently, there exists a large amount of relevant data including borehole logs, extensive 2D seismic surveys and a steadily increasing body of 3D seismic surveys directly related to lithium and geothermal development. Additionally, there are many scientific publications and R&D projects throughout the URG which provide a comprehensive understanding of this basin.

The GeORG Project is one such contribution. GeORG is a collaborative, multi-group study across country borders that interpreted 2D seismic data in an extensive grid within the URG and across all of Vulcan's licences within this basin. This data was supplemented by Vulcan with additional 2D seismic lines and a 3D seismic survey at Taro to better define fault features which are key exploration targets for lithium and geothermal development. Recently, 3D seismic data has also been acquired in the Lionheart, Mannheim and Lampertheim areas. Structural, geocellular and dynamic models were created from this data (tied to available well logs and production records from the Insheim and Landau geothermal wells), to determine the resource estimates for the Vulcan licences within the URG. The seismic data is important for resolving the presence and lateral continuity of the key zones of interest of the Rotliegend, Buntsandstein and Muschelkalk successions, as well as the granitic basement.

Geochemical data has been consistently acquired and verified throughout the URG to determine the presence and concentration of lithium within the brine. Samples have been verified independently and are consistent with averages used in the resource estimates. Vulcan's first comprehensive evaluation of brine chemistry was conducted in 2019 through a 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 Insheim resource area or property-neighbouring geothermal wells to verify the historical lithium brine geochemical results.

For the Phase One licences (plus Ortenau) the average lithium content from brine collected by Vulcan from six geothermal wells (including its 100%-owned Insheim geothermal plant) located throughout the URG and within or proximal to its licences was used as the representative grade for Resource Estimation. This grade was 181 mg/L Lithium (n=13 total metal analyses by ICP-OES). In addition, a detailed assessment of Permo-Triassic aquifer brine at the Insheim resource area production well yielded 181 mg/L Lithium (n=26 analyses). This grade was used as the regional lithium brine value for previous resource estimates and for the current update. These brine geochemical results demonstrate that the Permo-Triassic brine in the URG has a relatively homogeneous lithium chemical composition in the vicinity of the Phase One licences, both temporally and spatially.

In addition, independent brine sampling was conducted by a former project Competent Person (CP) in September 2019 (Insheim) and March 2022 (Landau) and by the current CP in November 2022 (Insheim and Landau). The former CP sent the resulting samples directly to two independent, certified laboratories and the current CP to another certified laboratory. In all cases, analytical results were consistent with previous results from Landau and Insheim. Further indication of the consistent lithium content of brine recovered at Landau and Insheim is indicated by ongoing sampling and analysis conducted by Vulcan to support pilot lithium extraction operations at these facilities, with hundreds of analyses returning similar results within analytical error margin of the average estimated grade.

For the other licences with the URVBF Resource Estimation but outside Phase One (except Ortenau), the lithium concentration from a Brühl well sample was taken into account after correction was made for dilution. Samples were collected from the Brühl well during production testing in 2013. The well was not subsequently available for sampling, due to project circumstances and sealing of the well. Aliquots of the 2013 sample were provided to Vulcan and were archived, and analysed in 2019, as part of the wider sampling and analysis programme at that time. Results were recognised as being influenced by dilution, consistent with the use of freshwater during production testing and with loss of drilling fluids. Vulcan conducted an assessment and interpretation of the results based on reservoir temperature estimates using geothermometers developed for geothermal brines. These calculations resulted in an estimate of original lithium content (before dilution) of 153 mg/L, which was identified as a potentially conservative correction. For comparison, the measured value in sample was 104 mg/L (total lithium). The calculated lithium value of 153 mg/L was used as the grade in the current Resource Estimates for only three of the northern licences (Mannheim, Ludwig and Therese). The CP has reviewed these interpretations and considers the brine resource grade to be conservative to realistic.

The targets are permeable zones containing high temperature brine with lithium concentrations that can be extracted with minimal losses. The exploration programmes have evaluated public datasets, and proprietary data sets owned by Vulcan, utilising existing well data (sometimes on-property, sometimes off property) and seismic data where possible due to the prohibitive expense of acquiring new data from deep brine drilling. Models are planned to be regularly updated as Vulcan's development drilling and data acquisition continues across all of its development areas.

Mineral Resources, Field Development Plan, and Reserves

Mineral Resources

Resources were estimated for Vulcan's licences within the URVBF, in the URG. Geologically, the resource area includes the fault damage zones and host rock matrix of the Permo-Triassic sediments which includes the Rotliegend, Buntsandstein, and Muschelkalk groups. The fault damage zones were modelled to include 200 m on either side of the fault. The host rock matrix makes up much of the bulk volume within the licences. Petrel, an SLB geomodelling software package, was used to model the three geological units representing the permeable reservoirs for lithium-enriched brine: Rotliegend, Buntsandstein and Muschelkalk. This modelling approach is based on a comprehensive information package that includes 3D seismic data, 2D seismic data, geological well data (including core samples, outcrop data, depositional environment interpretations), and production data from currently producing wells at the Insheim and Landau licences within the core of the Phase One area. Dynamic modelling for the Lionheart zone in Phase One was also used to define the drainage areas and resource footprints for those licences. The workflow implemented for the calculation of the Vulcan lithium brine resource estimates for each licence is as follows:

- Definition of the geology, geometry and volume of the Permo-Triassic strata within the fault damage zones and host rock matrix using all the available subsurface and surface data.
- Hydrogeological characterisation and an historical compilation and assessment of effective porosity within the URVBF to estimate an average value for each geological unit.
- Determination of a representative lithium-in-brine concentration for each licence, based on Vulcan's brine sampling programs across the URVBF as well as independent testing of samples at Insheim and Landau.
- Numerical calculation (estimation) of the *lithium-initially-in-place (LIIP)* using the relation:

LIIP = Gross Rock Volume (GRV) X Average Net-to-Gross Ratio (Avg NTG) X Average Effective Porosity (Avg Phie) X Average Concentration of Lithium in the Brine (Avg LC)

Where;

GRV (km^3): gross rock volume - extracted from the geomodels after the verification and validation of the continuity of the stratigraphic horizons and fault interpretations.

Avg NTG (decimal): net thickness to gross thickness ratio - gross thickness is determined from average thicknesses of the zones of interest identified in well log data and seismic data. The average net thickness is determined using an effective porosity cut-off of 5% within the gross interval. This is based on producing and previously producing geothermal and oil and gas wells within the URVBF (Appenhofen 1, Landau 207 and 211, Römerberg oil wells A-E – see reference list of studies below), within and proximal to Vulcan's Phase One area, that showed significant fluid flow from the target reservoirs. On the porosity versus permeability cross plot (Figure 11) of all the available core and sidewall core plug data in the URG for the Buntsandstein (Figure 12), 5 % effective porosity is equivalent to 0.02 mD permeability.– Because permeability cannot be measured directly using wireline logs, this correlation of porosity with permeability helps to establish the effective flow of fluids within a reservoir where core data are not available. This is based on The Canadian Oil and Gas Evaluation Handbook (2005) for the evaluation of subsurface reservoirs (also see Nelson, 1994 for theoretical explanation).

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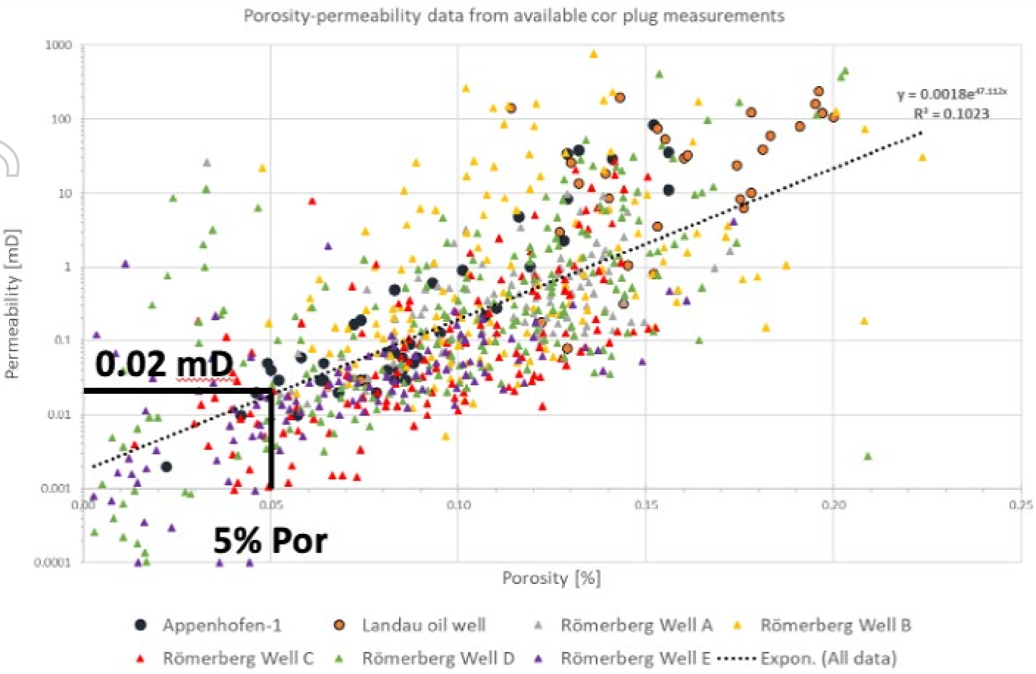

Figure 11: Porosity versus permeability cross plot of Buntsandstein core data for seven wells in the URVBF.

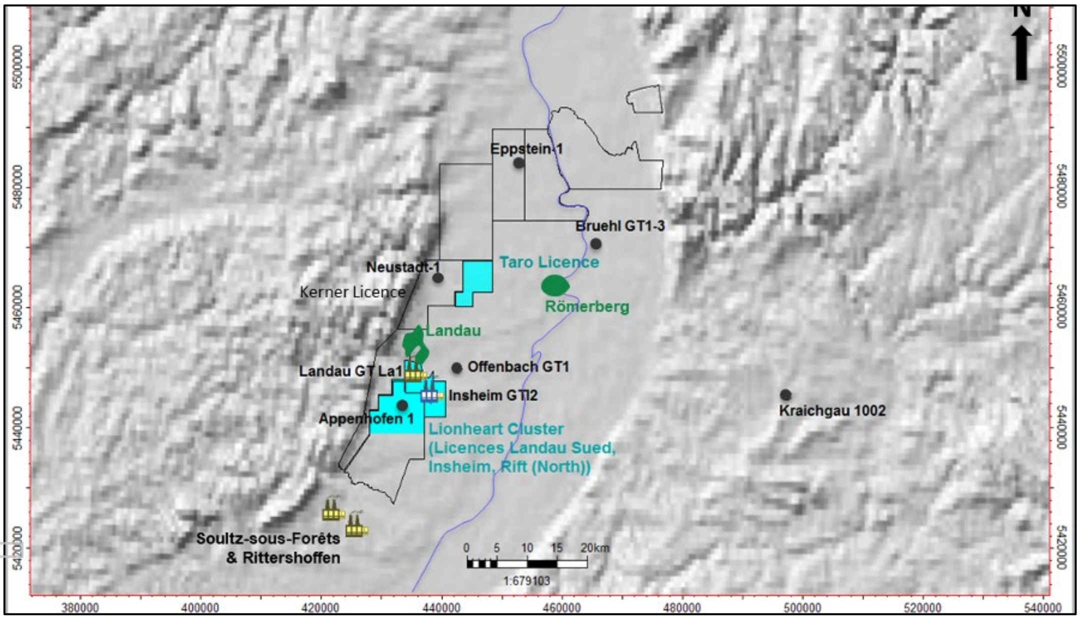

Figure 12: Map showing locations of wells with data incorporated into Phase One study, including on-property wells at Insheim-Landau geothermal plants, Appenhofen-1, wells within Landau field, and Römerberg field near to Taro. Green shows oil fields containing dense well drilling, black circles are wells with available data, geothermal plants with producing wells are also shown, including in Vulcan's own area.

Studies defining the porosity and permeability relationships using core plug measurements of producing geothermal and oil and gas wells:
GeORG Project, 2012 – Upper Rhine Graben regional study
Bossennec, 2019 – Römerberg oil field
Bush et al., 2021 – Landau geothermal wells
Heap et al., 2019 also provides core plug measurements of the Buntsandstein Group in the Soultz ESP-1 well in the URG in France.

Avg Phie (decimal): effective porosity - that portion of the total void space of a porous material that can transmit fluid. Determined from the petrophysical evaluation of density, neutron, and/or sonic well logs covering the zones of interest, supplemented with core and plug data where available.

Avg LC (mg/L): average lithium concentration determined from sampled wells in the URG.

- Assessment and confirmation of "reasonable prospects for eventual economic extraction" for the estimated Mineral Resources on each licence, as per the JORC (2012) definition of Resources.

Derivation of NTG and Phie inputs to the Mineral Resource calculations was supported by a compilation of publicly available porosity and permeability data for the Rotliegend, Buntsandstein, and Muschelkalk units (fault damage zones and host rock matrix) including:

- Over 300 effective porosity measurements from Buntsandstein core and outcrop analysis and total porosity from wireline well log data, located throughout the URG (Sokol, Nitsch and GeORG-Projektteam, 2013; Soyk, 2015; Egert et al., 2018).
- Over 250 Buntsandstein Group permeability measurements and/or interpretations (Sokol, Nitsch and GeORG-Projektteam, 2013; Stober and Bucher, 2015), including inferences on fracture permeability (Vidal et al., 2015; Baujard et al., 2017a).
- Over 1,500 Rotliegend outcrop and 62 Rotliegend core plug porosity measurements (Bär, 2012; Aretz et al. 2016).
- Over 550 Rotliegend Group permeability measurements from well core plugs (Bär, 2012; Aretz et al. 2016).

Lithium-brine analytical data used in the resource estimates were discussed in the previous section. As noted, an average grade of 181 mg/L lithium was used for the Phase One licences (plus Ortenau) and an average grade of 153 mg/L was used for the other licences (Mannheim, Ludwig, Therese, excluding Ortenau).

To validate the continuity of the stratigraphic horizons of interest and to validate the fault interpretations, an independent audit of the modelled surfaces and faults was conducted based on; 1) raw seismic profiles, 2) downhole drill logs and e-logs associated with geothermal, and oil and gas wells drilled within the URG, 3) the regional GeORG 2D geological model cross-sections, and 4) the 3D geomodel at Taro.

A cut-off grade / resource quantity analysis was not strictly applicable to resource, due to the use of average grade in the static resource estimate. However, it is noted that a grade for economic extraction of 100 mg/L has been established on a provisional basis for the lithium extraction process and that all resources are currently estimated to exceed that grade. As the licences progress to the dynamic Reserve Estimate stage, the influence of cut-off grade on project viability will be a more integral part of the estimate. Reserve estimation requires evaluation of well locations, deposit size, continuity of mineralisation, assumed mining method, metallurgical processes, costs and reasonable long-term metal prices. In the dynamic reserve estimation, cut-off grade will be confirmed and will represent the lowest grade, or quality, of mineralised material that is economically mineable. The cut-off value continues to be evaluated as Vulcan advances the URVBF work. It is possible that this cut-off value will be adjusted in future technical reports. A cut-off of 100 mg/L lithium is considered reasonable for the current stage of assessment. It is noted that lower values have been used to define other confined aquifer brine deposits (e.g., Dworzanowski et al., 2019), which tend to have lower grades in comparison to many salar-based lithium brine deposits.

The resource classification criteria used for the URVBF are based on the quality of the data available and the CP confidence level in the integration of all the data by Vulcan's multi-disciplinary team. This team includes geophysicists, geologists, hydrogeologists, geothermal specialists and chemical engineers with relevant experience in the Permo-Triassic brine geology, hydrogeology and lithium brine processing. The Mineral Resource classifications are shown on Table 1 for Vulcan's licences in the URVBF that were part of the Resource Estimate. Some important points to support the assigned mineral resource classifications include: 1) a greater level of confidence in the subsurface geological modelling because of Vulcan's acquisition of 2D and 3D seismic data, as well as static and dynamic modelling of the Permo-Triassic strata calibrated to available well data, 2) ongoing production data from two producing geothermal wells at Insheim (in production since 2012) and Landau (in production since 2007), and 3) knowledge of Vulcan's commissioned DLS adsorption mineral processing test work and results from its pilot plants at the operating wells.

Vulcan has completed multiple phases of test work, sampling and interpretation that are adequate to support the disclosure of Mineral Resource estimates (Table 1). In the opinion of the CPs, the Vulcan Upper Rhine Valley Brine Field licences for lithium and renewable energy projects have reasonable prospects for future 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 DLS technology. The CPs, Dr. Mark King, P. Geol. and Kim Mohler, P.Eng. take responsibility for this statement.

Per JORC, Mineral Resources are not Ore Reserves and do not have demonstrated economic viability. Inferred Mineral Resources have a lower level of confidence associated with their estimation than Indicated Mineral Resources, but it is reasonably expected that with further exploration the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources. Indicated Mineral Resources are sufficiently well defined to allow application of Modifying Factors to support well planning and economic evaluations of the deposit. Measured Mineral Resources are sufficiently well defined to allow application of Modifying Factors to support detailed well planning and final evaluation of the economic evaluations of the deposit.

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Table 1. Vulcan's combined Zero Carbon Lithium™ Project Lithium (Li) brine Measured, Indicated and Inferred mineral resource estimates. Phase One licences indicated in orange highlight. Note: see Competent Person Statement at the end of this document.

Licence/ Area	**Reservoir**	**Classification**	**GRV** km³	**Avg. NTG** %	**Avg. Phie** %	**Avg. Li** mg/L	**Elemental Li** t	**LCE** kt
Mannheim	BST	Indicated	4	90	10	153	54,111	288
	BST	Inferred	32	65	9	153	290,312	1,545
Ludwig	BST	Indicated	7	90	10	153	93,220	496
	BST	Inferred	22	65	9	153	199,226	1,060
Therese	BST	Indicated	2	90	10	153	29,907	159
	BST	Inferred	22	65	9	153	200,708	1,068
Flaggenturm	BST	Indicated	7	90	10	181	115,215	613
	BST	Inferred	37	65	9	181	391,201	2,082
Kerner	BST	Indicated	5	90	10	181	76,242	406
	BST	Inferred	13	65	9	181	132,558	705
Kerner Ost	*MUS, BST, ROT	Indicated	4.3	73	8	181	66,708	355
Taro	*MUS, BST, ROT	Indicated	14.5	73	8	181	237,362	1,263
Landau South	*MUS, BST, ROT	Measured	7.4	73	8	181	102,383	545
	BST	Indicated	1.2	90	11	181	22,220	118
Insheim	*MUS, BST, ROT	Measured	9	73	8	181	127,779	680
Rift-North	*MUS, BST, ROT	Measured	10.1	73	8	181	134,132	714
	*MUS, BST, ROT	Indicated	11.9	73	8	181	178,000	946
Ortenau	*MUS, BST, ROT	Indicated	57	73	8	181	659,013	3,507
	BST	Inferred	105	73	8	181	1,883,212	10,024
						mg/L		**kt**
Total LCE		**Measured**				**181**		**1,939**
		Indicated				**178**		**8,151**
		Inferred				**172**		**16,484**

Note 1: Mineral Resources are not Ore 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 value percentages.
Note 3: Reservoir abbreviations: MUS – Muschelkalk Formation, BST – Buntsandstein Group; ROT – Rotliegend Group.
Note 4: 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).
Note 5: NTG and Phie averages have been weighted to the thickness of the reservoir.
Note 6: GRV refers to gross rock volume, also known as the aquifer volume.
Note 7: Mineral Resources are considered to have reasonable prospects for eventual economic extraction under current and forecast lithium market pricing used in the DFS with application of Vulcan's DLS processing.

Field Development Plan

The field development plan is the overall well plan which defines the brine production and injection forecast for the Phase One project areas at Lionheart and Taro. The development plan for Lionheart (Figure 13) includes the addition of new wells, primarily at the Insheim license to the existing operational wells. The development plan takes into consideration the drilling plan for the wells and the timeline for construction of surface facilities and infrastructure for the project. All activities associated with the field development plan and overall Project execution take into consideration safety and environmental protection and plan to follow all regulatory requirements.

The aim of the development plan is to produce 600l/s of geothermal brine commencing for Phase One from Lionheart and another 300l/s from Taro, for a total of 900l/s from Phase One. It is expected to take 18 months to ramp-up to full capacity after start-up. The producer wells are planned to be connected to open faults which are within a high conductivity area, in order to minimise the drawdown, whereas the injector wells are planned for drilling away from the faults to optimise the sweep of lithium-rich brine toward the faults and the producers. Since the injectors are drilled in tighter areas than producers, they are mostly multilateral so that the connection to reservoir is maximised.

The drilling plans for Phase One are similar for all licences, for which Vulcan has acquired its own electric drilling rigs. The first new development wells are planned to start drilling in mid-2023 for Phase One, with start of operations for lithium production by the end of 2025. [26] [27]

The typical well plan trajectory will start from vertical at surface down to a depth of 1000m and then deviate the well to achieve the bottomhole target location in the Buntsandstein. Vulcan plans out each well individually but uses a generic model as a base case. The wells are planned to be drilled with water-based mud systems and includes extensive formation evaluation methods such as mud logging, wireline logging and geochemical analysis of cuttings. The wells are planned to be large sized boreholes to accommodate the large fluid rates expected, with 20″ surface casing down to 7″ liner across the production or injection intervals.

The dynamic reservoir modelling assumes dilution of lithium concentration over time at the reservoir level near the producer wells due to sweep effects of the lithium depleted brine reinjection. The cut-off assumed for economic production is 100 mg/L lithium, where the starting concentration is 181 mg/L lithium.

The expected flow rate from each well is determined by geological characterisation and the dynamic flow modelling, with maximum drawdown for producers and maximum injection pressures taken into consideration, and then optimised for lithium sweep. A 1:1 ratio of produced to injected fluid is assumed,

[26] Subject to receipt of all permits. Preliminary EIAs approved for two drill sites to date, requiring no full EIA, otherwise permits are progressing in line with expectations.

[27] The development drilling campaign is estimated to take 2.5 years. using the two Vulcan owned rigs for Lionheart (total of 14 new wells, 4 existing) and two externally sourced rigs for Taro (total of 9 wells).

as there is no water storage planned for the sites. This replacement of brine back to the reservoir allows for pressure maintenance and sweep effects.

There are a total of eight production wells planned for Lionheart, which includes two existing, operational production wells. A total of 10 injectors are planned with 2 existing operational wells, and an addition of 12 side-tracks. The location and number of wells may vary as this plan is subject to change as the drilling progresses and more reservoir and fluid information becomes available.

For Taro (Figure 14) a similar approach was taken. There are a total of five production wells and four injectors with six side-tracks planned for Taro. The location and number of wells may vary as this plan is subject to change as the development drilling progresses and more reservoir and fluid information becomes available.

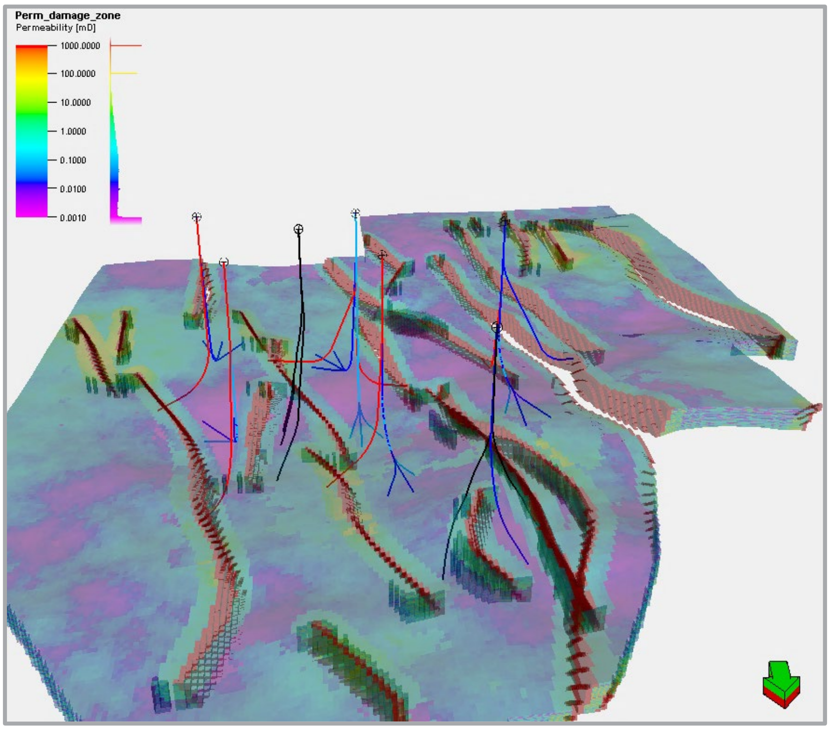


Figure 13. Lionheart Reservoir framework and planned well placement. Vulcan plans to use existing production wells and add new wells with the aim to achieve production/reinjection capacity of 600l/s – approx. 16,000tpa LHM equivalent at SOP[28].

[28] Production figures are estimates based on existing producers and planned wells, seismic analysis, reservoir simulation and field development planning, and will need review after development well drilling is completed.

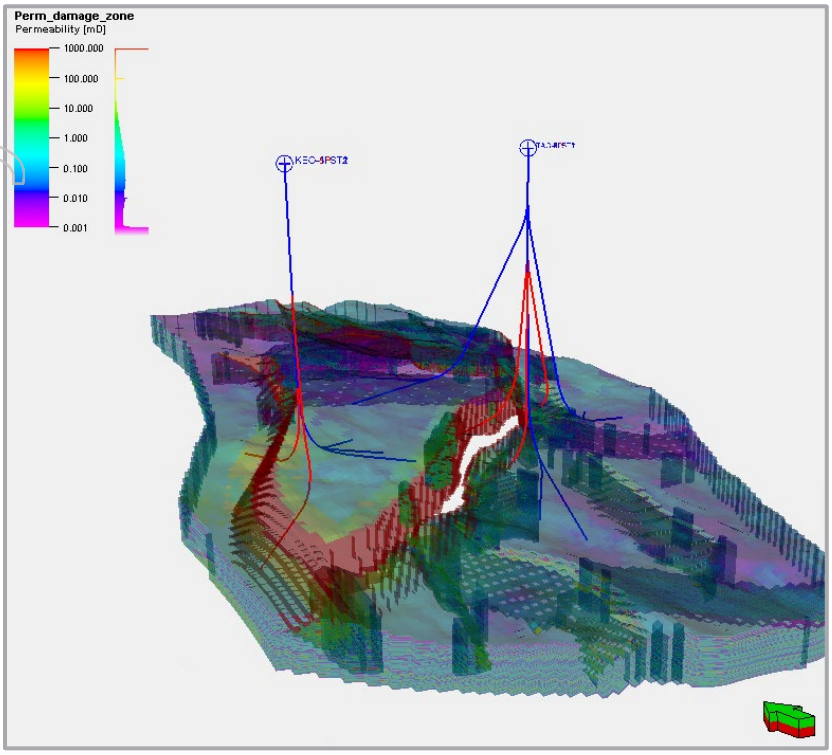


Figure 14 Taro Reservoir framework and planned well placement. Vulcan plans to add new wells with the aim to achieve production/reinjection capacity of 300l/s – approx. 8,000tpa LHM equivalent at SOP.

Mineral Ore Reserves

The Mineral Ore Reserves are reported on an area basis and comprise such quantities that are accountable to several licences. The first area for Phase One is Lionheart (Table 1) which comprises Mineral Ore Reserves from the Insheim, Landau-South, and Rift-North licences. The second area is Taro, which comprises ore reserves from the Taro-Lisbeth and Kerner licences.

The reference point for ore reserve booking is the wellhead or production manifold. As such it does not include the extraction recovery factor of the LEP which is 93.9% for a concentration of 181 mg/L production fluid and declines to 90.0% when reaching a concentration of 100 mg/L production fluid. A weighted average yields 93% for 15-30 years production. As such, the CLP outlet lithium mass flow is about 93% of the lithium inflow into the LEP inlet. The production forecasts are based on operational time of 315 days per year representing an uptime factor of 86.3%.

The reference point is chosen to enable stakeholders to compare Ore Reserves with the respective Mineral Resources and to calculate the subsurface recovery factor and meets the requirements of the reference point definition of Ore Reserves under JORC.

For Lionheart, the production forecast peaks at 17 kt LHM in 2028 and reaches a cumulative production of 224 kt LHM (196 kt LCE) after 15 years and of 398 kt LHM (350 kt LCE) after 30 years. The technical lithium recovery factor after 15 years of production is 10% and 18% after 30 years, which is estimated from the Measured Resource volume of 2,208 kt LHM (1,939 kt LCE). For the estimation of Mineral Ore Reserves, at Lionheart where there are existing production wells, the cumulative production after 15 years of production is used to represent Proved Ore Reserves. For the estimation of Probable Ore Reserves, the cumulative production from Year 16 to Year 30 is used.[29]

For Taro, the production forecast peaks at a rate of 8.9 ktpa LHM in 2028 and reaches a cumulative production of 215 kt LHM after 30 years. The technical lithium recovery factor after 30 years of production is 11.7%, which is estimated from the Indicated Resource volume of 1,843 kt LHM (1618 kt LCE). For the estimation of Probable Ore Reserves, the cumulative production after 30 years is used, therefore the Probable Ore Reserves are estimated to be 215 kt LHM (189 kt LCE) which can be seen above. There are no Proved ore reserves attributable to Taro or Kerner Ost, due to the lack of wells within the licence areas. In the Pre-Feasibility study (PFS) published in January 2021, there were Probable Ore Reserves attributed for the Taro project. The attributed Probable Ore Reserves were 420 kt LCE. A combined production profile for both fields is shown in the Lithium Production section for Phase One.[30] Whilst the overall Phase One Ore Reserve Estimate for Phase One has grown larger with the inclusion of the Lionheart area, the Mineral Ore Reserve estimate in the DFS and this announcement for Taro concludes with a 55% lower mineral ore reserve estimate as compared to the PFS. There are several reasons why the current estimate is significantly lower. This is mainly due to the planned development area being smaller as Taro North is not included in the field development plan of the DFS because the focus for Phase One has shifted to the Lionheart area, where Vulcan has acquired operating production/re-injections wells. Secondly, a more detailed field simulation of the Taro area during the DFS showed less optimal results when compared to the PFS work.

In the PFS, Probable Ore Reserves were attributed to the Ortenau licence area, in the amount of 700 kt LCE. This licence area is now planned as part of Phase Two of the Project. This figure was for an early stage, PFS-level study only, and is planned to be reviewed, revised and updated as part of ongoing feasibility studies.

Table 2: Phase One Ore Reserves. Note: see Competent Person Statement at the end of this document.

Lionheart: INS, LAN, RND		
Reserves Classification	Lithium grade	Economic Reserves Volume at Wellhead Reference Point
	mg/l Li	tonnes LCE
Proved	181	196,353
Probable	181	153,546
TAR-KER		
		tonnes LCE
Probable	181	189,070

[29] Phase 2 Reserves currently not updated since 2021 PFS, to be updated during current Phase 2 feasibility studies. See disclaimer on pages 66-68.
[30] Production is based on reservoir estimation, modelling and simulation, and is subject to further review as further development wells are drilled to increase brine production from Phase 1 area. Dilution is based on weighted average of two areas.

It is the opinion of the CP that methods utilised to estimate the Mineral Ore Reserves followed accepted industry practices and utilised a thorough approach. The geologic modelling that established the basis for the dynamic flow modelling was of high quality and utilised data from existing wells and 3D seismic. The history matching of the existing geothermal wells helped to confirm the model assumptions. Additionally, the iterative approach to test various well placements, dilution uncertainties and flow rates, established a range of possible outcomes with the base case representing a reasonable expectation for lithium production for the Phase One projects. The mining method utilized is widely accepted and proven for geothermal and hydrocarbon production with the utilisation of wells for lithium brine production to surface. The drill spacing is defined by the dynamic flow models and has been optimised for efficient reservoir flow.

The Mineral Ore Reserve estimation method established and used for the Vulcan Zero Carbon Lithium™ Project took into consideration the complex nature of this type of lithium brine recovery from geothermal wells. Consideration was given to reserve estimation methods used for the oil and gas industry from similar reservoirs. But with the reservoir being an active recharging system, there are differences that were accounted for in the decision to define the Ore Reserves based on the number of years of cumulative lithium production. This represents a probabilistic approach where a high level of certainty is associated with the likelihood of producing the Proved Ore Reserves volumes economically near existing production wells, per JORC requirements. The estimation of Probable Ore Reserves followed a similar test of uncertainty, and the cumulative lithium production after 30 years is believed to be a reasonable representation of what is economically recoverable with applied modifying factors. The modifying factors include the well network design, pilot testing of metallurgical processes, surface facility and infrastructure design, marketing contracts and pricing study, regulatory permitting process, and economic analysis that shows the project is viable.

Process Description

Vulcan has conducted extensive mineral processing and metallurgical testing to support the Zero Carbon Lithium™ Project, including operation of two lithium extraction pilot plants. The lithium extraction and processing technologies planned for use in the Project are either commercially proven in the lithium industry or commercially used in other similar analogous industries. They have been used either in similar industrial uses in the salt industry and for lithium production from brine mining with salars.

A simple description of the process starts with the brine enriched geothermal fluid produced in the Geothermal Plant where heat is transferred and utilised for geothermal power generation at the Organic Rankine Cycle (ORC) plant. The energy is sold to the grid, providing renewable power and heat for the region. The slightly cooled brine is sent to the LEP where it is sent to the Direct Lithium Sorption (DLS) system. The lithium chloride is recovered on a selective alumina-based sorbent and purified. The concentrated lithium chloride is then transferred to the Central Lithium Plant (CLP) for conversion to lithium hydroxide monohydrate (LHM).

This process has been extensively piloted in Vulcan's PP1 Pilot Plant which commenced operation on geothermal brine in April 2021 at the Landau-South geothermal plant, and is still operating at Vulcan's Insheim plant, both within Vulcan's Phase One area, thus validating some of the assumptions used in the DFS study, which are applicable to all the Vulcan license areas and the mineral Resource Estimates.

Latterly, a second pilot plant (P1A), has also demonstrated successful operation of the same extraction method in a High Pressure (HP) mode which removes the requirement for pre- and post-treatment, and therefore estimated CAPEX and OPEX savings. This process route was integrated at a later stage into the DFS.

Following the DLS, the next step is to convert the LiCl to LHM at battery grade for sale to market. This process utilises electrolysis and crystallisation for conversion. In 2022, samples of LiCl concentrate were tested and converted by Electrosynthesis Co. Inc. through further concentration, purification and then conversion into lithium hydroxide monohydrate via electrolysis and crystallisation.

Further optimising of the extraction and conversion processes is ongoing at the existing pilots and with the planned installation of a Demonstration Plant at the Landau facility (planned to be operational in mid-2023, permitted and currently under construction) to train an operations team in a pre-commercial environment. A Demo Plant for the LiCl to LHM process is also under construction and planned to be operational in 2023.

Site Infrastructure

The surface facility design is based on an interconnected design approach with main facility components co-located, like the LEP and ORC (Figure 15). At these plants the multi-well pads are connected via pipelines (or sometimes co-located at the ORC), and the CLP located in the Höchst Chemical Park near Frankfurt am Main. The LiCl product from the LEP will be trucked to the CLP for processing into LHM. See Figure 15.

Figure 15: Overview of Phase One Project Plants

At the LEP the entire system is planned to be built in three closed circuits: a brine cycle, an industrial water cycle, and a gas cycle. Industrial water is demineralized fresh water that circulates in a circuit between the drilling sites and the geothermal process plants. In addition, each Project cluster consists of three components: the well sites are where the brine is extracted, Interconnecting Piping and Power (ICPP) describes a complete pipeline and power line network, and Lionheart or Taro describes a site that houses all further facilities. Figure 16 provides an overview of the general process to produce Vulcan's sustainable LHM.

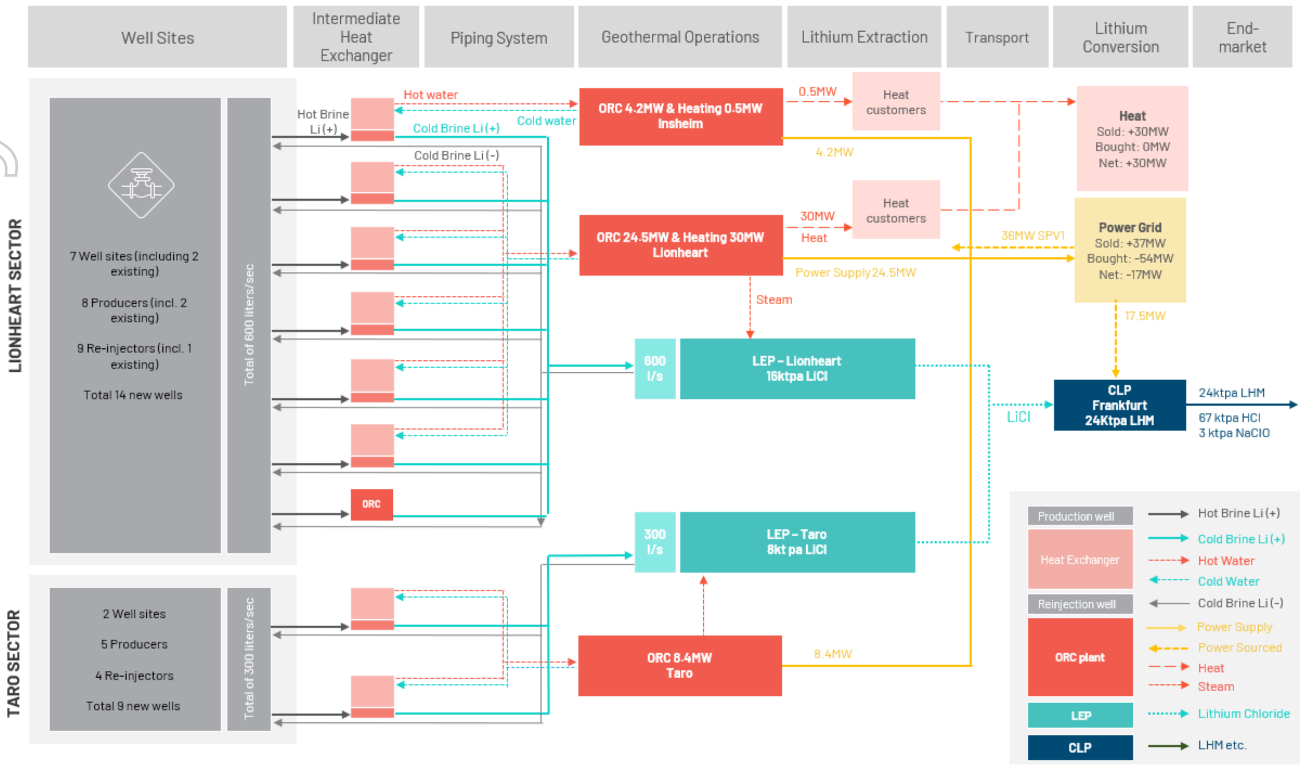


Figure 16 Overview of Project Flow Process

The general layout of each Phase One project is similar but varies depending on each location. See Figure 19 for the layout of the Lionheart site.

VULCAN ENERGY
ZERO CARBON LITHIUM™

Lionheart – 16km total of pipelines

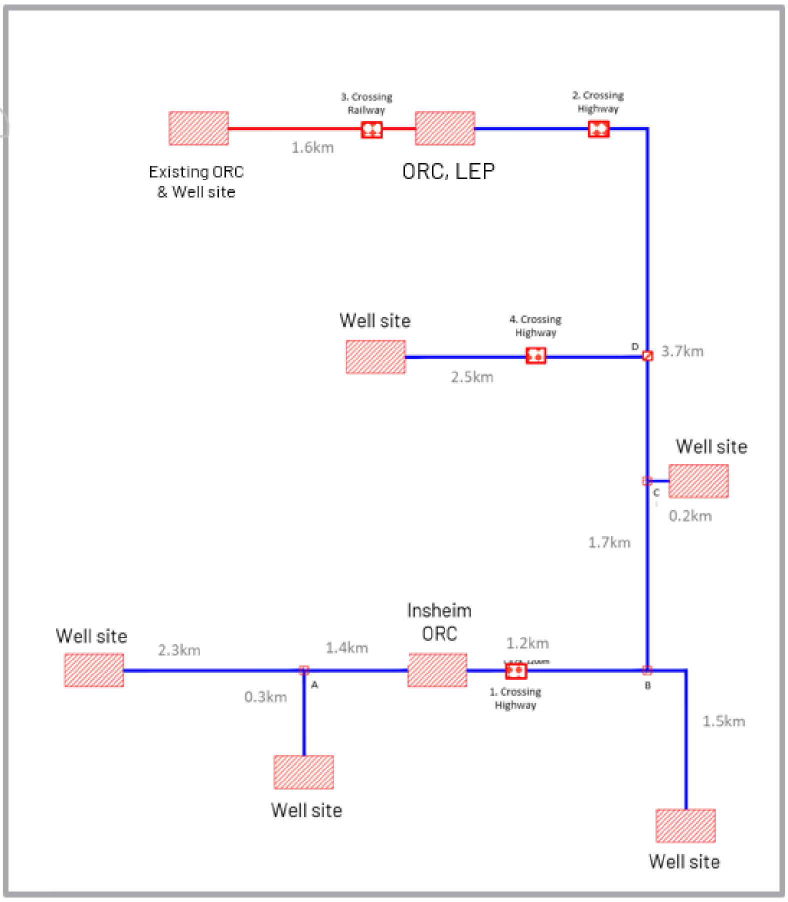


Figure 17: Planned pipelines at Lionheart.

Taro – 5km pipelines

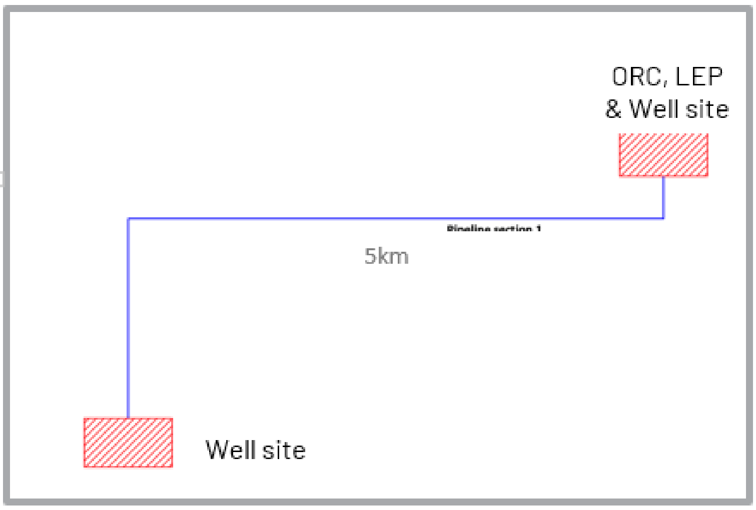


Figure 18: Planned pipelines at Taro.

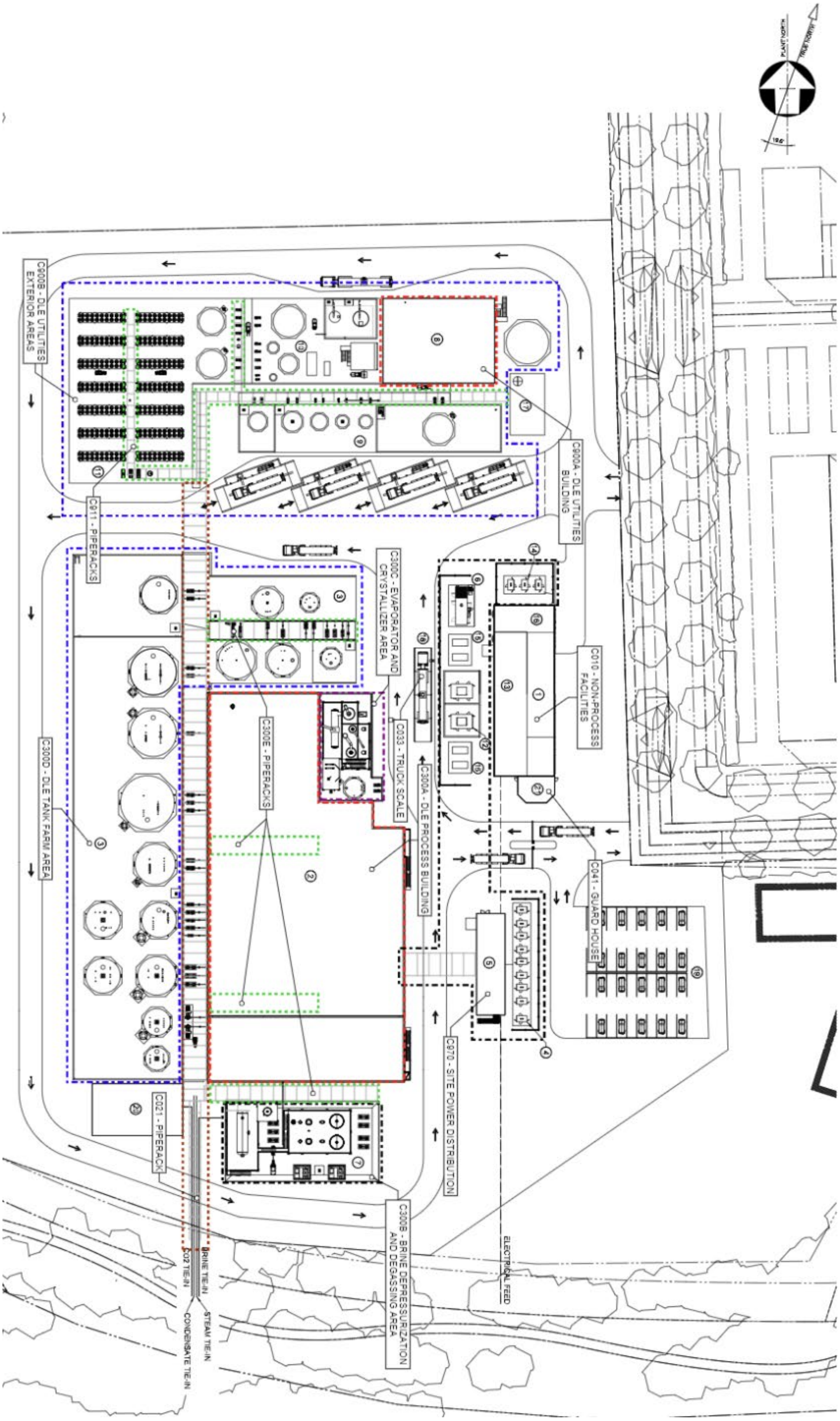


Figure 19 Planned layout overview of the Lionheart site.

The decentralised project design results in special requirements for the transport logistics from the well pad sites to the LEP and the geothermal plants, from raw material suppliers to the LEP or CLP as well as from the LEP to the CLP. Vulcan has decided to solve the logistics between the well pad sites and the LEP by means of a pipeline system in the Lionheart project complex and separately in the Taro project area in view of the planned climate neutrality. This is also consistent with the Phase One area, which is a hydrocarbon producing area and therefore already hosts pipeline structures. Due to the high concentration and the spatial distances, the concentrated lithium chloride will be transported by regular road transport to the CLP. The power infrastructure between the well pad sites and LEP will be placed in the same trench as the pipeline system to minimise surface disturbance.

Vulcan has been operating several lithium extraction pilot tests at the Insheim plant, utilising the geothermal brine from the existing wells. The PP1 has provided important insights into consistent brine composition and temperatures, including testing the operation at low pressures and aided in the design basis for the DFS. A newer high-pressure pilot (PP1-A) has identified value improvements that have been incorporated into the LEP design.

A lithium extraction demonstration plant is being installed adjacent to the Landau geothermal plant site to train Vulcan's operations team in a pre-commercial environment. Vulcan is targeting start of operations in mid-2023.

Figure 20: In-house designed lithium extraction Demo Plant, currently under construction.

Market Studies and Contracts

Vulcan contracted Fastmarkets to prepare a market supply study to evaluate global lithium markets from 2018 to 2040. The intention of the report was to offer insights into how the lithium market will develop with a focus on the lithium hydroxide market and with specific attention given to development in the European Union. However, the analysis is considered on a global basis and in the context of the entire lithium market and supply-chain.

Fastmarkets calculated the supply-demand fundamentals of the global lithium market. Having indicated that the market is undersupplied, Fastmarkets then looked at pricing to understand how the tight supply picture would keep lithium prices supported and the implications for Vulcan's Project.

Lithium supply has been increasing rapidly over the last few years to satisfy the needs of the growing demand. Figure 21 shows how lithium production increased in recent years, except for a slowdown in 2020 caused by the coronavirus pandemic.

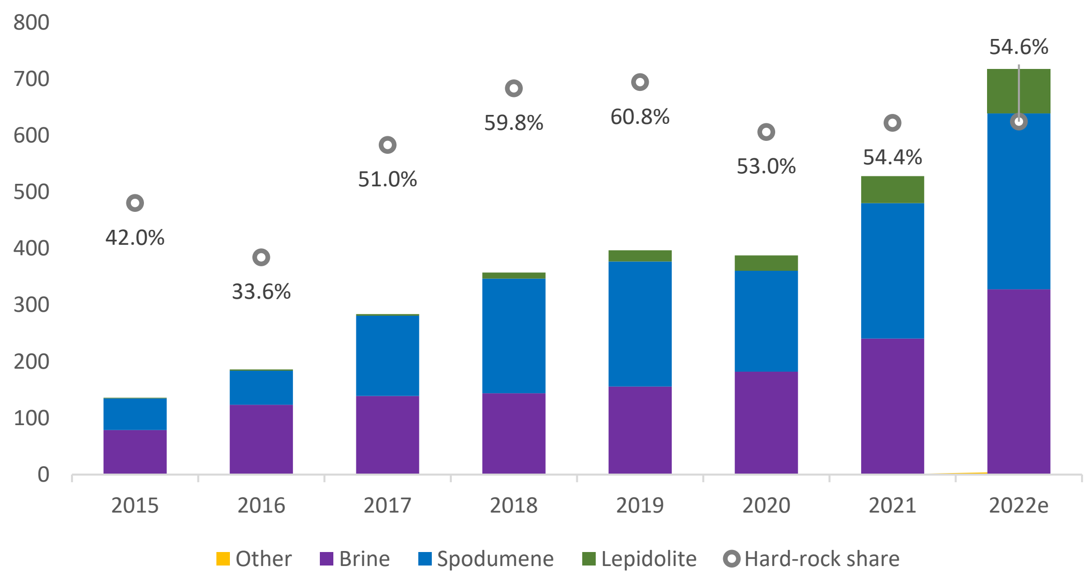
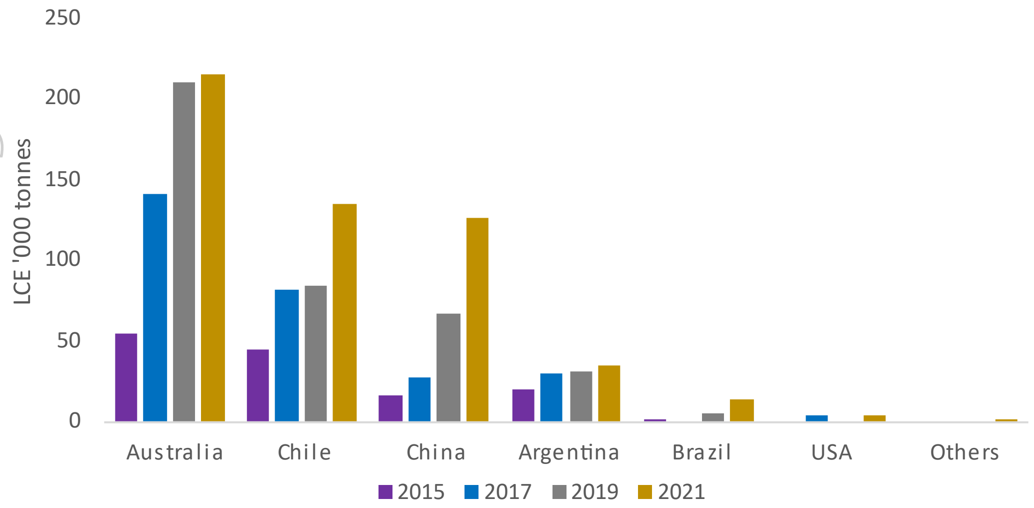


Figure 21: Global lithium raw material production (kt LCE) Source: Fastmarkets

Lithium is produced from two main deposit types, namely brines and hard rock pegmatites. With the increasing demand for lithium and strong price rises, economically extracting lithium from other deposits, such as clays and mica, are being investigated and developed. While these may be a minor source of lithium for now, they are forecast to form a greater part of the lithium supply picture within the next five years.

Concentrating on the two main sources, lithium brine deposits tend to have superior operating cost economics comparative to hard rock sources, for lithium carbon equivalent (LCE) production. While hard rock deposits have higher operating costs, brine operations are highly capital intensive at the outset. Other negative factors for development of evaporation-type brine deposits are the long development times (due to design issues and permitting, as well as the long lead time for evaporation to occur) and often an extended period between initial investment and revenue generation. Some of the disadvantages of brine when compared to hard rock extraction are partly mitigated by the development of direct lithium sorption (DLS) and some of the limitations of solar evaporation. Vulcan's Project is based on an established, commercially viable DLS technology.

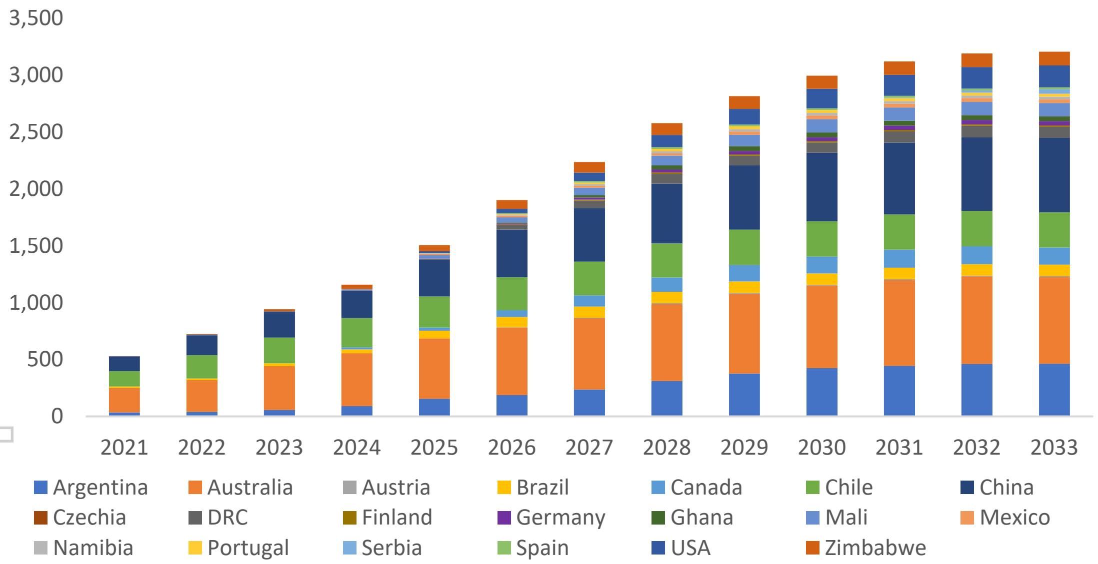
Major lithium flows come from six countries: Argentina, Australia, Brazil, Chile, China and the United States – see Figure 22. Other countries have supplied lithium in recent years, so while these six will continue to supply the market, several other countries are expected to begin or to restart extracting lithium due to current high prices and forthcoming demand tightness.



Source: Fastmarkets

Figure 22: Unprocessed lithium production by country (kt LCE).

Figure 23 shows Fastmarkets supply forecasts for lithium raw material production data to 2040, by country. This includes on-going projects as well as those that are at the earliest stage of investigation and development, and those which may not advance to commercialisation.



Source: Fastmarkets

Figure 23: Lithium forecast production by country (kt LCE).

The recent up-tick in interest in lithium may be centred on the potential for growth in the battery and energy storage solutions sectors however, lithium still has several important traditional uses. Use in these sectors is forecast to contribute steady demand into the future. However, with comparatively low growth rates for each of the applications, the market share of traditional applications is anticipated to drop in the face of increased demand for battery applications. This trend is already well underway with traditional markets having accounted for 75% in 2010, falling to 26% in 2021.

The increasing need for lithium is being driven by surging EV and other eMobility demands. Besides Li-ion batteries, no other proven battery type offers the properties to store sufficient power in a light and low-cost cell to enable the EV revolution. With EVs being championed to help decarbonisation efforts, Li-ion batteries have seen significant development and output growth in recent years.

Based on Fastmarkets data, EV penetration rates are forecast to show strong growth over coming years, helping incentivise investment in the battery supply chain. Hybrids and plug-in hybrids (PHEV) will continue to dominate global sales, with battery electric vehicle (BEV) sales accounting for just 2.0% of total car sales in 2019. However, this is forecast to lift each year to reach total sales of 48.6 m units by 2033 and account for 54% of the 2019-sales volume. See Figure 24. Fastmarkets has based growth forecasts on the 2019 sales volume due to the weakness of sales in 2020 and 2021, caused by semiconductor shortages and production reduction due to pandemic-related lockdowns.

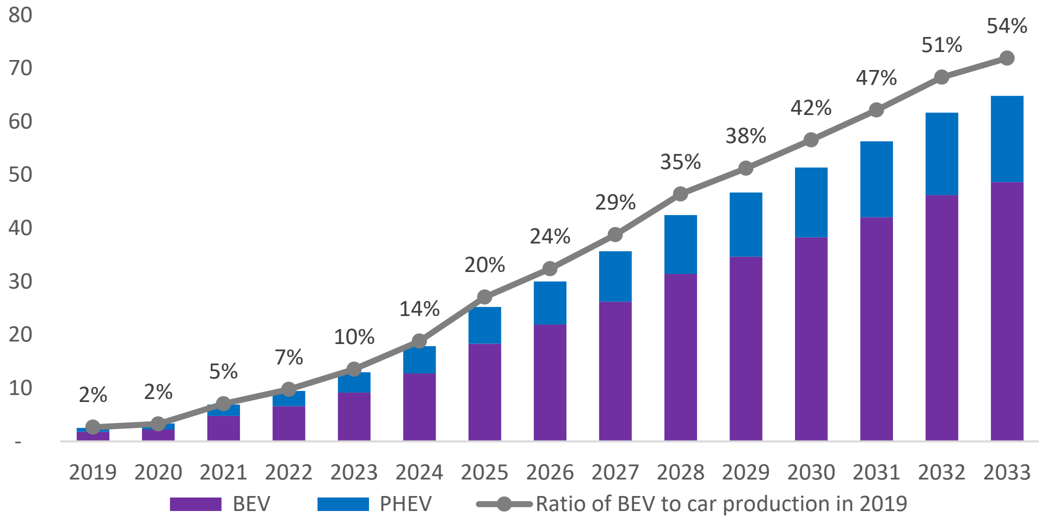


Figure 24: Global BEV and PHEV sales forecast (Million units).

When looking at the lithium market balance, Fastmarkets expects apparent supply growth to fail to keep pace with demand growth over the forecast period – see Figure 25. This is despite including all identifiable projects – with appropriate discounting for the likelihood of projects coming to market – and known expansions plans at existing facilities. Projects that are undefined and where there is little to no information available have not been included in the analysis. There are supply and demand risks that could affect the future outcome, with risk of lower-than-expected outputs and EV use of lithium falling out of favour.

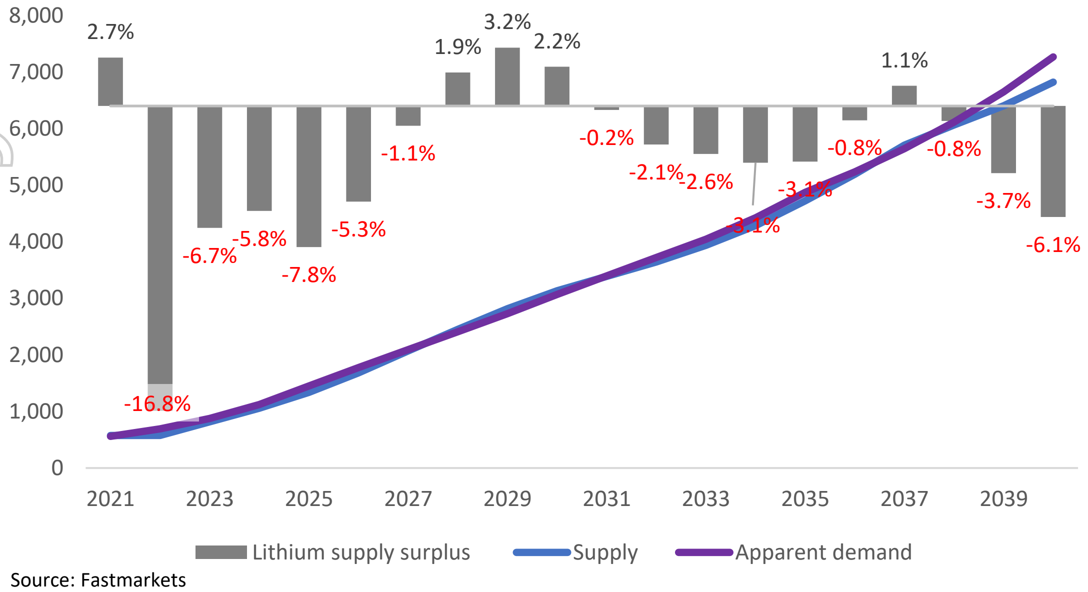


Figure 25: Supply-demand balance, and surplus as share of supply (kt, %) (Fastmarkets).

Fastmarkets also considered the GHG emissions potential from the various lithium sources. When assessing the lifecycle emissions of an EV compared to an internal combustion engine vehicle (ICE), the emissions related to manufacturing, battery assembly and battery minerals typically see the EV's GHG footprint being initially higher than those of an ICE. However, over the lifetime of the EV, the emissions from using electricity compared to fuel is significantly reduced, being 11.7tCO_2e versus 35.9tCO_2e[31] respectively. It is expected that battery minerals related emissions will decrease as cleaner extraction methods come online. Fastmarkets' analysis has included Vulcan's planned operation for reference, based off data from an LCA conducted by Vulcan's consultant, Minviro. Note that the values shown do not include credits which may be available from selling geothermal power (see Figure 26). As can be seen, Vulcan would potentially have the lowest emissions of all existing operations. This would potentially be attractive to customers and a competitive advantage.

[31] https://www.iea.org/data-and-statistics/charts/comparative-life-cycle-greenhouse-gas-emissions-of-a-mid-size-bev-and-ice-vehicle

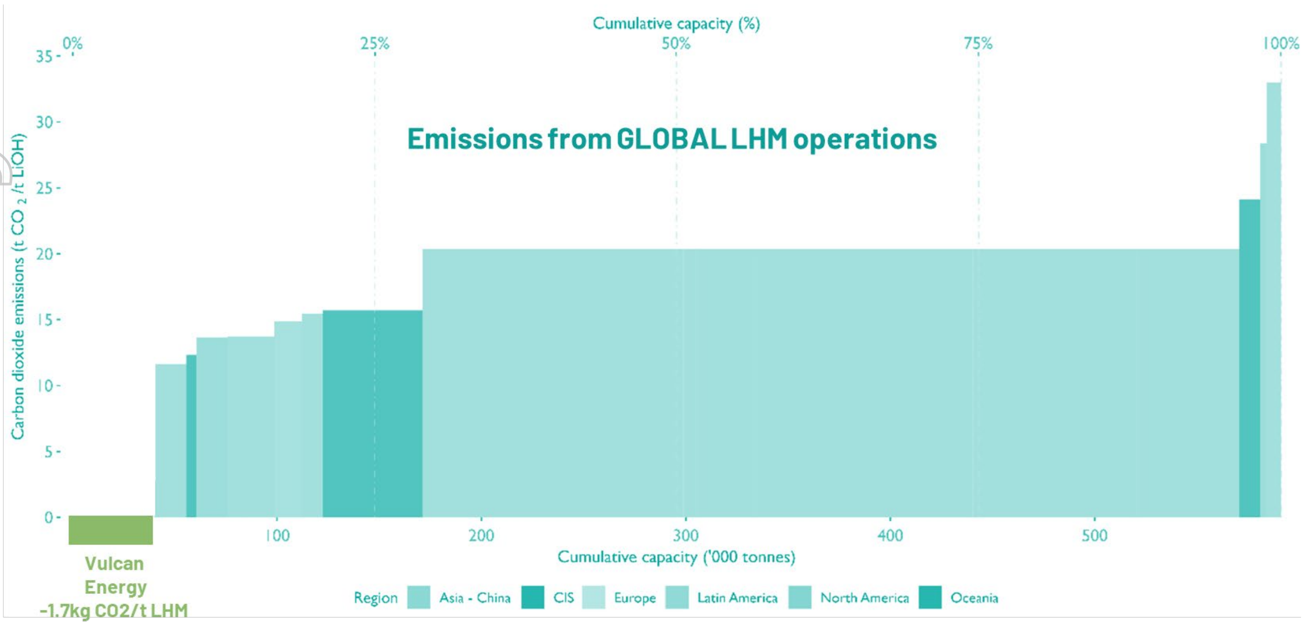


Figure 26: Emissions from lithium hydroxide operations (t CO2 eq./t LiOH)[32].

Vulcan has concluded five long term lithium supply agreements, also referred to as offtakes, with five key players in the European lithium-ion battery supply chain. The contract terms are from 5-10 years with some having flexibility to extend. The companies are:

- Renault Group, France
- Stellantis, France
- Volkswagen Group, Germany
- Umicore, Belgium
- LG Energy Solution, South Korea

Estimated Project Economics

A detailed economic model was undertaken by Vulcan for the Phase One DFS. As well as the fully integrated Phase One approach, the model evaluates two options for different business structures that allow Vulcan to optimise the value of each component of the project.

Option One (Figure 27) comprises the combination of two separate Special Purpose Vehicles (SPVs) analysed both separably, meaning operating independently. SPV1 would include the equipment and processes associated with the Lionheart and Taro zones in Phase One (Land, wells, ICPP, ORCs, LEPs). SPV1's outputs include energy in the form of electricity, steam and heat. All steam is consumed internally

[32] *Sources: Fastmarkets projection for industry. Vulcan CO_2 value provided by Minviro. The CO_2 assessment is a cradle-to-gate study. It starts with the cradle: extraction of geothermal brine. Thermal energy of the brine is extracted and used for electricity and steam generation. Generated electricity is assumed to be exported to the German electrical grid. Part of the heat is exported for district heating, substituting natural gas use, and the rest of the heat is used for internal processes. It is assumed that of the electricity used throughout all processes 50% is sourced from the German grid and 50% is procured from additional wind generated electricity, on top of wind-based electricity that is already present in the German grid mix. Electricity, steam, hydrochloric acid (30% concentration) and sodium hypochlorite (15.8% concentration) are co-products of the lithium hydroxide monohydrate product. All co-products are accounted for using system expansion, meaning no allocation is required. The climate change impact for the lithium hydroxide monohydrate product for the assumptions described above is -1.7 kg CO_2 eq. per kg $LiOH \cdot H_2O$. Vulcan is not aware of any other net zero carbon, zero fossil fuels lithium projects either in operation or development.*

whilst electricity is sold to the grid and heat is sold to customers located nearby. SPV1s outputs also include Lithium Chloride (LiCl) solution (40%) which is sold to SPV2. SPV2 includes the CLP. SPV2s outputs include LHM, HCl and Sodium Hypochlorite (NaOCl). The LHM is sold to the Vulcan parent company. HCl and NaOCl are sold directly to the market.

Option Two (Figure 28) comprises the combination of two separate business: Geothermal and Lithium. The Geothermal business is a proposed SPV which includes land, wells, ICPP and ORCs whilst the Lithium business includes two proposed SPVs: SPV LEP and SPV CLP. SPV Geothermal outputs include energy in the form of electricity, steam, and heat. SPV LEP's output is LiCl solution (40%) which is sold to SPV CLP. SPV CLP's outputs include LHM, HCl and NaOCl.

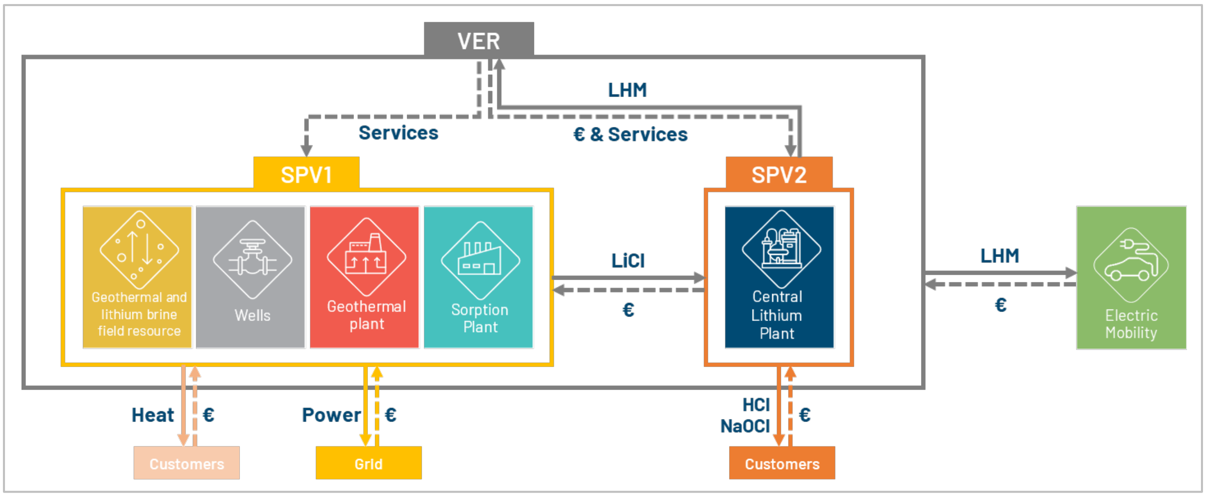


Figure 27: Option One - Value flow of target operating model.

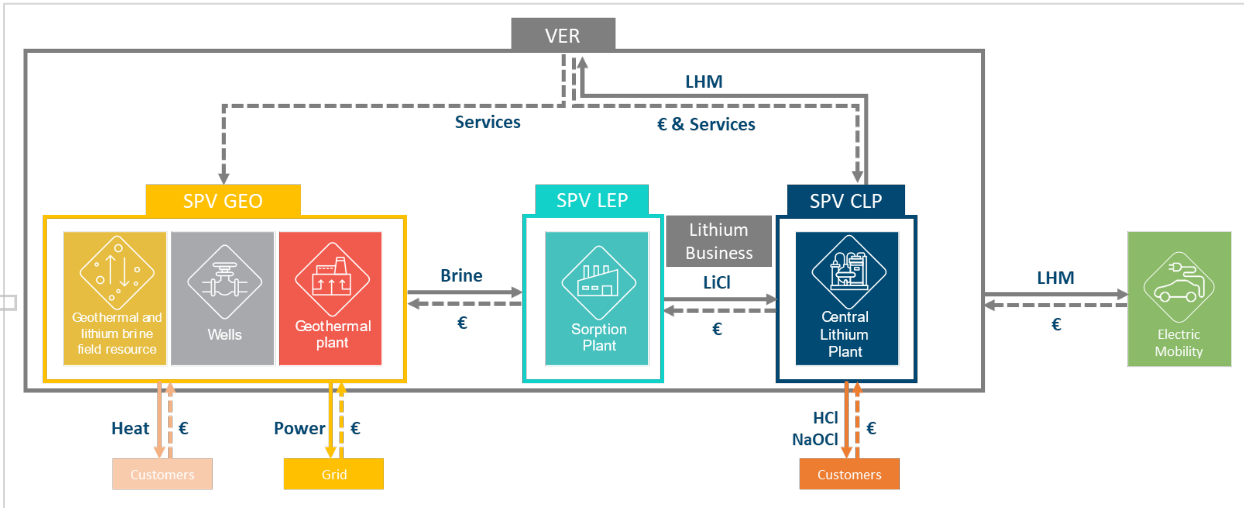


Figure 28: Option Two - Value flow of target operating model.

The inputs to the economic model are extensive. The geothermal brine production forecast is from the dynamic flow modelling as described in the Mineral Reserves section of this announcement. The estimated capital and operating costs are derived from a combination of sources from Hatch for the design basis for the surface facilities. The well related costs are provided by Vulcan and the ORC plant costs are from Turboden.

The key estimated inputs and outputs of the economic analysis and financial model are listed below (Table 3).

Geothermal assets	
Input	
Brine Flow	900 l/s total for Phase One 600 l/s for Lionheart 300 l/s for Taro
Lithium Concentration in Brine	181 mg/l
Output	
Power produced and sold	307,893MWh/a
Heat produced and sold	252,300MWth/a
Steam produced	5.9MW/a
Li-rich brine flow to LEP	900 l/s total for Phase One
LEP assets	
Input	
Brine Flow from geothermal asset	900 l/s total for Phase One
Steam consumed	5.9MW/a
Output	
LiCl Production in LHM equivalent*	24,755 t/a
CLP asset	
Input	
LiCl in LHM equivalent*	24,755 t/a
Output	
LHM Production (Battery-grade)	24,755 t/a
HCl Production (30%wt)	67,500 t/a (net of CLP consumption)
Sodium Hypochlorite (15.8%wt)	2,975 t/a

*Capacity

Table 3: Key estimated inputs and outputs of economic model.

The financial model includes consideration of operational constraints and sensitivities to model the various options under consideration in the DFS.

Expected Commodity Prices

LHM

The forecast average realised price per tonne of LHM in the economic model is taking into consideration Fastmarkets' long term price forecast (min 57.5% LiOH) ($/kg, EU & US) and combining it with Vulcan's pricing mechanisms concluded in its offtake agreements.

	Forecast average price realised combining Fastmarkets price forecast and Vulcan offtake agreements pricing mechanisms (€/t)
Average	*30,283*
2026	37,524
2027	33,743
2028	21,153
2029	23,477
2030	19,209
2031	15,571
2032	22,385
2033	24,975
2034	26,177
2035	27,378
2036	28,580
2037	33,020
2038	34,353
2039	36,018
2040	37,017
2041	37,017
2042	37,017
2043	37,017
2044	37,017
Long term price	*37,017*

Table 4: DFS economic model LHM price forecast, using Fastmarkets combined with Vulcan's offtake pricing mechanisms.

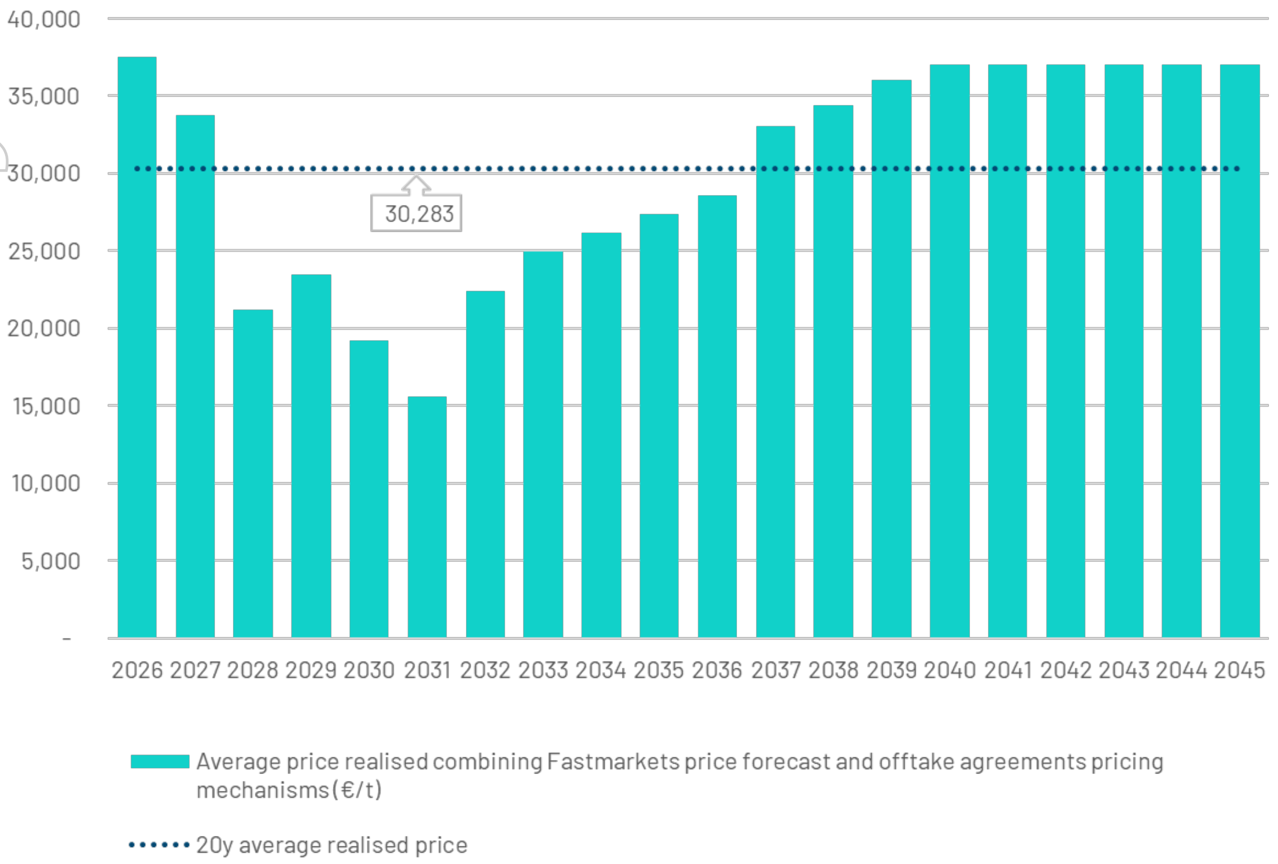


Figure 29: DFS economic model LHM forecast realised price, 20y forecast (€/t).[33]

During the first few months of Vulcan's operations from its planned commercial CLP, the Company will have to send samples of its LHM to its offtakers to be qualified as battery grade. Therefore, Vulcan will not sell its product as battery grade during the initial period of production to its offtakers but will have to sell some unqualified product to the market which will include a discount. This has been taken into consideration in the financial model.

Energy

Power

Vulcan intends to sell power to the grid from its geothermal facilities. Vulcan is subject to the German Renewable Energies Act (*Erneuerbare-Energien-Gesetz: EEG*) which applies to all plants for the

[33] The average forecast realised price per tonne of LHM is taking into consideration Fastmarkets long term price forecast (min 57.5% LiOH)($/kg, EU & US) and combining it with Vulcan's pricing concluded in offtake agreements which includes price floors and ceilings, fix prices, and price indexed on indexes like Fastmarkets. Therefore, the average realised price forecast varies from the Fastmarkets long term price forecast. The average realised price forecast is taken into consideration in our financial model and is used to underpin forecast revenues. Lithium prices are subject to unpredictable fluctuations, driven in part by changes in the balance of global supply and demand as well as international, economic and geopolitical trends and developments. Any decrease or significant volatility in the price of or demand for lithium could have a detrimental effect on Vulcan Group's business.

generation of electricity from renewable energies and therefore also to the geothermal plants which Vulcan Group operates and intends to operate as a part of its renewable energy business.

The EEG provides a feed-in tariff of €252/MWh for the power sold to the grid by geothermal assets. The feed-in tariff doesn't act as a fixed price but as a price floor, which means that if power prices go over the feed-in tariff, the operator can sell power at those higher prices. In Vulcan's financial model, Aurora Energy Research's power price forecast is used, and prices do not exceed the feed in tariff. For geothermal plants commissioned after 31 December 2023, a decreased statutory tariff applies. As a rule, the statutory tariff decreases by 0.5% on an annual basis compared to the preceding year, noting that the statutory tariff in place at the date of commissioning of an individual plant applies to this plant throughout its remuneration period and does not further decrease. The remuneration under the EEG is typically paid for a period of 20 years beginning from the commissioning date plus the remaining period of the calendar year in which the respective plant was commissioned.

Vulcan targets to start its power production by the end of 2025, therefore it plans to secure a €248/MWh tariff for 20 years. Once the 20-year period lapses, power is planned to be sold to the grid without the feed-in tariff.

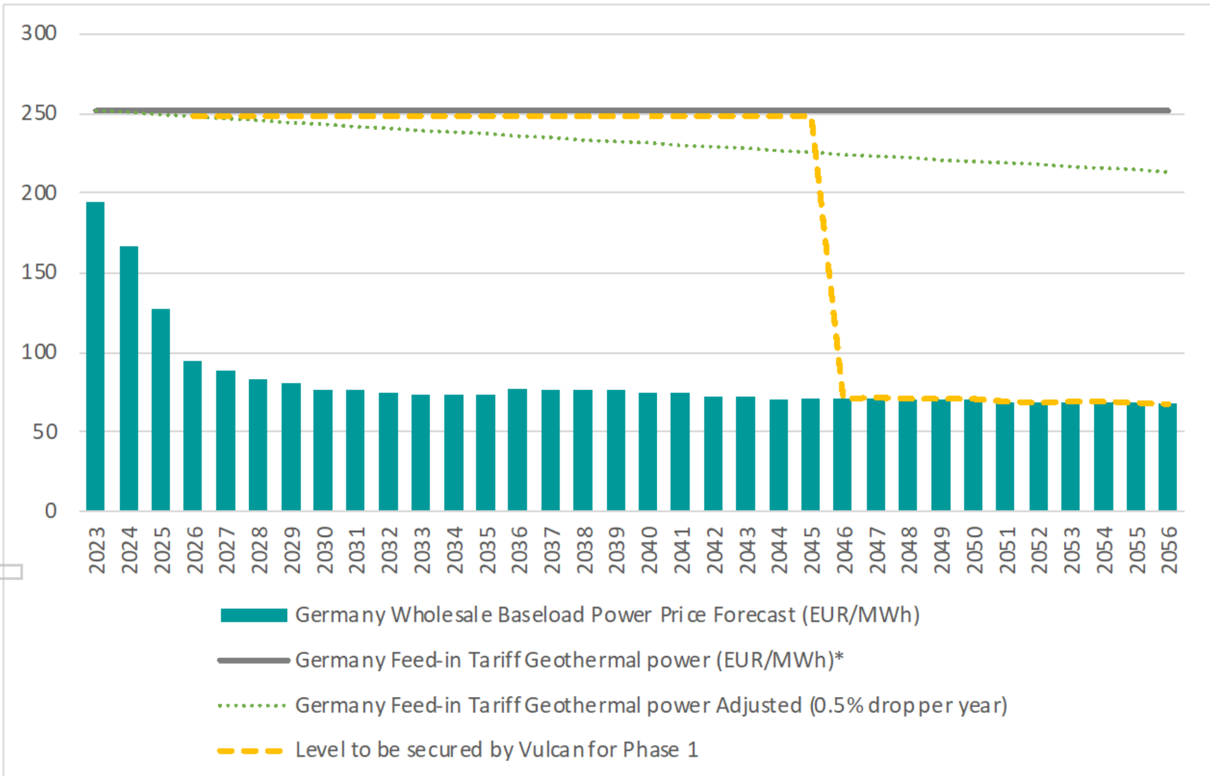


*Figure 30: EEG Feed-in Tariff (€/MWh). *EEG Feed-in tariff guaranteed for 20 years from start of operation but from 2024, the Feed-in tariff drops by 0.5% per year. Source baseload power price forecast: Aurora Energy Research.*

Heat

Vulcan intends to also sell heat to nearby customers. Vulcan has already concluded a large heat offtake agreement with MVV in Mannheim, but it will be covered by Phase Two of the Project.[34] The Company is in advanced discussions with local municipalities and utilities to sell its heat production as part of Phase One.

By-Product Chemicals

Vulcan expects to produce two by-products at its CLP: Hydrochloric Acid (HCl) and Sodium Hypochlorite (NaOCl). Both products are basic chemicals with thousands of customers in Europe and can be sold locally. Both products, but especially HCl, have very volatile prices and are difficult to forecast. According to OPIS, 2022 HCl contract prices were reported around €125/t in Europe[35] whilst NaOCl at €250/t FOB. Those by-products are non-core to Vulcan's business model.

Taxation Regime

Vulcan has applied a Project tax rate of 29.175% for assets in the Rhineland-Palatinate area and 31.1% in Hesse.

Technical Assumptions

Key Technical Assumptions

As part of the economic analysis, Vulcan has applied production rates in-line with feedback and test work data received from its technical teams. Phase One considers the production of geothermal energy in the form of steam, heat and electricity and of lithium chloride through two Project areas (Lionheart and Taro). LHM is produced at the CLP.

A two-and-a-half-year construction schedule is applied with first production, or so called Start of Production (SOP) commencing end of 2025. For a more comprehensive list of assumptions used in the DFS, please see the Appendices.

It is assumed that by SOP, both Lionheart and Taro have access to 100% of the brine flow rates from the wells (600l/s from Lionheart and 300l/s from Taro). Once the brine flow rate is available, production ramp up is faster for the ORC (6 months) than for the LEP and CLP (24 months).

	Q1 2026	Q2 2026	Q3 2026	Q4 2026	Q1 2027	Q2 2027	Q3 2027	Q4 2027
Production ramp-up	25%	50%	65%	80%	90%	95%	99%	100%

Table 5: Estimated production ramp-up for LEP and CLP.

[34] See relevant ASX announcements.
[35] *Global Chlor-alkali Report, Market Advisory Services, December 2022, by OPIS, a Dow Jones Company.*

Energy Balance

It is intended that Vulcan will have the capacity to produce more than 300GWh of electricity from three ORC plants (including Vulcan's existing, operational plant) as part of Phase One that will be sold to the grid. Additionally, it will also have the capacity to produce more than 250GWh of heat that is planned to be supplied to nearby customers as district heating and almost 6MW of renewable steam consumed internally. As described in the Table 6 below, Vulcan is targeting to be a net heat supplier, a neutral steam consumer, and a net electricity consumer, with an overall net positive energy balance (across heat and power), i.e. a new producer of energy.

	Insheim ORC	Lionheart ORC	Taro ORC	Total
Power Production (MW)	4.2	24.5	8.4	36.8
Heat Production (MW)	0.5	29.9	0.0	30.4
Power Production (MWh)	34,856	203,326	69,712	307,893
Heat Production (MWh)	4,150	248,140	-	252,290

Table 6: Phase One- Targeted Energy output.

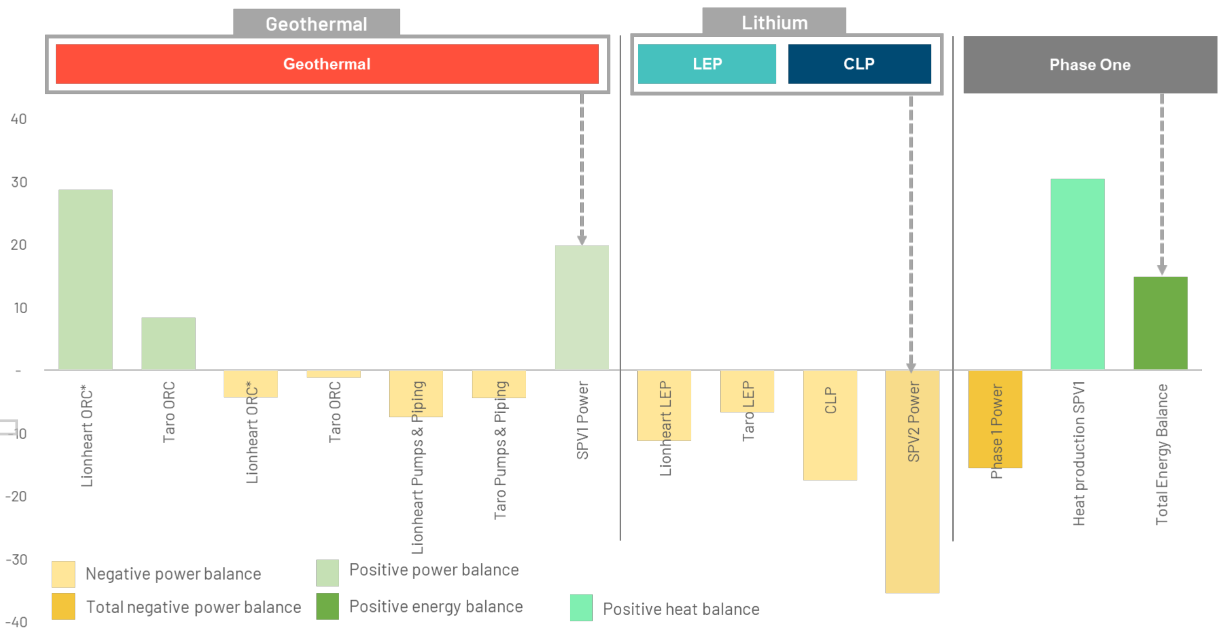


Figure 31: Phase One - Targeted Energy Balance.[36]

[36] Vulcan's Phase One is a net consumer of power, and a net producer of heat. The overall positive energy balance is a net effect of these two different types of energy.

According to Minviro, an independent consulting firm who specializes in Life Cycle Assessments for battery metals, Vulcan's Project, including all three scopes, will have a forecast negative carbon footprint of -1.7t of CO_2 per tonne of LHM produced.

Lithium Dilution

An estimate of lithium dilution was applied to the production forecast as the re-injected brine will be subject to a reduction in lithium concentration over time as the reservoir is affected by production and reinjection in the swept area.   This is projected to impact revenues as with the same amount of brine extracted, less lithium is being produced. Vulcan's financial model takes into consideration lithium dilution at each well site but does not take into consideration a potential recharge of the lithium which may leach-out from the mica-rich basement rocks over time, or in-flow from surrounding areas outside of Vulcan's licenses, or the drilling of additional production wells to boost production. On average, in the Project area, lithium concentration drops by ~1.6% per year.[37]

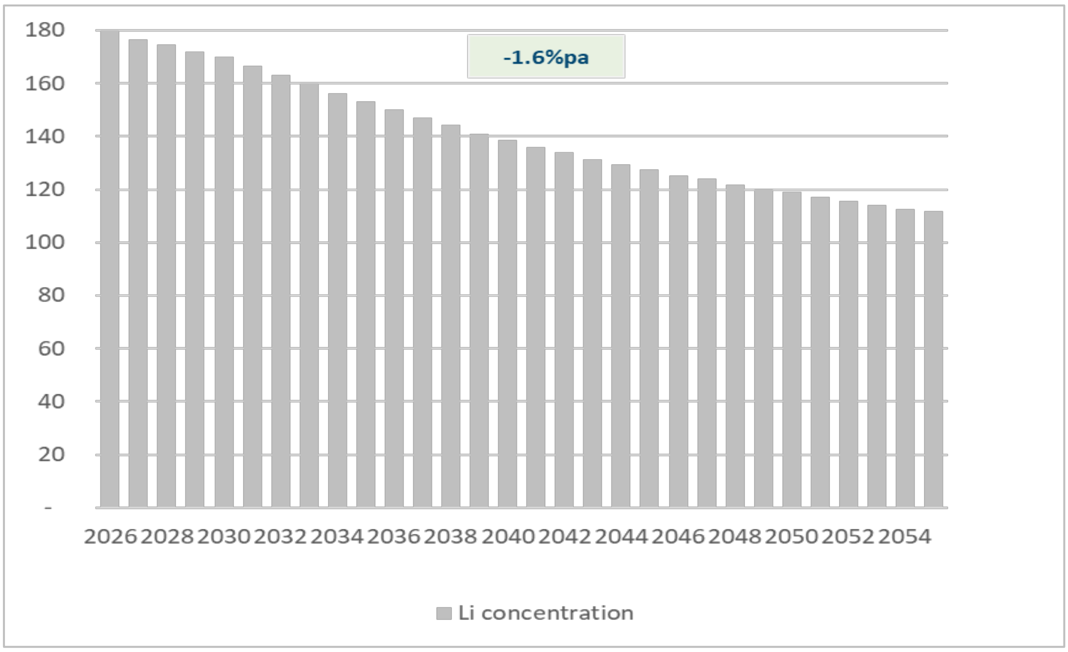


Figure 32: Phase One – estimated Lithium Dilution (Li ppm), averaged over both zones in Phase One.

Estimated Lithium Production

Taking into consideration the factors listed below, Phase One LHM output has been calculated and displayed in the graph below. A steady decrease is observed over time, associated with long term dilution of the reservoir. This could be offset in future by adding further production wells and allowing existing production wells to become solely used for renewable energy generation.

[37] *Dilution is based on reservoir estimation, modelling and simulation, and is subject to further review as further development wells are drilled to increase brine production from Phase 1 area. Dilution is based on weighted average of two areas.*

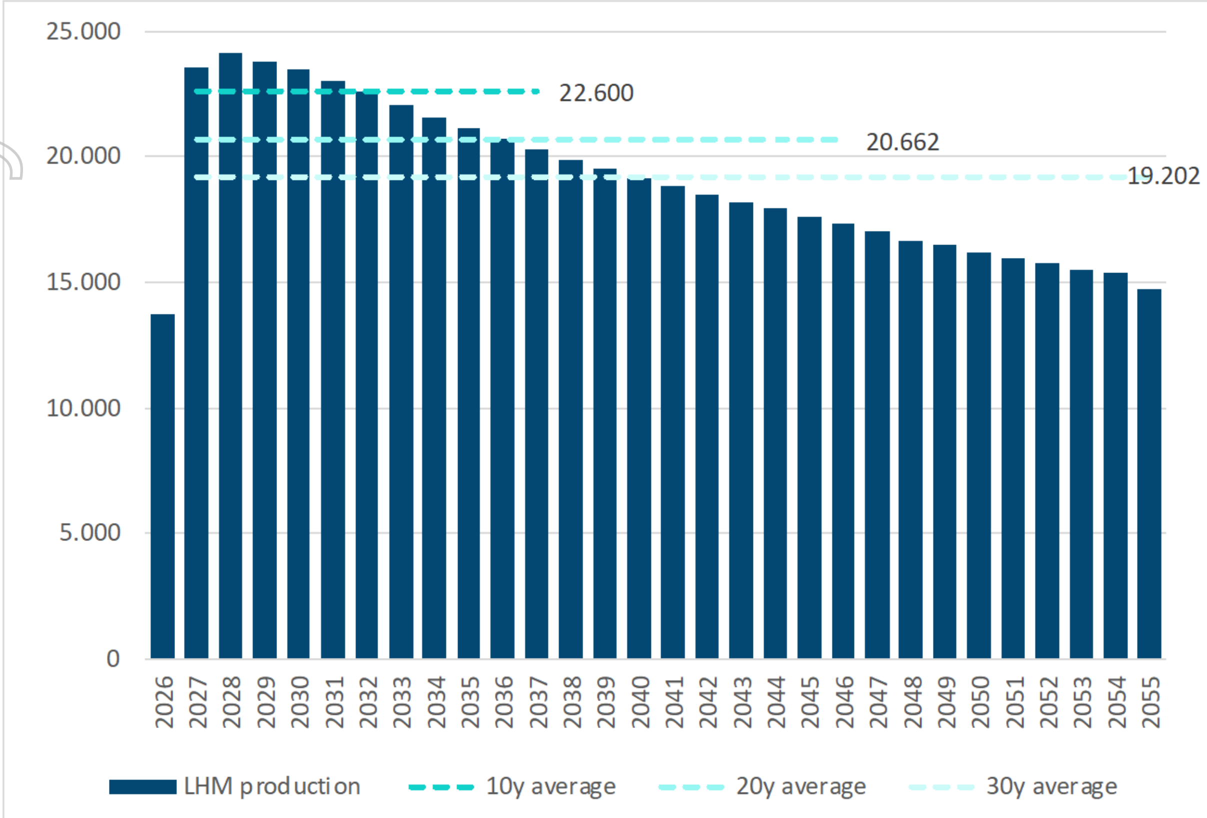


*Figure 33: Phase One - targeted LHM Production, tpa. *Excluding ramp-up in 2026 in average calculation.*

Estimated Energy Production

Phase One energy output has been displayed in Figure 34 and averages around 307,000MWh/a power and 160,000MWh heat, which remains fairly stable during the Project duration as no significant temperature drop is expected or decline in flow rates, consistent with Vulcan's current operations, which have seen no temperature drop in over a decade of operation.[38]

[38] *Only part of the low temperature heat generated by planned Lionheart geothermal plant is estimated to be sold in the financial model. Shown production and timeline is a target and should be treated with caution.*

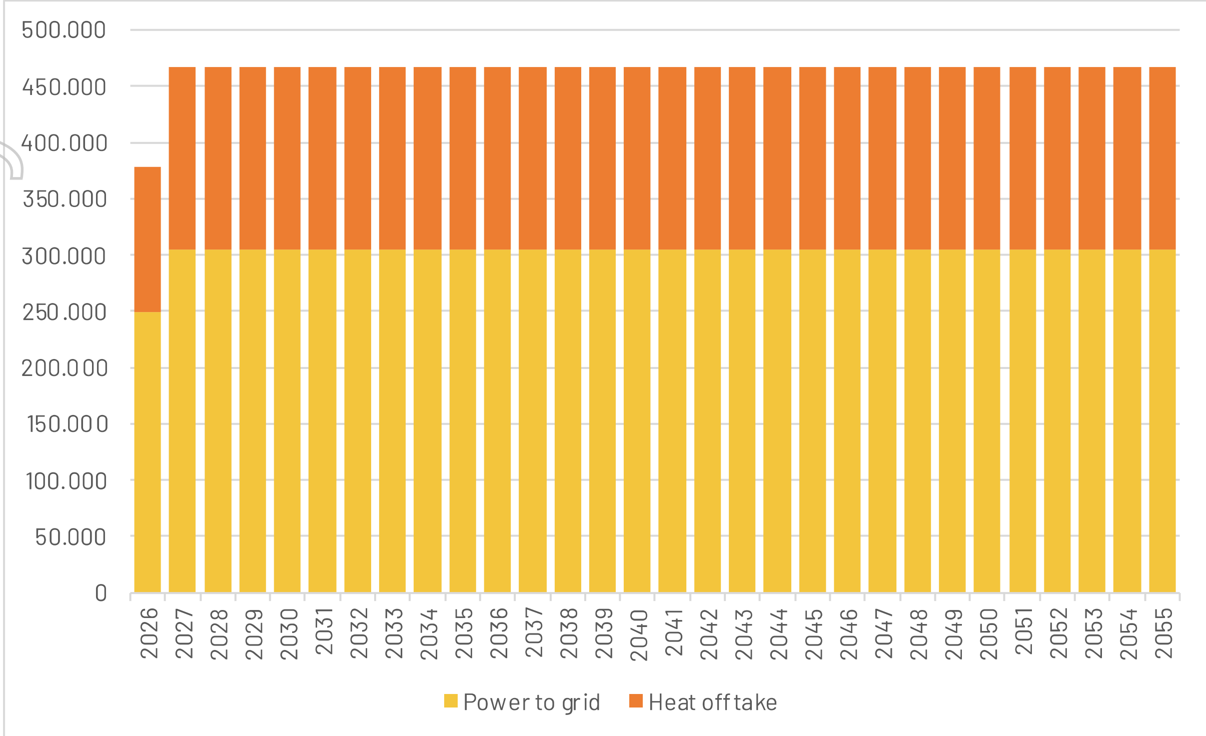


Figure 34: Phase One - Energy Production, 30 years, MWh/a.

Estimated Operating Costs

Vulcan has estimated operating costs in-line with the costs supplied by Hatch for the lithium part of the business, with internally calculated costs for geothermal operations. By far the largest projected cost component for Vulcan is energy in the form of power. It accounts for more than a third of the total estimated OPEX. Labour is projected to be the second largest estimated OPEX component, far behind, accounting for approximately 20% of the total. A contingency of 11% is included in the estimated OPEX displayed below in Table 7.

	Geo OPEX (€/a)	LEP OPEX (€/a)	CLP OPEX (€/a)	OPEX Phase One (€/a)	OPEX % of total
Reagents	-	1.3	1.08	2.34	2%
Operating Supplies	-	7.0	1.85	8.82	8%
Maintenance Supplies	2.0	11.3	5.23	18.51	17%
Water	-	0.2	2.72	2.87	3%
Steam	-	-	1.90	1.90	2%
Nitrogen	-	1.4	0.20	1.56	1%
Energy	18.3	12.2	11.51	42.01	38%
Labour	1.4	13.2	8.66	23.31	21%
Trucking	-	2.2	-	2.18	2%
Services & Others	-	6.2	2.07	8.30	7%
Total Estimated OPEX	22	55	35	112	100%

Table 7: Key target operating cost inputs (€M/a), 20y average.

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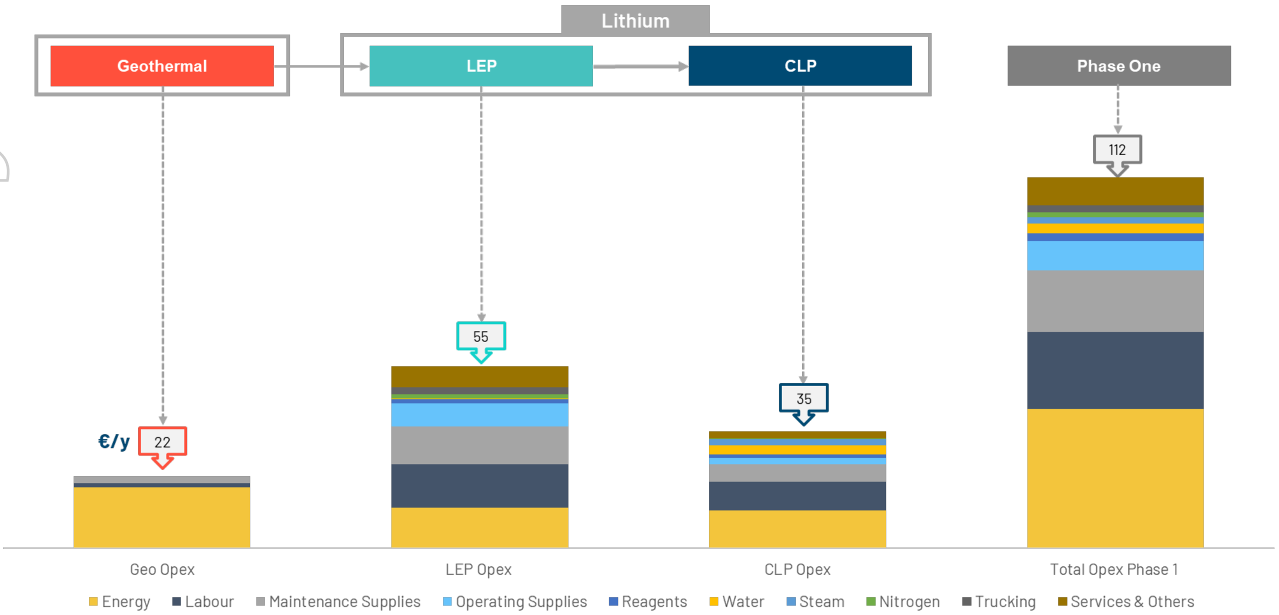


Figure 35: Key estimated operating cost inputs (€M/a), 20y average.

Lithium specific costs are also dominated by electricity costs, which is similar to other lithium assets globally. The difference with most other lithium assets and Vulcan's Project is that a majority of power consumption is offset by the geothermal assets selling more than 300,000MWh of green electricity to the grid every year.

	LEP OPEX €M/y	%	LEP €/t LHM*	CLP OPEX €M/y	%	CLP OPEX €/t LHM*	LHM total OPEX €Mpy	%	LHM total OPEX €/t*
Reagents	1.3	2%	61	1.08	3%	52	2.34	3%	113
Operating Supplies	7.0	13%	338	1.85	5%	89	8.82	10%	427
Maintenance Supplies	11.3	21%	547	5.23	15%	253	16.53	18%	800
Water	0.2	0%	7	2.72	8%	132	2.87	3%	139
Steam	-	0%	-	1.90	5%	92	1.90	2%	92
Nitrogen	1.4	2%	66	0.20	1%	10	1.56	2%	75
Energy	12.2	22%	591	11.51	33%	557	23.72	26%	1,148
Labour	13.2	24%	639	8.66	25%	419	21.87	24%	1,058
Trucking	2.2	4%	106	-	0%	-	2.18	2%	106
Services & Others	6.2	11%	302	2.07	6%	100	8.30	9%	402
Total OPEX	54.9	100%	2,656	35.20	100%	1,704	90.07	100%	4,359
**Based on an average 20y LHM production of 20,662tpy*									

Table 8: Key estimated lithium extraction and conversion operating cost inputs.

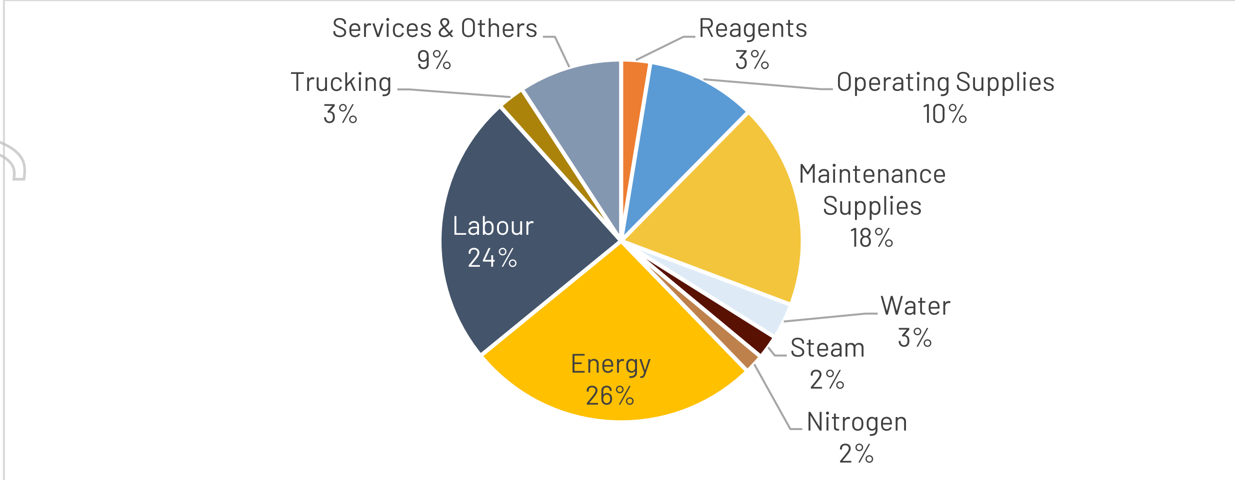


Figure 36: LHM estimated OPEX breakdown (%).

Electricity

Electricity cost is estimated to be the largest estimated operating cost in Vulcan's Project. The cost of electricity is calculated by using a long-term power price forecast for the German grid and adding location and consumption specific costs including fees and taxes. The forecast displayed in the (Figure 37) below is not including grid costs as it is site specific but is displaying the long-term power price forecast as supplied by Aurora Energy Advisory. Vulcan is estimated to pay on average, over the first 20 years of its operation, €77/MWh for power, pre-taxes and grid associated costs.

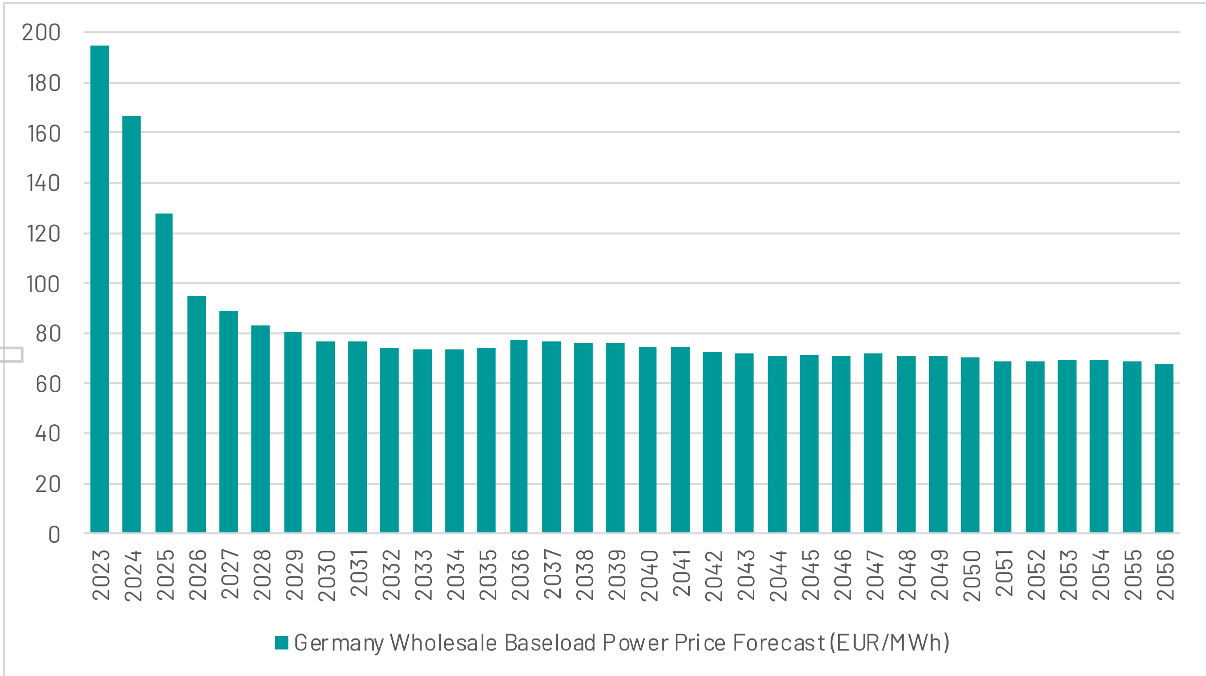


Figure 37: Power price forecast (€/MWh) Aurora Energy Research.

Forecast Estimated Global Cost Curve Position

Vulcan's Phase One OPEX is forecast at around €4,359 or US$4,577 and currently places the Project at the bottom of the global cost curve for LHM, according to analyst forecast data from Fastmarkets. Vulcan benefits from not having to purchase feedstock of its lithium production, which is the main OPEX component for all spodumene converters, mostly located in China. Vulcan also benefits from a technology that uses a limited volume of reagents, which is the main OPEX component for brine producers in South America.

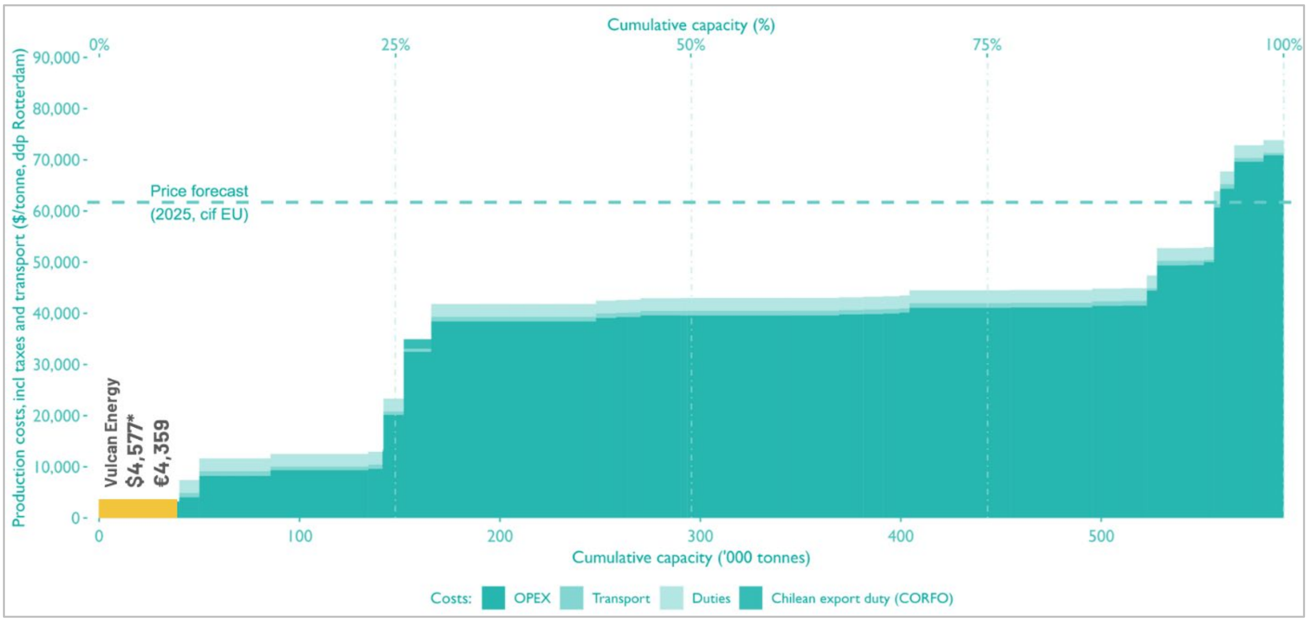


Figure 38: Forecast Fastmarkets Global Cost Curve LHM, Delivered Costs 2025 ($/tonne, ddp Rotterdam), and Vulcan's forecast costs[39].

Estimated Capital Expenditure

[39] *Projected cost curve provided by Fastmarkets and Vulcan's OPEX estimate provided by the Company. Vulcan's OPEX converted from € to $ using 1.05 EUR/USD FX. Vulcan has used a projected cost curve by Fastmarkets as it is the Price Reporting Agency (**PRA**) for lithium for the London Metals Exchange. Fastmarkets' estimate of a project's costs uses a bottom-up approach based on assumptions about the operations. On top of this, costs for transport to a common location and any duties that would be applied are added to allow comparison from different sources.*

Vulcan has developed its Phase One capital expenditure (CAPEX) estimate in-line with international and inhouse cost guidelines. Total estimated CAPEX estimate for this phase is €1,496M as described in the Table below.

The CAPEX is built up for each project with an understanding of direct and indirect cost. Sufficient engineering and procurement definition has been completed across the projects to determine overall accuracy. The Phase One contract strategy has been used to understand when further indirect cost (i.e., EPCM fee) need to be applied or when to build in risk and contingency. Owner's cost has also been identified into the overall CAPEX estimate.

Estimate Accuracy Based on Design Maturity: SPV Geothermal Est at +/- 20%, SPV Lithium Est at +20/-15%. SPV Lithium planned to have the original DFS estimate at Class 3 accuracy (+/-15%), however several value improvements opportunities were identified late in the DFS, and sufficient engineering was not able to be completed to achieve Class 3, therefore these opportunities have a lower accuracy than the original estimate, therefore giving an approximate DFS Phase accuracy of (+20/-15%). These opportunities are planned to be developed to the same detail and accuracy as the original estimate in the next phase.

	Lionheart Geo	Taro Geo	Lionheart LEP	Taro LEP	CLP	Total
Drilling	151	97	-	-	-	**248**
Well Sites	61	28	-	-	-	**89**
ICPP	103	23	-	-	-	**126**
ORC	88	55	-	-	-	**143**
LEP & BoP	-	-	233	178	-	**411**
CLP	-	-	-	-	256	**256**
Owner's costs	13	6	8	4	8	**38**
Contingency	25	8	35	27	38	**132**
EPCM	-	-	19	14	20	**53**
Total Estimated Capex	**440**	**217**	**294**	**223**	**322**	**1,496**

Table 9: Estimated capital costs - Phase One (€M).

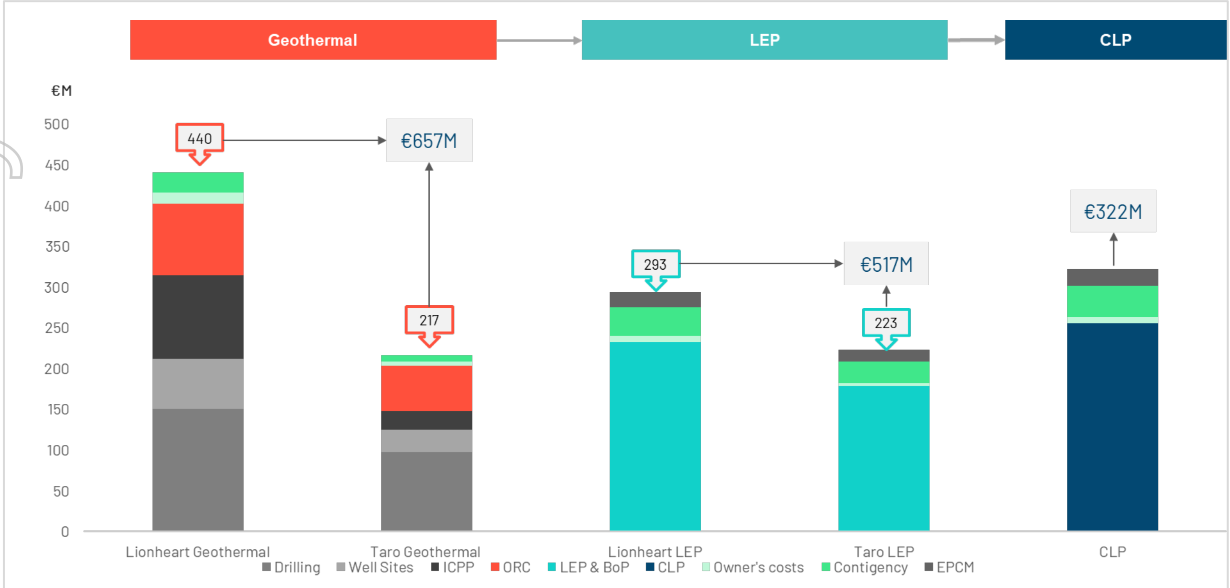


Figure 39: Key estimated capital expenditure - Phase One (€M). Contingency: some contingency is already included in other CAPEX components such as drilling, hence the lower contingency number reflected in the graph[40].

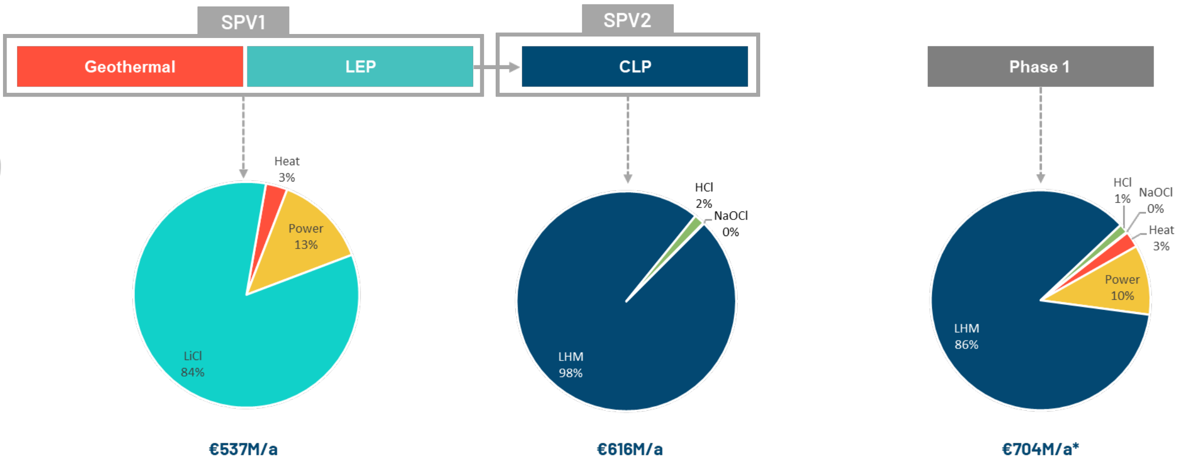
Projected Revenues

Based on the price assumptions in the model described above, estimated annual revenues (€M/a, 20-year average) are displayed below for Phase One.

	SPV1			SPV2			Total
	Heat	Power	LiCl	LHM	HCl	NaOCl	
Revenues SPV1 (geothermal)	16.7	71.8	448.9				537.4
Revenues SPV2 (lithium)				605.7	9.4	0.8	615.9
Revenues Integrated Phase One*	16.7	71.8	448.9	605.7	9.4	0.8	**704.4**
**LiCl is excluded as it is an internal sale if SPV1 and SPV2 are within the same entity*							

Table 10: Option One – estimated annual revenue €M/a, 20y average.

[40] *Estimate Accuracy Based on Design Maturity: SPV Geothermal Est at +/- 20%, SPV Lithium Est at +20/-15%**
**SPV Lithium planned to have the original DFS estimate at Class 3 accuracy (+/-15%), however several value improvements opportunities were identified late in the DFS, and sufficient engineering was not able to be completed to achieve Class 3, therefore these opportunities have a lower accuracy than the original estimate, therefore giving an approximate DFS Phase accuracy of (+20/-15%). These opportunities are planned to be developed to the same detail and accuracy as the original estimate in the next phase.*



Annual Revenue €M/y, 20y average (excluding 2026 ramp-up)

	SPV1			SPV2			Total Phase 1
	Heat	Power	LiCl	LHM	HCl	NaOCl	
Revenues SPV1	16.7	71.8	448.9				537.4
Revenues SPV2				605.7	9.4	0.8	615.9
Revenues Phase 1*	16.7	71.8	448.9	605.7	9.4	0.8	**704.4**

LiCl is excluded as it is an internal sale if SPV1 and SPV2 are within the same entity

Figure 40: Forecast annual revenue breakdown €M/a, 20y average.[41]

Phase One forecast revenues are mostly dictated by LHM realised prices as 86% of all revenues are linked to those prices. From the 2030s onwards, LHM prices are estimated to continue to increase but revenues are forecast to remain mostly flat and then slightly decline. This is linked to lithium dilution in the brine and therefore a reduced LHM output over time.

Energy revenues show much more stability than revenues linked to lithium, at least for the first 20 years of operations. Indeed, in the first 20 years of production, 81% of the energy revenues are coming from selling power under a feed-in tariff. Revenues are estimated to start declining after 20 years as the feed-in tariff will expire and power selling price will be linked to the market. Heat prices are usually indexed to electricity prices.

Target Operating Margins

Option One estimated operating (EBITDA) margins are summarised below, showing a 20-year average. SPV1 margins are forecast around 86% compared to 21% for SVP2, however, estimated CAPEX for SPV1 represents for 78% of Phase One CAPEX so high margins are required. SPV2 costs include the cost of buying the feedstock, LiCl, from SPV1, which is indexed on the realised LHM selling price.

[41] *Please refer to Technical Assumptions for the assumptions underpinning these target revenues*

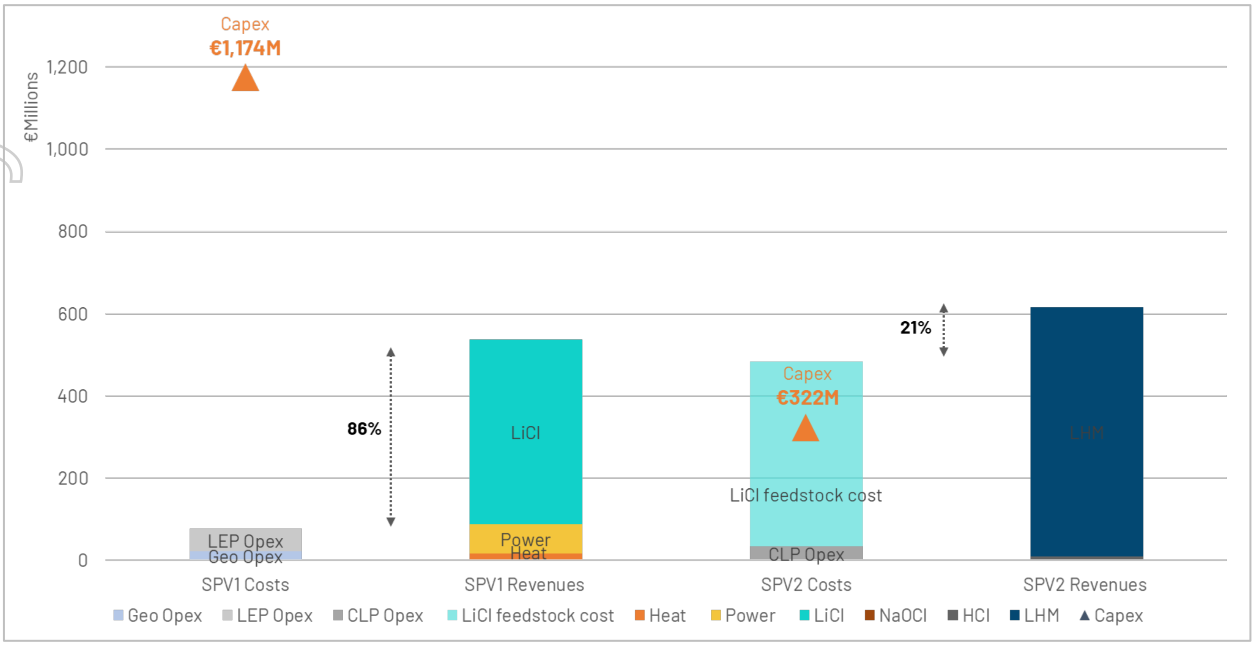


Figure 41: Option One – estimated operating margins – 20y average.

Option Two estimated operating margins are summarised below. SPV Geothermal margins are forecast around 85% and SPV Lithium around 72%. CAPEX for both SPVs are also much closer than Option One.

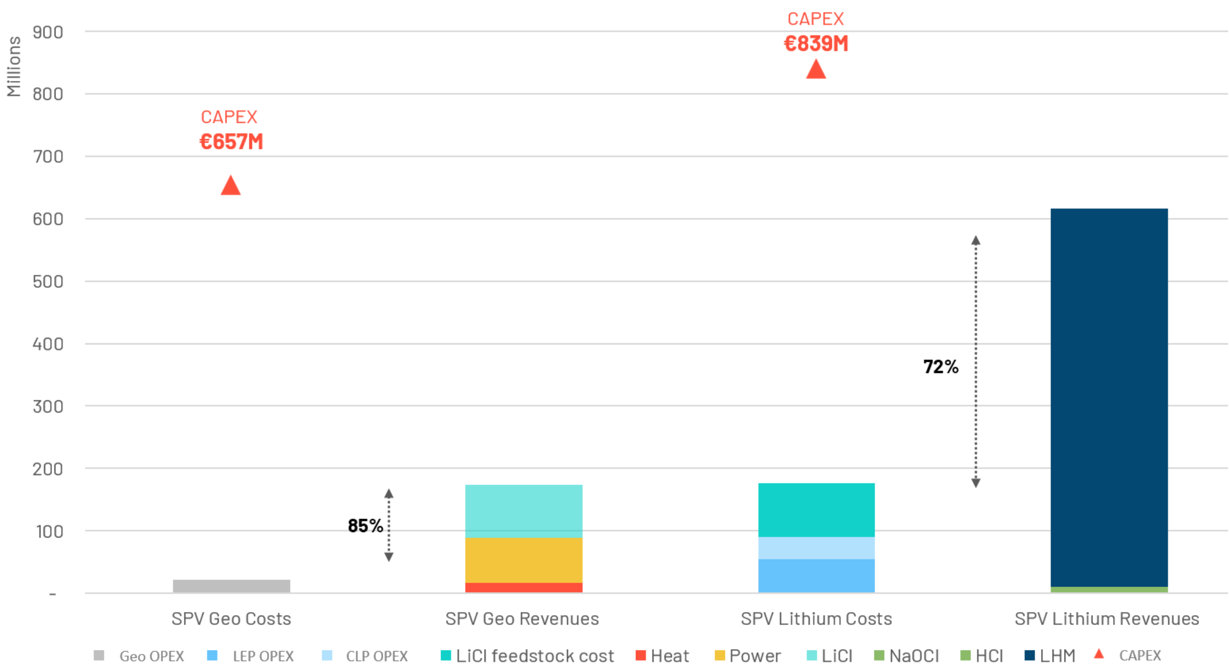


Figure 42: Option Two – estimated operating margins – 20y average.

Estimated Target Cash Flow

Estimated average EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) for Integrated Phase One and for the first 20 years of the Project is around €600M per year whilst cash flows are estimated to be around €437M.

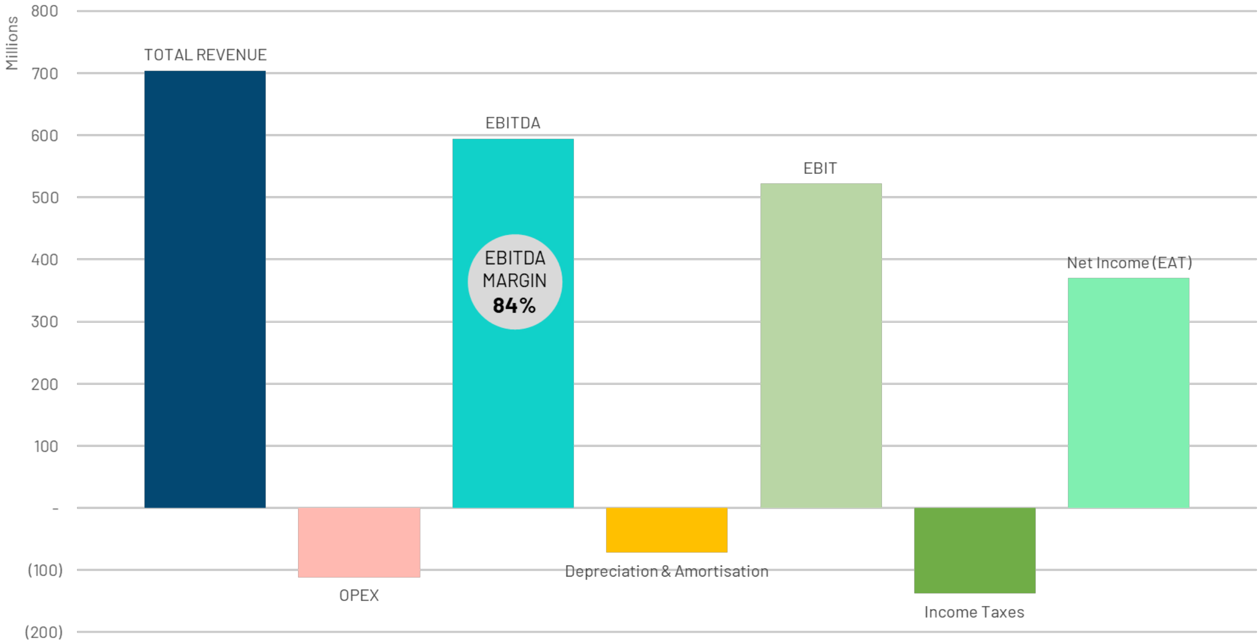


Figure 43: Phase One targeted financials – 20y average (€M/a).

Target Project Economics[42]

Using the above assumptions, the Project is estimated to generate a net operating cashflow of €437M/a over the first 20 years of the life of the Project. The Phase One (integrated project) estimated payback is 3.5 years. Estimated pre-tax NPV is €3,917 M and pre-tax IRR is 34.4%. Expected post-tax NPV is €2,584M and post-tax IRR is 26.1%.

	SPV1	SPV2	Phase One (integrated)
Revenues €M/a	537	616	704
Net Operating Cash Flow €M/a	339	104	437
NPV pre-tax m€	**3,022**	**895**	**3,917**
NPV post-tax m€	**1,998**	**572**	**2,584**
IRR before Tax	**34.1%**	**35.5%**	**34.4%**
IRR after Tax	**26%**	**26.1%**	**26.1%**
Payback in years	3.5	3.3	3.5 (integrated)
Total CAPEX m€	1,174	322	1,496
Geothermal	*657*		*657*
LEP	*517*		*517*
CLP		*322*	*322*
Avg OPEX €/t LiOH	2,656	1,704	4,359

Table 11: Option One – estimated project economics.

	SPV Geothermal	SPV Lithium	Phase One (integrated)
Revenues €M/a	174	616	704
Net Operating Cash Flow €M/a	111	328	437
NPV pre-tax m€	**724**	**3,192**	**3,917**
NPV post-tax m€	**435**	**2,149**	**2,584**
IRR before Tax	**11.4%**	**45.9%**	**34.4%**
IRR after Tax	**7.3%**	**34.0%**	**26.1%**
Payback in years	6.5	2.5	3.5 (integrated)
Total CAPEX m€	657	839	1,496
Geothermal	*657*		*657*
LEP		*517*	*517*
CLP		*322*	*322*
Avg OPEX €/t LiOH		4,359	4,359

Table 12: Option Two – estimated project economics.

[42] *Please see Technical Assumptions section for further information.*

Sensitivity Analysis

A sensitivity analysis of the Vulcan Project has been carried out considering the LHM price, power price, FX, OPEX and CAPEX costs, flow rate and lithium concentration, at 10% increments (between +/-40%). Using these sensitivities, the analysis indicates that the Project is most sensitive to the items directly impacting revenue (flow rate, lithium price and FX). Regarding the FX, LHM offtakes are linked to a PRA with a US$ index or a fixed price in US$. The flow rate fluctuation impacts both lithium extraction output and energy output. Lithium prices impact revenues but their fluctuations are limited by the pricing mechanisms in place with offtakers. As a generally low-cost operation, OPEX has a limited impact on financials. Power prices also have a limited impact as the price fluctuations impact both cost and revenues in a similar manner. See Figure 44 below for Post-tax NPV sensitivity – Phase One.

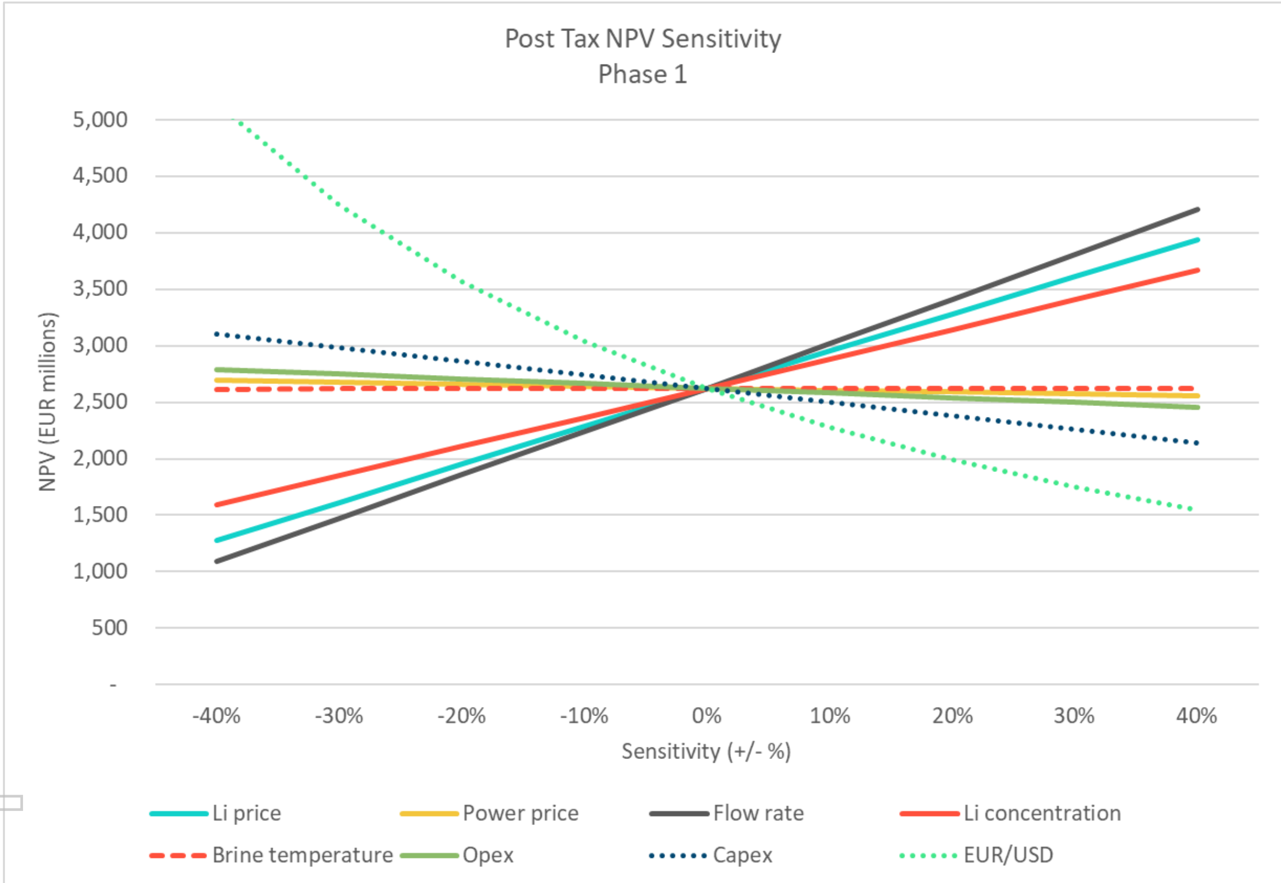


Figure 44: Post-tax NPV sensitivity – Phase One.

Environmental, Social & Permitting

There is an extensive regulatory framework in place that applies to the Vulcan Zero Carbon Lithium™ Project, regulated at all levels from local to federal to EU. These regulations ensure safe construction and operation of the wells, infrastructure and facilities associated with the project, as well as the protection of the environment and communities. These regulatory requirements are a key consideration for every aspect of Project planning, development, and operation.

Vulcan aims to have a net positive impact for the benefit of future generations. Vulcan therefore has an important role to play in Europe's decarbonisation journey. Vulcan has a management strategy designed to have minimal impacts on communities and the environment. Vulcan strives for continual improvements in our approach and engage in ongoing dialogue with local stakeholders to manage the potential impacts of construction and operational activities on the environment and their communities including water, biodiversity, land, and air.

Vulcan's strategy includes management strategies to minimise waste and water usage. Additionally, Vulcan works at ensuring minimal effect from environmental impacts, including seismicity linked to geothermal drilling, by utilising best practices and working to remain compliant with all regulations. Vulcan's approach aims to quantify project-related environmental and social impacts via informed decisions led by a framework about supply chains and energy use to mitigate and minimise potential negative impacts. Vulcan's Environmental Management Framework will continue to be developed, assessed, and optimised as operations advance and the company commits to having a positive input in the communities and environments in which it operates.

The main regulatory requirements for project development approvals are set under the German Federal Mining Act (*Bundesberggesetz: BBergG) because* the Project is intended to recover a mineral regulated under this act. Many other major Acts, codes and regulations are followed to acquire permits and set operating standards. Vulcan is engaged in direct communication with the regulating authorities to ensure transparency with regards to its Project plans and operations.

There are several reports that have been prepared on environmental assessments for the Project. Many are embedded in the permitting processes for various Project segments. For Phase One the environmental assessments are specific to activities that support the initial development areas and the existing operational facilities. This includes a 3D seismic survey in Insheim, well site development, pipeline planning, surface facility planning and existing operation of the geothermal plant at Insheim, plus other activities not all listed here. Vulcan has engaged in the environmental assessment activities early in the Project planning process to accommodate stakeholder consultation and regulatory approval timelines. The permitting process for geothermal projects in Germany is continuous up to and beyond the point of project construction, until final permission to operate is received (Figure 47). To date, the 3D seismic survey permits for the Lionheart area has been approved as well as the Preliminary Environmental Impact Analysis for the planned Phase One Taro well development, thereby negating the need for a full EIA due to minimal impact, with a decision on Lionheart's first preliminary EIAs expected shortly. An operating permit for Vulcan's lithium extraction Demo Plant has also been granted. Vulcan has initial approvals in place (Figure 46), and the permitting is progressing with finalisation expected within the planned development timeline.

Vulcan has an extensive communication strategy which has been able to achieve broad media coverage reaching many levels of stakeholders within Europe and Germany. As part of this strategy, Vulcan utilises a range of channels and tools including social media, local project websites roadshows, site visits, Info Centres (Figure 45) and interviews. Vulcan is supportive of a German initiative aimed at addressing renewable heat requirements of municipalities nationwide to assist with energy security and are planning for current and future operations to play a role in supplying district heat. An important focus for Vulcan is to work with local mayors and policy makers in the municipalities to ensure local supply of renewable energy, heat, and net zero carbon lithium is a benefit for both the local community and national decarbonisation efforts.

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Figure 45: Vulcan local Information Centre.

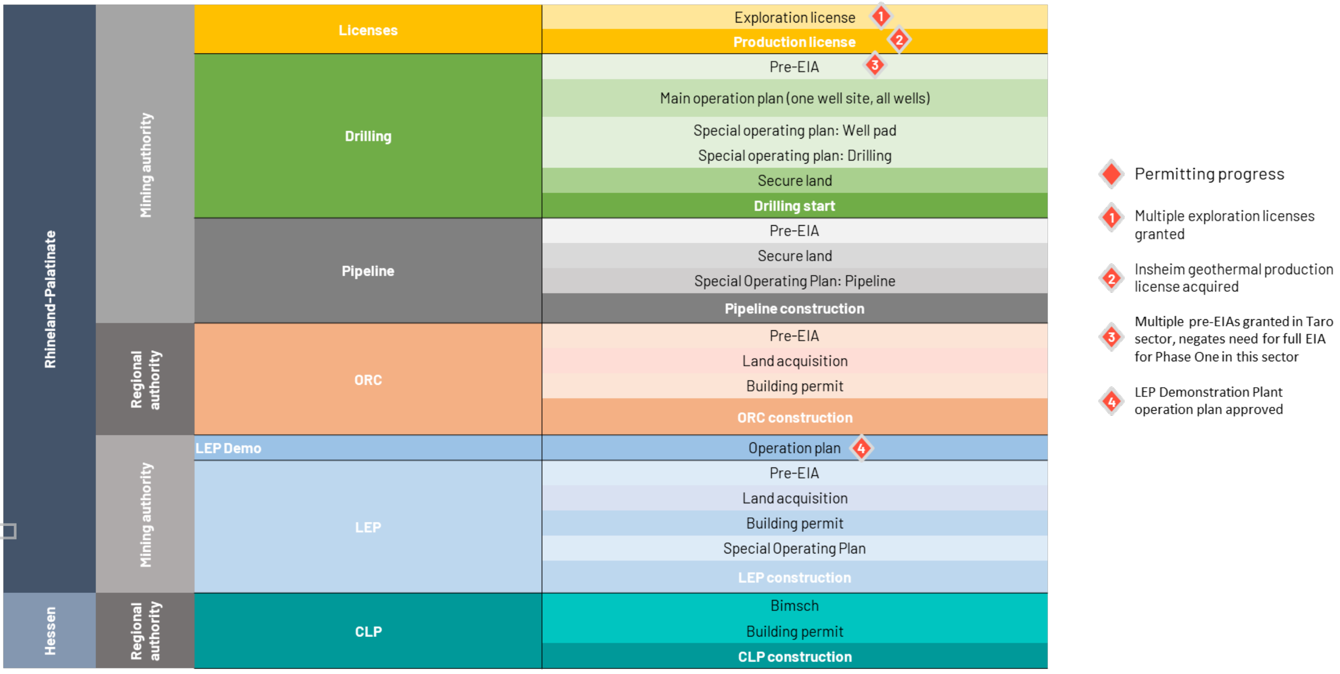

Figure 46: Main permitting steps for Phase One and progress. Vulcan notes that the permitting process for a geothermal project in Germany is continuous throughout integrated development right up until the final permission to operate after the plants are built. Vulcan has initial approvals in place, and the permitting is progressing with finalisation expected within the planned development timeline. There is no guarantee that Vulcan will receive all of its permits within the planned time period or at all.

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PERMITTING PROCESS

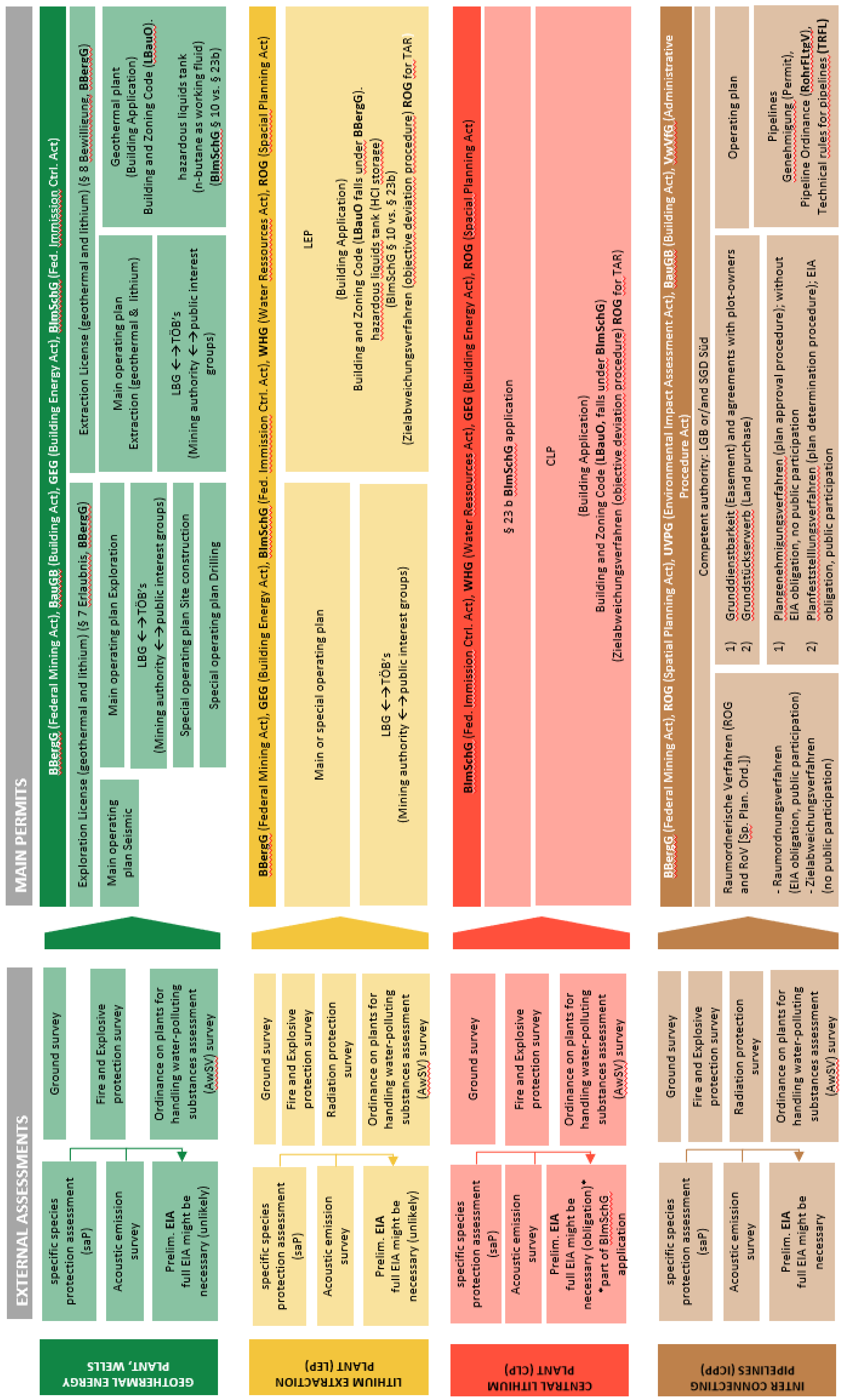

Figure 47: Vulcan's permitting process

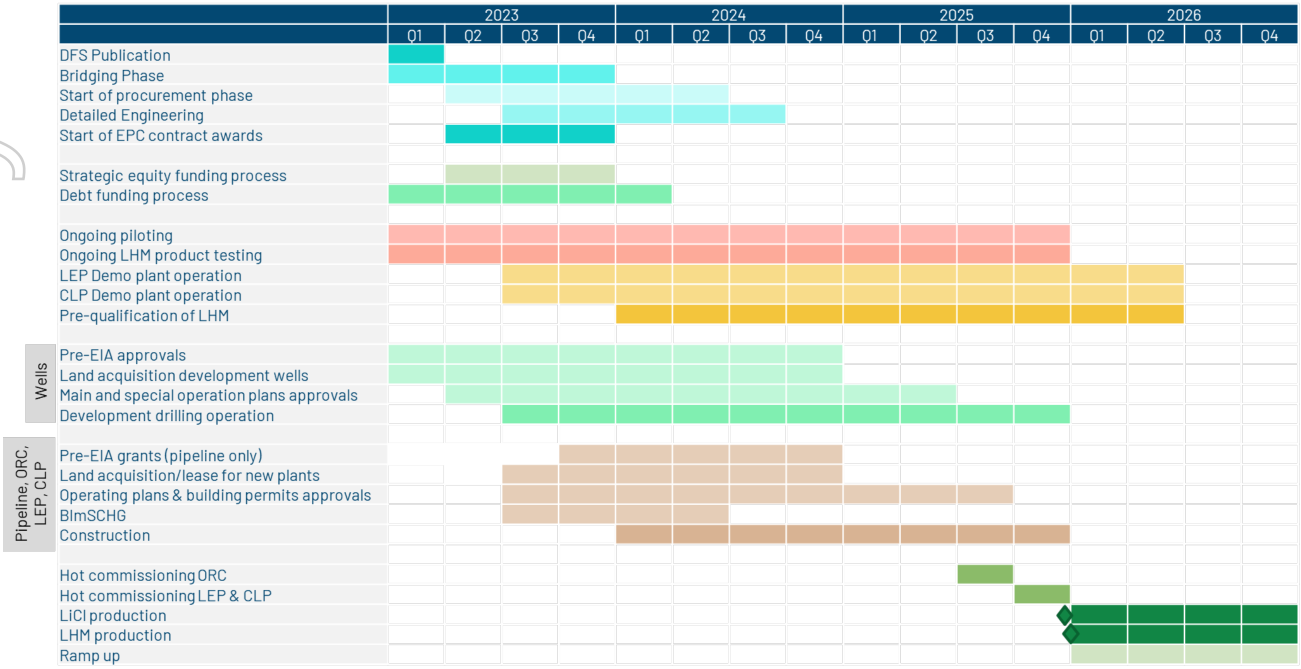

Figure 48: Target project timeline for Phase One

Next steps

Vulcan is ramping up its execution and operations capability during 2023. The in-house team has expanded to approximately 280 personnel, with significant further recruitment under way. During the coming year, the focus will be on start-up and operation of Demo Plants to train the operations team in a pre-commercial environment, start of development drilling to increase brine production in the Phase One area, permitting in line with the development timeline, and award of key packages and contracts for Phase One.

Table 13: 2023 – Our short term objectives

DFS 1	Phase One DFS (complete)
Demo	Demo Plants to commence operation and first LHM production from demo
Drilling	Start drilling of new production/re-injection wells in Phase One area
Permits	Grant of relevant permits in line with development timeline for 2023
Funding	Secure funding: equity for Phase One, pursue public funding, substantially advance debt funding process
Execution	Build and deliver project execution model: organisation in place and award of key packages & contracts for Phase One
Phase+	Complete Phase Two definitive feasibility study

Corporate Directory

Managing Director and CEO	Dr. Francis Wedin
Deputy CEO	Cris Moreno
Chairman	Gavin Rezos
Non-Executive Director	Ranya Alkadamani
Non-Executive Director	Annie Liu
Non-Executive Director	Dr. Heidi Grön
Non-Executive Director	Josephine Bush
Non-Executive Director	Dr. Günter Hilken
Non-Executive Director	Mark Skelton
Executive Director, Germany	Dr. Horst Kreuter
Company Secretary	Daniel Tydde

For and on behalf of the Board

Daniel Tydde | Company Secretary

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Reporting calendar

22 March 2023	Annual Report
28 April 2023	March Quarterly
28 July 2023	June Quarterly
15 September 2023	Half Year Report
27 October 2023	September Quarterly

Disclaimer

The DFS is based on the material assumptions outlined in this announcement. While Vulcan considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the DFS will be achieved.

To achieve the range of outcomes indicated in the DFS, additional funding will be required. Investors should note that is no certainty that Vulcan will be able to raise the amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Vulcan's existing shares. It is also possible that Vulcan could pursue other financing strategies such as a partial sale or joint venture of the Project. If it does, this could materially reduce Vulcan's proportionate ownership of the Project.

Forward looking statements

Some of the statements appearing in this announcement are in the nature of forward-looking statements. Such forward-looking statements include details of the proposed production plant, forecast financial information (including revenue and EBITDA), estimated mineral resources and ore reserves, expected future demand for lithium products, planned strategies, corporate objectives, lithium recovery rates, projected concentrations, capital and operating costs, permits and approvals, levies, the Project development timeline and exchange rates, among others.

Vulcan has concluded that it has a reasonable basis for providing the forward-looking statements included in this announcement. However, you should be aware that such statements are only predictions and are subject to inherent risks and uncertainties including those mentioned elsewhere in this announcement. 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, uncertainty and disruption from COVID-19 or the Russian invasion of Ukraine, prevailing exchange rates and interest rates and conditions in the financial markets, among other things. These risks and uncertainties may be known or unknown. 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.

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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.

No investment

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. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the DFS, and should obtain their own advice before making any investment decision.

Industry data

Certain market and industry data used in connection with or referenced in this announcement may have been obtained from public filings, research, surveys or studies made or conducted by third parties, including as published in industry-specific or general publications. Neither Vulcan nor its advisers, nor their respective representatives, have independently verified any such market or industry data. To the maximum extent permitted by law, each of these persons expressly disclaims any responsibility or liability in connection with such data.

Effect of rounding

A number of figures, amounts, percentages, estimates, calculations of value and fractions in this announcement are subject to the effect of rounding. Accordingly, the actual calculation of these figures may differ from the figures set out in this announcement.

Financial data

All monetary values expressed as "$" or "A$" in this announcement are in Australian dollars, unless stated otherwise. All monetary values expressed as EUR or € in this announcement are in Euros, unless stated otherwise. All monetary values expressed as "US$" in this announcement are in US dollars, unless stated otherwise. The assumed exchange rate to convert Euros into Australian dollars or US dollars (as applicable) is shown in the footnote to each respective slide.

In addition, prospective investors should be aware that financial data in this announcement includes "non-IFRS financial information" under ASIC Regulatory Guide 230 'Disclosing non-IFRS financial information' published by ASIC and also 'non-GAAP financial measures' within the meaning of Regulation G under the U.S. Securities Exchange Act of 1934.

The non-IFRS financial measures do not have standardised meanings prescribed by Australian Accounting Standards and, therefore, may not be comparable to similarly titled measures presented by other entities, nor should they be construed as an alternative to other financial measures determined in accordance with Australian Accounting Standards. Although Vulcan believes the non-IFRS financial information (and non-IFRS financial measures) provide useful information to readers of this announcement, readers are cautioned not to place any undue reliance on any non-IFRS financial information (or non-IFRS financial measures).

Similarly, non-GAAP financial measures do not have a standardised meaning prescribed by Australian Accounting Standards or International Financial Reporting Standards and therefore may not be comparable to similarly titled measures presented by other entities, nor should they be construed as an alternative to other financial measures determined in accordance with Australian Accounting Standards or International Financial Reporting Standards. Although Vulcan believes that these non-GAAP financial measures provide useful information to readers of this announcement, readers are cautioned not to place undue reliance on any such measures.

Technical information

Vulcan has so far only carried out a pre-feasibility study (the results of which were announced to the ASX in the announcement "Positive PFS & Maiden JORC Ore Reserve: Zero Carbon Lithium ™ Project" dated 15 January 2021) ('PFS') and the DFS for Phase One of the Project. Vulcan has not yet carried out a definitive feasibility study for Phase Two of its Project. This announcement includes information relating to both the PFS and DFS. Investors should not rely on the results of the PFS as Vulcan considers that the material assumptions underpinning that study are no longer correct in light of the additional studies undertaken in preparing the DFS.

Competent Person Statement

Information in this announcement that relates to Exploration Results and Mineral Resources is based on information that was reviewed, overseen, and compiled by Mark King, PhD, FGC, P.Geo., of Groundwater Insight Inc. and deemed to be a 'Competent Person'. Dr. King is a Professional Geoscientist with certification in the Province of Nova Scotia, Canada, a 'Recognised Professional Organisation' included in a list that is posted on the ASX website from time to time. Dr. King has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is 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). Dr. King consents to the disclosure of the technical information as it relates to the mineral resource information in this announcement in the form and context in which it appears.

Information in this announcement that relates to Production Target and Mineral Ore Reserves is based on information that was reviewed, overseen, and compiled by Ms. Kim Mohler, P.Eng., who is a full-time employee of GLJ Ltd. and deemed to be a 'Competent Person'. Ms. Mohler is a member as a Professional Engineer of the Association of Professional Engineers and Geoscientists of Alberta (APEGA), a 'Recognised Professional Organisation' included in a list that is posted on the ASX website from time to time. Ms. Mohler has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity that she 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). Ms. Mohler consents to the disclosure of the technical information as it relates to the Production Target and Mineral Reserve information in this announcement in the form and context in which it appears.

Glossary[43]

- CAPEX = Capital Expenditure in tangible and intangible assets
- EBIT = Earnings before interest and taxes
- EBITDA = Earnings before interest, taxes, depreciation and amortisation
- IRR = Internal Rate of Return
- Net Income (EAT) = Earnings after tax
- NPV = Net Present Value
- NPV_8 = Net Present Value using a discount rate of 8%
- OPEX= Operating expenditure including reagents, operating supplies, maintenance supplies, water, steam, nitrogen, energy, labour, trucking, services and other costs. Operating expenditure excludes corporate overhead costs for DFS Phase One purposes.
- Operating Margin = Profit on sales after costs of production, expressed as a percentage
- Payback = Period of time required for the return on an investment to repay the total initial investment

[43] *These financial definitions are alternative performance measures that are not defined or specified under IFRS or AASC standards and for which there are no generally accepted reporting formats.*

Appendix 1: Key Risks – Technology/Execution/Resource

	Risk Description		Mitigation
	Technology: VULSORB™ industrial manufacturing capability still to be demonstrated.		Currently in discussions with a local toll manufacturer to manufacture VULSORB™, who is already supplying Vulcan for its Demo Plant. Similar to other sorbents which have also been tested in Vulcan's pilot plants, are commercially available and could be used instead.
	Technology: VULSORB™ + HP Operation has limited pilot scale testing so far.		If HP Operation is not seen as successful, the Project can revert back to the proven LP mode of Operation, which has many thousands of hours of successful testwork.
	Technology: Electrolysers – widely used in salts industry but not yet commercially used on lithium salts.		Extensive Demonstration Plant testwork conducted by NORAM and other companies on LiCl electrolysis over many years. Planned to be further backed up by operational tests in Electrolysis Demo Plant, using a commercial scale electrolyser, which is aimed to optimise process parameters and operating conditions.
	Technology: Demo Plant operational data after design freeze in April could lead to change during Bridging or Execution Phase		Extensive pilot plant data already provides some risk mitigation. Expedite Demo Plant data during bridging and execution to optimise process parameters and operating conditions.
	Execution: Delay in order of Long Lead Items (LLI) of Equipment packages and award of EPC/EPCm contracts and further supply chain issues		All LLI have been identified and clear schedule to be awarded and clear advancement of vendor data to support 3D model to achieve 60% model review ASAP. Bridging moving to E&P Phase rather than just Engineering and clearly identified LLI and award of EPCm, see Hatch updated Bridging phase scope and deliverables.
	Execution: Some critical decisions by authorities on permitting pathway - risk of delay. There is no guarantee that Vulcan Group will be able to obtain all required approvals, licences and permits for lithium and geothermal renewable energy production in time or at all.		Proactive engagement with authorities, selection of sites outside of environmentally sensitive areas.
	Execution: Brine production expansion drilling programme dependent on continued success of land purchase, permits and then significant ramp up in capability and capacity.		Proactive engagement with local stakeholders and authorities, focus on first areas in schedule
	Execution: Bridging phase is front-end loaded with numerous intensive and parallel work streams including approvals, engineering, contracts and procurement, financing to meet early milestones and protect overall execution phase.		Project Directorate in place and on the ground, Integrated Level 2 schedule now developed showing key links between projects and what risk and workstream pushes what
	Execution: Speed and ramp up of Project Execution teams to deliver projects		Vulcan group rolling out transition to Functional Organisation with Execution focus, Project Directorate and other key roles identified and recruitment ongoing
	Execution: The target execution schedule (27 months from detail design to start of production) is a tight schedule		27 months is well benchmarked across other key Battery related projects in Europe and globally, key execution risks need mitigating early on and supported by early decision making
	Economics: FX EUR/USD: all LHM offtakes are linked to a PRA with a USD index or a fixed price in USD		Commercial team to explore converting offtakes to EUR-linked pricing index when the European lithium market matures.
	Economics: DFS CAPEX estimate is combination of Class 3 (+/-15%), accuracy and Order of Magnitude accuracy for the late Value Improvements.		DFS Phase took budgetary quotes at the top of the commodity cycle with high inflationary conditions. Key budgetary quotes related to HP mode equipment were re-budgeted by suppliers and included in DFS Cost Estimate. Contingency and Design Allowance are included where applicable. These opportunities are planned to be developed to the same detail and accuracy as the original estimate during Bridging and an Open Book Estimate (OBE) approach is planned to be used during Bridging to understand trends against DFS.
	Resource: Brine flow rate risk		Due to field development plan simulation results, lower "per well" brine flow rate has been shown to be more optimal for lithium sweep, therefore more conservative brine flow rate assumptions have already been used, of 69l/s average (>100l/s in PFS). This is in line with the Vulcan's current geothermal wells and plant in operation. Use of 3D seismic targeting fault zones correctly and optimised for flow are expected to further reduce risk. Finally, measures such as side-track/double-completion drilling can be used to increase flow rates.

	Resource: Unforeseen geological conditions impacting total resource		Integration of 3D seismic data into work plan. Expedite new production/re-injection well drilling to further reduce risk.
	Resource: Seismicity events during ramp up of the field		Incorporate experience of the team in managing seismicity from Vulcan's existing geothermal operations, including extensive monitoring and "traffic light" system of warnings. Manage ramp-up sensibly and conduct best practice seismicity risk studies prior to commencing ramp up.

Key Risks – General

	Risk Description		Mitigation
	Markets: General demand for lithium hydroxide may decrease as a result of new market or technological developments and other factors. Any such factors resulting in a decrease in the general demand for lithium hydroxide may have a detrimental effect on Vulcan Group's business.		Vulcan closely monitors developments in the battery industry, and preferred battery chemistries. Vulcan notes that, whilst EU customers are investing in battery manufacturing which requires lithium hydroxide, other current battery types such as LFP use lithium carbonate, which Vulcan can switch the back-end of its process to making with relative simplicity. Future battery-types, such as solid state, use LiCl, which Vulcan produces as a precursor, giving flexibility.
	Geopolitical: The Russian invasion of Ukraine, the sanctions imposed by numerous countries and international organizations in response thereto and countermeasures implemented by Russia have adversely affected, and may continue to adversely affect, the availability and price of equipment, components and energy, supply chains, international trade, financing conditions and the global economy at large, which has had, and may continue to have, a detrimental effect on Vulcan Group's business.		Vulcan has the ability to produce most of the power it needs and consume it internally, so is somewhat insulated from sharp price increases in power. Vulcan does not directly consume any fossil fuels, providing further mitigation. Vulcan will seek to work with suppliers to mitigate effects of equipment and materials price fluctuation, however there may still be supply chain interruptions and increases in the cost of equipment.
	ESG: Vulcan Group may fail to achieve its sustainability ambitions or fail to maintain current or obtain potential future ESG ratings and sustainability-related certifications, each of which could have a material adverse effect on its business, assets, results of operations, financial condition, prospects and reputation.		Vulcan has appointed a Head of ESG and has a Board Director with very extensive ESG-related experience. Vulcan engages with expert third party consultants, including ERM and Baringa, to provide up to date advice on the changing ESG landscape, to ensure it maintains its status as an ESG-leader. In addition, Vulcan is ensuring that sustainability related topics are embedded within its engineering and procurement practices including setting executive individual and group KPI's with ESG baseline metrics.
	Markets: Lithium prices are subject to unpredictable fluctuations, driven in part by changes in the balance of global supply and demand as well as international, economic and geopolitical trends and developments. Any decrease or significant volatility in the price of or demand for lithium could have a detrimental effect on Vulcan Group's business.		Vulcan has put in place a series of binding, take or pay lithium hydroxide offtake agreements for the first five years, and in one case the first ten years, of production. These offtake agreements are based on a basket of different mechanisms, providing some downside protection against lower prices. Vulcan is also targeting a very low OPEX, meaning it would be somewhat protected against lower prices.
	Markets: Any decrease in the price or demand for geothermal energy may have a detrimental effect on Vulcan Group's business.		The portion of revenue derived from geothermal energy in Vulcan's financial model is very minor. In addition, Vulcan expects to sell power under a 20 year feed-in tariff under the German Renewable Energy Law. Finally, because Vulcan is a consumer as well as a seller of energy, the effect of lower prices would also be offset by lower OPEX costs.
	Financial: Significant future funding will be required by Vulcan Group to support the further implementation of its Zero Carbon Lithium™ Project. If Vulcan Group is unable to obtain additional financing as needed on acceptable terms or at all, it may need to abandon its development plans or reduce and/or change their scope which may, in turn, adversely affect Vulcan Group's operations.		Vulcan is taking a multi-pronged approach to financing, which involves assessing the possibility for equity financing at a project level (geothermal, lithium extraction, lithium refining, or a combination), equity financing at a top-co level, debt financing and grant funding from public bodies. Vulcan is working with a multi-disciplinary team at BNP Paribas on a debt financing process, and has already attracted non-binding letters of intent from Export Credit Agencies in Europe. Vulcan is expecting support at a German Federal and European level. Additionally, Vulcan aims to be supported by its existing shareholders, including institutional investors and large corporates.

	Technical: The resource estimates relating to Vulcan Group's current and future projects are subject to certain assumptions and interpretations which may prove to be inaccurate. Any material deviations may result in alterations to development plans which may, in turn, adversely affect Vulcan Group's operations.		Vulcan plans to regularly update its models as it gathers new data, including from the drilling of development wells in the Phase One areas, the sampling of brines from these wells, logging of core, and 3D seismic acquisition and processing. Resource estimates are planned to therefore be updated and refined accordingly, allowing Vulcan to progressively mitigate the risk as the project develops.
	Financial: As it is envisaged to incur significant debt in the future, an increase in interest rates would likely increase Vulcan Group's costs for its future debt financing arrangements.		Because of its sustainability credentials, Vulcan expects to qualify for so-called "green financing", which can involve a reduced borrowing interested rate. This would provide some mitigation for rising interest rates. In addition, Vulcan is in discussions with European public funding institutions, including the lending arm of the EU and Export Credit Agencies.
	Legal: Vulcan Group might be unable to adequately protect its intellectual property rights.		Vulcan has a granted utility patent and several patents pending, as well as granted and pending trademarks in a number of jurisdictions. Vulcan will continue to engage expert IP counsel to protect its rights going forward.
	Technical: Battery raw materials and geothermal energy exploration and development are high-risk undertakings and there is no assurance that Vulcan Group's exploration activities will result in the commercial extraction of lithium or sustainable production of geothermal renewable energy.		Vulcan uses modern geothermal industry best practice by incorporating 3D seismic data and analysis and has a world class team, with considerable local geological expertise to advance its exploration and consequently its production to progress towards sustainable production.
	Social acceptance: Vulcan's projects may face opposition from local residents and other stakeholders, which may result in delays, additional costs, discontinuation of construction or operations and uncertainty.		All large-scale infrastructure projects require strong community engagement to ensure any concerns are addressed. Vulcan takes this extremely seriously and has resourced an experienced public and stakeholder relations team with deep local knowledge. We use geothermal industry best practice, and we are commencing community engagement in the various areas where we intend to develop projects. Our current engagement to date, which clearly and transparently explains our process to develop renewable heat and power, combined with sustainable lithium extraction has informed our view that we will achieve stakeholder acceptance and manage delays.
	Loss of key personnel: Vulcan may lose its directors or other key personnel or may be unable to recruit or retain qualified personnel for key positions. Without such directors or key personnel Vulcan Group may not be able to successfully manage, develop and operate its business		Vulcan strives to create a safe, attractive, rewarding and engaged workplace to retain and incentivise its staff, including regularly engaging with staff through surveys and external remuneration consultants in an attempt to maintain this environment.

Appendix 2: Peer Comparison data European lithium projects

COMPANY[1]	CODE	PROJECT	STAGE	RESOURCE CATEGORY	RESOURCES M ONNES	RESOURCE GRADE (LI2O)	CONTAINED MT LCE TONNES	INFORMATION SOURCE
European Metals	ASX: EMH	Cinovec	PFS Complete	Indicated & Inferred	708.2	0.43	7.39	Annual Report June 22
Rio Tinto	ASX: RIO	Jadar	PFS Complete	Indicated & Inferred	144	1.80	6.12	Annual Report Dec 21
Infinity Lithium	ASX: INF	San Jose	PFS Complete	Indicated & Inferred	111.2	0.61	1.68	Annual Report June 22
Savannah Resources	AIM: SAV	Barroso	DFS Underway	Measured, Indicated & Inferred	27.0	1.06	0.71	Corporate Presentation December 2022 – Company Website

Data provided for lithium focused peers with comparable project size and stage and published resource information.

Appendix 3: Phase One DFS expert third party consultants

- JORC Resources review, audit and sign-off: GLJ Ltd. and Groundwater Insight; Reservoir Geology and deep lithium brine expertise.
- JORC Reserves review, audit and sign-off: GLJ Ltd., Reservoir engineering, well planning, field development, process engineering, economic analysis, and brine expertise.
- LEP and CLP plant engineering and design: Hatch Ltd., lithium plant engineering expertise.
- ICPP pipeline engineering and design: GEF Ingenieur AG.

Appendix 4: Phase One DFS Model Assumptions and Parameters

General	
General and economics	
FX EUR/USD	1.05
NPV discount rate	8%[1]
Tax rate	30%
Construction time	2.5 years
State royalty	0%[2]
Brine royalty	Applied on 2 wells
Life of Mine	30 years
Life of Mine production target	0.54Mt LHM
LHM grade	57%
CO_2 emissions/t of LHM[3]	-1.7t CO2 eq. per kg $LiOH{\cdot}H_2O$

Input	**Lionheart**	**Taro**
Number of production wells per area	8	5
Average Flow rate (l/s) per well	69	
Average Flow rate (l/s)	600	300
Li grade (mg/l) at SOP	181	181

Li grade (mg/l) after 10 years	150			160	
ORC run/to be run by Vulcan	Yes	Yes		Yes	
ORC Power Capacity (MW)	4.2	24.5		8.4	
ORC Operating rates	95%	95%		95%	
Ramp up	None (operating)	6 months		6 months	
Heat capacity (MW)	0.5	30		0	
Steam generation (MW)	0.0	3.3		2.6	
LEP		Yes		Yes	
LEP Lithium recovery		93.9%		93.9%	
LEP Stream factor		86%		86%	
Ramp up		2 years		2 years	
LEP production capacity (tpa LHM eq.)		16,000		8,000	
CLP Li recovery	98.6%				
CLP Utilisation	86%				
CLP production capacity (tpa)	24,755 LHM 67,500 HCl 2,975 NaOCl				

[1]*WACC rate is 8% which is based on peer industry average.*

[2]*Geothermal exempt from royalty. Lithium expected to also be exempt due under § 32 BBergG, since it is classified as a strategic raw material by the EU – to be confirmed with state authorities during ongoing permitting process. Up to 10% royalty would apply if it was not exempt.*

[3]*Vulcan CO2 value provided by Minviro. The CO2 assessment is a cradle-to-gate study. It starts with the cradle: extraction of geothermal brine. Thermal energy of the brine is extracted and used for electricity and steam generation. Generated electricity is assumed to be exported to the German electrical grid. Part of the heat is exported for district heating, substituting natural gas use, and the rest of the heat is used for internal processes. It is assumed that of the electricity used throughout all processes 50% is sourced from the German grid and 50% is procured from additional wind generated electricity, on top of wind-based electricity that is already present in the German grid mix. Electricity, steam, hydrochloric acid (30% concentration) and sodium hypochlorite (15.8% concentration) are co-products of the lithium hydroxide monohydrate product. All co-products are accounted for using system expansion, meaning no allocation is*

required. The climate change impact for the lithium hydroxide monohydrate product for the assumptions described above is -1.7 kg CO_2 eq. per kg $LiOH{\cdot}H_2O$.

Appendix 5: JORC Table One

Vulcan DFS and URVBF February 2023

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

Criteria	JORC Code Explanation	Commentary
Sampling techniques	• Nature and quality of sampling (e.g., 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 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 (e.g., '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	• Vulcan's Zero Carbon Lithium™ Project Upper Rhine Valley Brine Field (URVBF) as it pertains to Vulcan's resource estimations and associated brine sampling programs contains the following licences: Insheim, Landau, Ortenau II, Taro-Lisbeth, Rift, Mannheim, Ludwig, Therese, Kerner and Fuchsmantel-Flaggenturm. Vulcan has access to existing, operating deep geothermal wells with proven drilling information and lithium brine grades within the core of its licence areas, through 100% ownership of the Insheim project and through access agreements to the Landau project. Whilst it has yet to conduct drilling to enable access to brine in the licences outside of the core area in its licence field, it also has access to historical brine sampling data from other, off-property wells drilled previously in the URVBF. • Within the URVBF, geothermal wells access hot brine from the Permo-Carboniferous Rotliegend Group, Lower Triassic Buntsandstein Group, and the Middle Triassic Muschelkalk Group, (collectively, Permo-Triassic) sandstone and carbonate aquifers/reservoirs overlying the granitic basement, as well as the basement itself. These geothermal wells, however, are limited in number within the URVBF, due to the nature of deep geothermal development. Consequently, Vulcan brine sampling programs were limited to collecting Permo-Triassic brine samples from available wells through the following programs: ○ In 2021-22, extensive brine sampling at the Landau and Insheim geothermal wells and power plants for the lithium extraction pilot plant study was carried out. Sampling was also conducted at the newly drilled Vendenheim well proximal to Vulcan's Ortenau license. ○ In 2019-20, sampling and analysis from four different geothermal wells located throughout the URVBF (Landau Gt La1, Insheim GT2, Brühl GT1, and Soultz GPK2 wells) was undertaken to verify historically reported lithium concentrations. • 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

	may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g., submarine nodules) may warrant disclosure of detailed information.	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. Brine sampling programs were conducted in 2019 and 2021 by Vulcan employees who maintained a chain of custody protocol from sample site to delivery of the samples to the Karlsruhe Institute of Technology (KIT), University of Heidelberg (Uni HD), and IBZ-Salzchemie GmbH & Co. KG in Halsbruecke, Germany, for analytical work. Industry standard collection techniques were applied to collect new samples averaging 10 litres in volume. A split of each sample collected by Vulcan in 2019 was shipped by commercial courier to an APEX Mineral Resources CP and analysed at the accredited AGAT Laboratories facility in Edmonton, Alberta, Canada. In addition, four brine samples collected by GeoT were shipped by commercial courier to an APEX Mineral Resources CP in Edmonton, Alberta, Canada for analysis at the accredited and ISO 9001:2015 registered facilities of AGAT Laboratories and also at the accredited and ISO 9001:2015 registered Bureau Veritas Laboratory (formerly Maxxam Analytical). • The current Mineral Resources CP collected independent brine samples at the Landau and Insheim resource area during the November 2022 site visit and submitted these for analysis at AGAT Laboratories, an accredited and ISO 9001:2015 registered commercial analytical services firm located in Calgary, Canada. Splits of these samples were also submitted blindly to the Vulcan laboratory located in Karlsruhe, Germany. Results of the 2021-2022 sampling program are consistent with previous Vulcan sampling programs and also with historical reporting associated with this field. • The current Mineral Resources CP reviewed the techniques of the regional brine sampling and the Insheim resource area brine sampling programs carried out by Vulcan, along with their related analytical procedures, and concluded that these were conducted using reasonable and industry-standard techniques in the field of brine sample collection and assaying and that there are no significant issues or inconsistencies that would cause the validity of the sampling or analytical techniques used by Vulcan to be questioned. • In combination, these data support the Mineral Resource CP's conclusion that the Permo-Triassic brine in the URVBF reservoir units is consistently enriched in lithium.
Drilling techniques	• Drill type (e.g., core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-	• A range of well data from various sources are available for this project covering different sections of the Mesozoic and Paleozoic rock formations of the URVBF. The majority of well data are from geothermal wells (GT) in the area that typically have been drilled into fault damage zones in the reservoir units and terminated in granitic basement. Insheim and Landau within Vulcan's core development area are producing geothermal wells, Vendenheim well was drilled into the granitic basement. Brühl GT1 was successfully drilled into the

	sampling bit or other type, whether core is oriented and if so, by what method, etc.).	geothermal reservoir by a third party and was subsequently sealed, and Offenbach GT1 is an unsuccessful well that did not tap productive zones. Additional well data are available from publications addressing areas of the Landau and Römerberg oil fields or geothermal projects in Rittershoffen (e.g., well GRT-1) and Soultz-sous-Forêts (e.g., wells EPS-1, GPK-1, and GPK-2). Also contributing to the current Vulcan database are regional studies conducted in the URVBF in association with the trans-national GeORG project, which combines data from individual wells, excerpts from various well databases, and outcrop data to establish overall ranges on reservoir properties, lithologies and facies. • Since in mature deep geothermal fields like the URVBF, high capital cost wells are drilled straight for production/re-injection purposes, within the URVBF licence areas, Vulcan has not conducted any new lithium brine or geothermal drilling programs designed specifically to support exploration, evaluation, or resource estimation work programs. It is therefore currently reliant on its own existing, producing/re-injection geothermal wells, as well as published or otherwise available data from existing geothermal wells to characterise brine chemistry. The resource study was able to access and utilize detailed drilling and subsurface lithological information from historical wells within the Insheim, Rift, and Landau licences, and from additional wells in the vicinity of the Ortenau and Mannheim licence areas. • Geothermal and lithium production wells are usually designed with larger diameters than holes commonly drilled for production purposes in the oil industry. This is necessary to optimize fluid flow hydraulics for both brine production and injection wells. • Current geothermal well drilling in the URVBF generally consists of a 30" diameter (30") conductor casing drilled vertically to depth followed by several additional sections. These comprise a 20" surface casing in a 26" hole, a 13 3/8" intermediate liner in a 17 ½" hole, and a 9 5/8" production liner in a 12 ¼" hole, above a 7" liner in an 8 ½" hole. The final diameter hole is drilled into the targeted reservoir and to the well's total depth. Each section reduces in diameter as the drill hole deepens and their designed intervals are dependent on factors such as lithology and stability. • Drilling muds are typically water based and have weights chosen to correspond with lithological and pore pressure conditions. • Conventional rock coring within the reservoir interval may occur but logging of cuttings returned with the drilling mud (mud logging) typically provides lithological and stratigraphical information for the units encountered (i.e., formation tops and formation thickness, etc.). Mudlogging is highly relevant in cases of drilling geothermal production or injection wells. Drilling data with regards to depth, time, rate of penetration (ROP), weight on bit (WOB), revolutions per minute (RPM), pump pressure, mud flow rates, and gas

		chromatography, among others, are constantly monitored and recorded. Resulting data are typically available or summarized in associated reporting.
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.	• While Vulcan has yet to conduct any new drilling or core sampling programs within the URVBF resource area, it owns its own production/re-injection wells in its core Insheim project and has access to operating geothermal production/re-injection wells at Landau, along with all associated technical information. This includes a large amount of drilling, geological, petrophysical and lithium brine data that apply to its resource areas within the Insheim, Landau, and Rift licences. • Brine samples from regional geothermal wells and the Insheim and Landau wells were generally recovered directly from the flowing brine stream within associated geothermal facility brine circuits, typically on both the "hot" and "cold" sides of such circuits. The brine sample collection method and sample collection documentation are in accordance with lithium brine industry standards and include procedures to avoid dilution of brine by drilling or process fluids prior to sample collection.
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 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.	• Vulcan's URVBF resource project benefited greatly from access to publicly available detailed lithological logs and down hole geophysical log (where available) data for the various oil and gas and geothermal wells that occur within or adjacent to the licenced areas. Government agencies have compiled such data for more than 30,000 oil and gas wells, geothermal, thermal, mineral water and mining boreholes across the entire URVBF, within and proximal to Vulcan's resource areas. • During 2020, Vulcan acquired additional detailed lithological and downhole geophysical measurements from geothermal well Brühl GT1-3 which is located approximately 5km from Vulcan's northern license areas. It penetrated through the same Permo-Triassic strata being assessed by Vulcan. Wireline logging runs were performed in the open hole 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. • From 2020 to 2022, Vulcan reinterpreted existing 2D seismic data in the Ortenau, Taro, and Lionheart (i.e., Insheim, Landau and Rift) licence areas. This interpretation benefited particularly from detailed study of historical well logs from two wells (Appenhofen 1 and Brühl GT1). These logs were acquired by companies other than Vulcan but their content facilitated Vulcan's interpretation and correlation of subsurface stratigraphy. That is, the historical well logs data

		helped with interpretation of seismic line profiles and to confirm and validate key stratigraphic marker horizons including the Buntsandstein surface and various fault zones that are critical to the current resource estimation process. • The detailed lithologic and geophysical well logging data acquired by Vulcan from various sources was assessed based on quality and resolution and incorporated into the URVBF modelling that underlies the resource estimation program carried out by the company. • Based on validation discussions with Vulcan staff, plus review of compiled logging data and related geological and resource estimation digital models, the Mineral Resources CP has concluded that such data are acceptable for use in Vulcan's current brine resource estimation program.

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.
	• 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.
		• Vulcan collects regular samples from the hot and cold circuit sample points at Insheim and Landau, to gain an understanding of whether the geothermal plant cycle influences lithium concentration as the brine cycles through the plant.
		• The sample sizes are appropriate for industry standard brine assay testing and comparable to those documented in Vulcan's previous brine resource reports for the URVBF holdings prepared in 2019 and 2020.
		• Vulcan's sampling protocol includes collection of the following three aliquots:
		  ○ one aliquot of the unfiltered, non-acidized brine sample for anion analysis
		  ○ one aliquot of unfiltered brine with supra-pure HNO_3 for total metal analysis via ICP-OES; and
		  ○ a filtered and acidized sample for analysing solutes (cations/ trace metals) and dissolved metal analysis via ICP-OES.
		• Insertion of Sample Blanks and Sample Standards into the sample stream is included in the Vulcan sampling protocol.
		• In addition, duplicate samples are 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 have experience with analysing lithium in brine.

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.	• The brine sample collection, sample handling, analytical techniques, and QA/QC protocols used by Vulcan conform to industry standards. • The Mineral Resources CP concludes that Vulcan lithium brine sampling and analysis uses industry standard protocols and are acceptable for use in the Mineral Resource estimates.

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	• 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 their derivation, etc. • Nature of quality control procedures adopted (e.g., standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	
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.	• With focus on the Upper Rhine Valley Brine Field area, Vulcan has yet to conduct any new drilling or core sampling and therefore there is no twinned hole information to report. Vulcan has operating geothermal wells with proven drilling information and lithium grades within its Insheim license and access to operating geothermal wells in the Landau licence, as well as access to historical and/or nearby well data. • The Mineral Resources CP visited the Vulcan properties and Karlsruhe offices and laboratory for three full days, from November 8-10, 2022. At both the Landau and Insheim operations, the Mineral Resources CP collected five brine samples from the production wells. two of samples were analysed at the Vulcan analytical laboratory in Karlsruhe, Germany (one sample location identified to Vulcan and one not identified). Two of the samples were analysed at the Karlsruhe Institute of Technology (KIT) Laboratory, (one sample location identified to Vulcan and one not identified). The fifth sample was analysed by AGAT Laboratories, an independent, ISO 9001:2015 registered laboratory in Calgary, Alberta, Canada (delivered by CP). All three labs routinely process high TDS brine, perform trace element analysis for lithium, and have rigorous internal QA/QC protocols. The mean lithium results from the three labs for site visit samples were similar (KIT 181 mg/L, Vulcan 177 mg/L and Canadian lab 171 mg/L). The results are also comparable to the lithium grade of 181 mg/L used in the current resource estimation for the southern Vulcan licences, which is based on previous. • Vulcan sampling results plus compiled URVBF results from other sources.

		• Verification samples were also collected by the previous Mineral Resources CP during site inspection in 2019. Samples were analysed at 2 separate commercial labs in Calgary, Alberta Canada (AGAT Laboratory and Bureau Veritas Laboratory). The analytical results showed a mean value of 180 mg/L Li. This result is similar to the average analytical result for Vulcan's regional well sampling and Insheim resource area well sampling programs (181 mg/L Li).
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.	• 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 classifications applied.
	• Whether sample compositing has been applied.
		• The resource study uses subsurface lithological information from existing, operating wells within the Insheim and Landau licences, and from off-property geothermal wells including at Vendenheim and Brühl. These well locations are supplemented with extensive 2D seismic data and limited 3D seismic data.
		• Vulcan has existing, operating geothermal wells with proven drilling information and ongoing lithium grade sampling results within the Insheim and Landau resource areas that form the core of the field. Existing production/re-injection wells are located within 10m of each other on the surface, and within 2km of each other at the target depth. The Landau and Insheim production wells, as well as Appenhofen well, in the Measured Resource area in Phase 1, are approximately 5km apart on the surface.
		• Subsurface 3D geological models were constructed by Vulcan, to outline the Permo-Triassic aquifers and fault domains underlying the URVBF, in support of resource estimation. Below is a description of the seismic surveys that were used to construct these models:
		  ○ An area of 46.8 km^2 of the Taro licence area is covered by 3D seismic. The survey was initially referred to as 3D Speyerdorf. It was acquired in 2007 (operator: Geoenergy GmbH, acquisition & processing contractor: Geofizyka Toruń S.A.) and purchased by Vulcan in 2020.
		  ○ Four legacy 2D lines from 2006 with a total length of ~42 km were re-processed together with the Taro 3D survey. One of them (SPE1) provides a valuable well tie to the closest offset wells in Neustadt. Seismic imaging (Common Reflection Surface migration) and SRD (Seismic Reflection Datum) parameters are identical to the Taro 3D survey.

		○ With several data purchases from third party public and private entities completed, the Vulcan 2D database was expanded over the past year and now includes most existing 2D seismic data sets across most of Vulcan's license areas in the URVBF. ○ The GeORG Project provided an extensive interpreted 2D seismic grid across the URG which complemented interpretation. • The orientation of the Permo-Triassic strata is generally flat-lying and continuous in the URVBF area. High-angle faults have created a complex horst and graben structural environment. However, the Permo-Triassic strata are generally laterally continuous, despite being locally offset by rift-related faulting. It is noted that the Permo-Triassic strata have been mapped for approximately 250 km along the north-northeast strike length of the entire URVBF. • With respect to lithium brine concentration, the average brine analytical results from both the regional well sampling and detailed Vulcan sampling at the Upper Rhine Valley Brine Field resource area from 2019 to 2022 are comparable, with a combined average value of 181 mg/L lithium. In addition, these values are comparable to historical and proprietary lithium concentrations that were compiled throughout the URVBF. The combination of Vulcan-sampled and historically sampled and analysed brine shows a narrow range of lithium brine concentrations in the Permo-Triassic aquifer brine in the vicinity of and within Vulcan's licences, as well as consistency over time. • With respect to spacing between sample points, there were no lithium brine samples collected within the boundaries of the Rift, Kerner, Taro, Ortenau, Mannheim, Ludwig, Therese, or Fuchsmantel-Flaggenturm licences. The closest wells to these areas include the Insheim area (Insheim GT-1 and GT-2 wells; ca. 2km from Rift), Landau (Landau GtLa 1 and Landau-Sued wells, ca. 5km from Kerner), Brühl (Brühl GT-1 well; 5km from Ludwig), and Vendenheim (ca. 5km from Ortenau). • Given the consistency of the lithium grades within the reservoir, and the sedimentary, continuous nature of the reservoir itself, 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 classifications applied.
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	• Vulcan has two operating geothermal wells (Insheim and Landau) with proven drilling information and ongoing lithium grade results. These wells were highly deviated to intercept fault zones that constitute corridors of high fluid flow. Based on the overall dimensions of the Permo-Triassic aquifer and consistent analytical results, no sample bias is expected. • The 3D geological models were constructed by Vulcan using 2D seismic results and, to a lesser extent, 3D seismic results purchased from previous licence holders or contained in the GeORG data sets. In the seismic interpretation, formation

	mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	horizons were selected based on the uniqueness of the marker horizons within the seismic profiles. Fault zones were picked only where they could be positively identified in the seismic lines and were correlated in consideration of their offset, dip angle and depth. • Marker horizons were validated against wireline logs and check shot data from the acquired well data drilled in or adjacent to the south and northeast portions of the URVBF resource area. On this basis, it is concluded that there is good agreement between the re-interpreted seismic line data and the in-situ stratigraphy throughout the field. • Access to detailed data from studies of nearby geothermal wells acquired by Vulcan in 2020 improved understanding of the hydrogeological characteristics of the fault and fracture zones within the Permo-Triassic strata. The structurally complex fault damage zones are interpreted to typically represent conduits for localised high fluid flow of mineralised brine, due to higher fracture abundance and high fracture connectivity. • In the opinion of the Mineral Resources CP, Vulcan's revised URVBF geological models, based on the totality of seismic data and drilling data available to date, provide an acceptable level of confidence in the spatial location and orientation of the top and bottom surfaces of Muschelkalk, Buntsandstein and Rotliegend Group successions, as well as the basement surface and fault zones. Further, the resulting models are considered to provide a reasonable approach for estimating Gross Rock Volumes, for use in resource estimation.
Sample security	• The measures taken to ensure sample security.	• Vulcan's 2019 through 2022 brine sampling programs were conducted by Vulcan employees. Samples were transferred with chain of custody from sample site to analytical laboratories that included: the Vulcan Lab in Karlsruhe, the Karlsruhe Institute of Technology (KIT), University of Heidelberg (Uni HD), and IBZ-Salzchemie GmbH & Co. KG in Halsbruecke, Germany. • Independent sampling by the CP was discussed earlier in Section 1, under "Verification of sampling and assaying."
Audits or reviews	• The results of any audits or reviews of sampling techniques and data.	• A review and check of the URVBF resource estimations was completed by an external consultant independent from Vulcan (GLJ). In addition, the CP (independent of Vulcan) conducted a review of all Vulcan activities that supported resource estimation and the activities of the external resource check consultant. • The Mineral Resources CP assisted with, and reviewed, the adequacy of Vulcan's sample collection, sample preparation, security, analytical procedures and QA/QC protocol, and conducted a site inspection of the Vulcan Property in November 2022. • The Mineral Resources CP participated in numerous and ongoing discussions and meetings involving methods and interpretations for the exploration work to define the geometry and hydrogeological characterization of the Permo-

		Triassic aquifer that forms the basis of the current resource model. • Independent sampling by the CP was discussed earlier, in Section 1, under "Verification of sampling and assaying."

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 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.	• The Vulcan Zero Carbon Lithium™ Project area within the URVBF is comprised of 15 licenses (13 exploration licenses and two geothermal production licenses), thirteen of which, including the Insheim production license, are 100% owned by Vulcan (Taro-Lisbeth, Ortenau II, Mannheim, Therese, Ludwig, Kerner, Löwenherz, Fuchsmantel-Flaggenturm, Ried, Waldnerturm, Lampertheim and Lampertheim II, Insheim), one of which is an exploration license where Vulcan has an agreement to develop geothermal brine projects in return for a royalty payment, and one where Vulcan has an offtake agreement with the owner operator for the existing geothermal operation, and a 51:49% JV agreement (in Vulcan's favour) to develop a new geothermal brine project on the same license, at a separate location. All of them (apart from Lampertheim, Lampertheim II, Löwenherz, Waldnerturm and Ried) collectively cover the current lithium brine Mineral Resources described in this document. In addition, Vulcan has a further 11.46 km2 of granted exploration licenses in Italy not included in this resource estimate, and applied for 155 km^2 within the Upper Rhine Valley of France. For present purposes, the Insheim, Landau and Rift licences are referred to as Vulcan's Lionheart Project area. • For the purposes of development, the Insheim, Landau-Sued, Rift-Nord. Kerner and Taro licences are termed Phase One. • An Exploration Licence is issued pursuant to the German Federal Mining Act (Bundesberggesetz: BBergG) which defines freely mineable mineral resources as property of the state that is administered by state authorities. Accordingly, state permits are required for exploration and extraction. Vulcan requires both an Exploration Licence and an Extraction Licence or Mining Proprietorship to ultimately produce from its holdings. Any future geothermal brine production from any site would also require granting of a Production Licence plus completion of an operating plan and planning approval procedure that comply with the *Act on the Assessment of Environmental Impacts.* • An Exploration Licence is granted for a maximum of five years and can be extended by a further three years under certain conditions. If exploration has not commenced within one year of the licence being granted, the licence may be revoked. The same result may apply if exploration is interrupted for more than one year. The Exploration Licence is merely a legal title for the exploration of mineral resources in the granted area and is not sufficient to carry out technical programs such as seismic surveys or exploration work in the form of drilling. For such purposes, an operating plan (Betriebsplan) must be approved by the responsible state authority. • An Exploration Licence shall accord the holder the exclusive right to: Explore for the geothermal resources specified in the

		licence; to extract and acquire ownership in the resources that must be stripped or released during planned explorations; to erect and operate facilities that are required for exploring the resources and for carrying out related activities. • The CP was advised by Vulcan that all Exploration and Production Licences covering its URVBF were in good standing at the Effective Date of the current Mineral Resource estimate. A tabulation of Vulcan's Exploration Licence holdings within its resource area is presented below. • The Mannheim licence in the northeast of the licence group is 14,449 hectares and is centred at UTM 465874 m Easting, 5484762 m Northing, in the WGS84 UTM Zone 32N projection. • The Ludwig licence in the north central area of the licence group is 9,634 hectares and is centred at UTM 457285 m Easting, 5480857 m Northing, in the WGS84 UTM Zone 32N projection. • The Therese licence in the north central area of the licence group is 8,112 hectares and is centred at UTM 451123 m Easting, 5482018 m Northing, in the WGS84 UTM Zone 32N projection. • The Fuchsmantel-Flaggenturm licence in the central area of the licence group is 28,228 hectares and is centred at UTM 444023 m Easting, 5475828 m Northing, in the WGS84 UTM Zone 32N projection. • The Kerner licence in the south-central area of the licence group is 7,226 hectares and is centred at UTM 438513 m Easting, 5462653 m Northing, in the WGS84 UTM Zone 32N projection. • The Ortenau II Licence in the south of the licence group is 37,410 hectares and is centred at approximately: UTM 421900 m Easting, 5384900 m Northing, Zone 32N, WGS84. • The Taro-Lisbeth licences in the south-central area of the licence group are 3,268 hectares and are centred at UTM 445481 m Easting, 5464438 m Northing, in the WGS84 UTM Zone 32N projection. • The Landau-Sued licence in the southern area of the licence group is 1,941 hectares and is centred at UTM 435916 m Easting, 5448130 m Northing, in the WGS84 UTM Zone 32N projection. • The Insheim licence in the southern area of the licence group is 1,900 hectares and is centred at UTM 439040 m Easting, 5444442 m Northing, in the WGS84 UTM Zone 32N projection. • The Rift North licence in the southern area of the licence group is 6,483 hectares and is centred at UTM 435535 m Easting, 5442945 m Northing, in the WGS84 UTM Zone 32N projection. • Outside of the resource area, Vulcan has five other exploration licenses within the Upper Rhine Valley: Lampertheim, Lampertheim II, Löwenherz, Waldnerturm and Ried. • Vulcan has 100% interest in all these licences except for Rift-Nord, in which it has a 100% right to any new geothermal brine

		project developed there, and Landau-Sued, where Vulcan has a brine offtake agreement with the owner-operator for the existing geothermal brine operation, and a 51:49 JV for a new development in the same license. • Vulcan was granted 100% of the Ortenau II and Mannheim Exploration Licence for geothermal, brine and lithium exploration by the Baden-Württemberg government office, which is managed by the Freiburg State Office, Council for Geology, Raw Materials and Mining. • On December 13, 2021, Vulcan was granted 100% of the Ludwig, Therese and Kerner Exploration Licence for geothermal and Lithium exploration by the Rheinland Pfalz government office, which is managed by the Mainz State Office, Council for Geology and Mining. • In May 2022 Vulcan acquired 100% of the Flaggenturm Exploration Licence for geothermal exploration granted on December 2, 2020, from Finap Beteiligungs GmbH, Berlin. • In May 2022 Vulcan acquired 100% of the Fuchsmantel Exploration Licence for Lithium exploration granted July 14, 2021 from Finap Beteiligungs GmbH, Berlin. • On December 7, 2022 Vulcan and Geo Exploration Technologies GmbH, Mainz signed a shared Licence agreement. Under the terms of the agreement Vulcan has the right to explore and develop lithium and geothermal energy on the northern part of Geo Exploration Technologies' Rift Licence based on a royalty agreement. The agreement has been approved in writing by the Rheinland Pfalz government office, which is managed by the Mainz State Office, Council for Geology and Mining, and is subject to formal registration of joint ownership of the license by the same office. • The Insheim production Licence and Insheim Geothermal Power Plant were acquired by Vulcan through the 100% acquisition of Pfalzwerke geofuture GmbH effective on 1. of January 2022. • The Taro-Lisbeth Licences were acquired by Vulcan through the 100% acquisition of Global Geothermal Holding UG on 15. February 2021. • On November 5, 2021, Geo-x GmbH, Landau, owner of the Landau geothermal plant and Landau-Sued geothermal production license, was granted 100% of the Ilka Exploration Licence for Lithium exploration by the Rheinland Pfalz government office, which is managed by the Mainz State Office, Council for Geology and Mining. In parallel in November 2021 Vulcan and geo-x GmbH signed a brine offtake agreement. Under the terms of the agreement Vulcan has the right to purchase and extract the lithium from the brine produced at the Landau plant until 2043. In addition, Vulcan has entered into a 51:49 JV to develop a new geothermal project on the Landau-Sued license, separate to the existing project. • The CP notes that there is always some risk or uncertainty that government regulations and policies could change between the issuance and termination dates of Exploration

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		Licences, Production Licences and related permits issued by state authorities.
		• Any future geothermal and/or lithium brine production would require an operating plan and planning approval procedure that complies with the Act on the Assessment of Environmental Impacts.
		• In the URVBF, induced seismicity is a potential risk which can be caused by injection of brine. The CP notes that mitigation of such risk may be addressed by the following activities, among others:
		  ○ Performing regular seismic monitoring, as is currently practiced by Vulcan at its Insheim wells and plant;
		  ○ Reducing production flow rates temporarily if seismicity occurs during the operational phase.

Exploration done by other parties	• Acknowledgment and appraisal of exploration by other parties.	• The URVBF is under active exploration for its geothermal potential by multiple companies. Geothermal production is currently occurring at several sites other than those in which Vulcan is involved. As a result, important geological and brine data developed in support of non-Vulcan initiatives and evaluations is present. This has been accessed to the maximum degree possible by Vulcan for application in its own exploration and development programs. • Historical brine geochemical analytical results include historical analysis from the Landau, Insheim, Soultz, Brühl, and Vendenheim geothermal sites from 2019 to 2021. This includes samples from the Buntsandstein Group aquifer (n=6) and the Rotliegend Group-basement aquifer (n=11). The areal weighted mean concentration of these samples is 181 mg/L lithium. The historical data are presented in referenced 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 was also used as part of the resource estimation process. • GeotIS and GeORG data were evaluated and used to support construction of the 3D geological model used in Vulcan's current Mineral Resource estimates. GeotIS and GeORG are digital geological atlases with emphasis on geothermal energy. They provide access to extensive compilations of well data, seismic profiles, information, and interpreted schematic cross sections from the evaluation of 2D seismic data 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, but data profiles have been collated and interpreted for inclusion in the representative geo-dataset information systems. • The Lionheart Project area (Lionheart) and Taro-Lisbeth Licence area 3D modelling was improved beyond the constraints of GeORG subsurface information through Vulcan's 2020 acquisition of 2D seismic profile lines for these areas. This 2D seismic data acquisition was then extended to Vulcan's other license areas across the URVBF. These data

		were acquired by Vulcan specifically for the purpose of improving the associated 3D geological model. The seismic information and subsequent 3D geological models were re-interpreted by Vulcan as part of Vulcan's 2020-22 exploration work. • Any modelling or data artifacts within the model space were addressed by Vulcan and/or an independent consultant (GLJ) with involvement of the CP, in advance of the current Mineral Resource modelling. • Detailed studies of data from geothermal well Brühl GT-1 which is located ca. 5 km south of Vulcan's Ludwig license and drilled in 2013, were carried out by Vulcan in 2020 to better understand the hydrogeological characteristics of the fault/fracture zones within the surrounding Permo-Triassic strata. The dataset included detailed lithological log 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 GeoT, now part of Vulcan, to describe and characterise this nearby well data. Specific focus was placed on the Buntsandstein Group pore space and micro-fractures to develop comparative models for the Permo-Triassic strata underlying the Lionheart and Taro areas. Insight gained from this detailed work was subsequently applied by Vulcan across the broader spatial extent of the URVBF.
Geology	• Deposit type, geological setting and style of mineralisation.	• The lithium mineralisation at the URVBF is situated within confined, subsurface aquifers associated with the Permocarboniferous Rotliegend Group, the Lower Triassic Buntsandstein Group, and the Middle Triassic Muschelkalk Group (collectively, the Permo-Triassic strata) sandstone aquifers and carbonates situated within the URVBF at depths of between 2,165 and 4,004 m below surface. The Muschelkalk aquifer may not be present in the northern licences and is only included in the resource calculations for the Taro-Lisbeth, Insheim, Landau, and Ortenau licences. • The Permo-Triassic strata are comprised predominantly of terrigenous sand facies, with minor shales, carbonates, and anhydrites, 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 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 URVBF. • Lithium mineralisation occurs in the brine that is occupying the Permo-Triassic aquifer pore space. • With respect to a deposit model, the lithium chemical signature of the brine is believed to be controlled by geothermal fluid-rock geochemical interactions. With increasing depth, total dissolved solids (TDS) increase in NaCl-dominated brine. Lithium enrichment associated with these deep brines is considered to be related to interaction with hot crystalline basement fluids and/or dissolution of micaceous materials at higher temperatures. • Vulcan's current URVBF geological models benefit from reinterpretation of existing 2D and 3D seismic data acquired in 2020-22 by Vulcan. Depending upon the area considered, the seismic reinterpretation program mapped in detail four

		formation horizons based on their uniqueness within the seismic profiles. Faults were interpreted where doubling of a specific reflector occurs (thrust fault) or where a specific reflector is missing (normal fault). Numerous substantial faults penetrating through the Buntsandstein Group strata are interpreted for the entire Vulcan URVBF in the most recent geological model. The seismic interpretation mapped, in detail, 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 be interpreted as a fault zone, a feature was required to have a minimum horizontal extension of 400 m. Damage zone envelopes associated with particularly well-defined faults were developed through modelling and are applied as 200 m fault damage zone half widths from the fault centre. • In the opinion of the Mineral Resources CP, the current geological models provide a level of confidence that is reasonable in terms of identifying the spatial location and orientation of the Buntsandstein Group, Rotliegend Group, Muschelkalk zone basement and constituent faults for use in the current resource estimates. • The structurally complex fault damage zone areas are interpreted from geological modelling as representing zones for localised high fluid flow of mineralised brine, due to higher fracture abundancy and connectivity.
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: ○ easting and northing of the drill hole collar ○ elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar ○ dip and azimuth of the hole ○ down hole length and interception depth ○ 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	• Within the URVBF, due to the nature of deep geothermal development in mature brine fields, Vulcan has yet to conduct any new drilling or coring programs. However, the current Mineral Resource study was able to utilize subsurface lithological information from existing production/re-injection wells that Vulcan owns or has agreements to access, as well as historical wells within and adjacent to the holding. • There are numerous historical geothermal wells or petroleum wells drilled by other companies that extend deep enough to penetrate Permo-Triassic strata within the URVBF licence area. • Location coordinates plus orientation information for wells used to assess the lithium concentration of brine within Permo-Triassic aquifers covered by Vulcan's URVBF holdings are tabulated below. • Coordinate system: DHDN/3-degree Gauss zone 3, EPSG:31463.

report, the Competent Person should clearly explain why this is the case.

Hole Name	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (deg)	Total Depth (TVDSSm)	Top Perforation (TVDSSm)	Base Perforation (TVDSSm)
Landau Gt-La1	3436152	5450302	149	270	-2896	-2324	-2896
Landau Gt-La2	3436149	5450308	149	90	-3107	-2135	-2641
						-2726	-2922
Insheim GTI1	3438343	5446624	139.78	146	-3410	-3113	-3410
Insheim GTI1b	3438343	5446624	139.78	146	-3611	-2319	-2624
						-2657	-2680
						-2850	-2873
						-2972	-3611
Insheim GTI2	3438345	5446617	139.78	34	-3525	-2775	-3081
						-3253	-3525
Soultz EPS1	3417106	5422154	176.6	n/a	-2035	-	-
Brühl GT1	3465862	5472347	98.3	n/a	-3174	-3022	-3183
Vendenheim GT1	3409685	5390570	135	~120-130	-4515	-	-

Data aggregation methods

- In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g., 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.

- Average lithium grade values used in the resource calculation differed between the southern licences (Phase One plus Ortenau) and the northern licences (Phase Two excluding Ortenau)
- For the Phase One licenses (plus Ortenau), in the central and southern part of the Upper Rhine Graben, the average lithium content from brine collected by Vulcan from six geothermal wells, (including its 100%-owned Insheim geothermal wells and plant), located throughout the Upper Rhine Graben and proximal to the Ortenau and Taro licences was used as the representative grade for Resource Estimation. This grade was 181 mg/L Lithium (n=13 total metal analyses by ICP-OES). In addition, a detailed assessment of Permo-Triassic aquifer brine at the Insheim resource area production well yielded 181 mg/L Lithium (n=26 analyses). This grade was also used as the regional Lithium brine value for previous resource estimates (ASX, 2020), and also for the current update. These brine geochemical results demonstrate that the Permo-Triassic brine in the Upper Rhine Graben has a relatively homogeneous lithium chemical composition in the vicinity of Vulcan's central and southern license areas.
- For the more northerly Phase Two licences (excluding Ortenau), the lower lithium concentration measured from the Brühl well was conservatively used as representative of the lithium grade of these areas, after correction was made for dilution. Samples were collected from the Brühl well during production testing in 2013. The well was not subsequently available for sampling, due to project circumstances and sealing of the well. Aliquots of the 2013 sample were provided to Vulcan and were archived, and eventually analysed in 2019, as part of the wider sampling and analysis program at that time. Results were recognized as being influenced by dilution, consistent with the use of freshwater during production testing, and also with loss of drilling fluids. Vulcan conducted

		an assessment and interpretation of the results based on reservoir temperature estimates using geothermometers developed for geothermal brines. These calculations resulted in an estimate of original lithium content (before dilution) of 153 mg/L, which was identified as a potentially conservative correction. For comparison, the measured value in the sample was 104 mg/L (total lithium). The calculated lithium value (153 mg/L) was used as the grade in the current Resource Estimates for the Northern licenses. The CP has reviewed these interpretations and considers the resource grade to be conservative to realistic. • The brine geochemical data presented and evaluated by Vulcan represent laboratory analytical values. Averaging of results has been carried out in some instances but resulting mean values are clearly identified as such where this has taken place. • Elemental lithium values applied in the current Vulcan resource estimate were converted to Lithium Carbonate Equivalent ("LCE") using a conversion factor of 5.323, based on the stoichiometric quantity of lithium in Li_2CO_3. Reporting lithium values in LCE units is standard lithium 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 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 (e.g. 'down hole length, true width not known').	• Vulcan has operating geothermal wells with proven drilling information and ongoing measurement of lithium grades, within the Insheim and Landau licences in the core of the field. • 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 brine from the Permo-Triassic aquifers to the surface, for geothermal power generation. • As mineralisation is related to liquid brine within a confined aquifer, intercept widths are not a critical concept. Well perforation points essentially gather mineralised brine from the aquifer at large, assuming the pumping rate is sufficient to create drawdown in the aquifer.
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 current associated News Release and previous News Releases by Vulcan include explanatory figures that were used in reporting of project information to support respective resource estimation disclosures. • 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	• Comprehensive reporting of all exploration results is presented in the associated News Release and in the Technical Reports associated with Vulcan's URVBF Exploration Licences.

	not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	• There are no outlier analytical results in the geochemical dataset used to evaluate the lithium concentration of Permo-Triassic aquifer brine. The lithium brine values, within analytical error margins, are interpreted to be relatively homogenous in the vicinity of Vulcan's Exploration Licences, as informed by brine analytical data assembled by Vulcan.
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 characterize the configuration and hydrogeological properties of the Permo-Triassic aquifers. These aquifers include the Buntsandstein Group, Rotliegend Group and Muschelkalk Group. Hydrogeological properties include porosity and permeability. Historical geochemical data were used to assess the lithium concentration in Permo-Triassic aquifer brine. A total of 43 historical brine analysis records were compiled. These historical data were verified by Vulcan, and it is the opinion of the Mineral Resources CP that: o The Permo-Triassic aquifer is relatively homogeneous in terms of lithium concentration within the extent of Vulcan's URVBF Exploration Licences. o The verification of historical geochemical results produced a geochemical dataset that is adequately reliable for inclusion in the current resource estimation. • During 2020, Vulcan commissioned GeoT, now part of Vulcan, to: 1) review the acquired seismic information and nearby well data, 2) to conduct hydrogeological characterisation studies specific to URVBF Permo-Triassic fault/fracture zones, and 3) make inferences on potential geothermal well (and Lithium brine) production scenarios and their influence on fluid flow within and adjacent to fault/fracture zones. The Mineral Resources CP has reviewed a series of related internal reports and found them to be factually prepared by persons holding post-secondary degrees with an abundance of experience and knowledge in geothermal and geochemical evaluation within the URVBF. • Numerous geothermal, or oil and gas wells, were historically drilled by companies other than Vulcan within the boundaries of the URVBF licences. • Intersected formation tops were reviewed for five historical wells in the Lionheart (i.e., Insheim, Landau, and Rift) development area and Taro. Two of these wells (Insheim GTI1 and GTI2) intersected formation tops of the Muschelkalk, Buntsandstein and Rotliegend groups as well as the basement rock of the URVBF.
Further work	• The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling). • Diagrams clearly highlighting the areas of	• Vulcan plans to continue to de-risk and develop its Zero Carbon Lithium™ Project in the Upper Rhine Valley Brine Field using the following systematic, stepwise approach: o Drill development wells across Vulcan's core "Phase One" area contemplated within its DFS, focused on the producing, core of the field in the Insheim-Landau region and neighbouring region in Taro-Lisbeth/Kerner. The focus should be on sustainably increasing brine

	possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	production and re-injection flow rates across the field to feed larger scale commercial production, using recently acquired state-of-the-art seismic data and associated modelling and simulation. Continually refine model as more data is gathered during the development drilling and ramp-up of brine flow, aiming for continuous improvement during development. o Construction, commissioning, and implementation of a pre-commercial demonstration plant, to train a lithium operations team in a pre-commercial environment. Continuation of the demonstration plant operation, and current pilot plant operation which has been operating since April 2021, to further optimise operating conditions prior to commercial production start. o Execution of further 3D seismic surveys in step out, Phase Two areas, along with processing, interpretation and analysis of these surveys to run field simulations and further optimise field development plans, and associated further feasibility studies to develop these areas to the next stage. Drilling of Phase Two, step out development wells in these areas. o Further acquisition of 2D and 3D seismic data, and where applicable drilling data, across outer-lying regions and newly acquired areas in the URVBF, resulting in enhanced understand of the field, and the ability to develop further phases. o Drilling of test well into northern target area near Frankfurt, designated "Ried", to test if the brine reservoir is lithium-bearing to the north. o Conduct research and development on the potential for a "recharge effect" on lithium from basement rocks, to estimate the long-term effects on the lithium resources in the region. o Execution of a bridging engineering phase for Phase One, towards project execution, construction and commissioning. This engineering phase will include value improvement initiatives to optimize the field development plan and project economics.

Section 3: Estimation and Reporting of Mineral Resources.

Criteria	JORC Code Explanation	Commentary
Database integrity	• Measures taken to ensure that data has not been	• A review of compiled data was conducted by the Mineral Resource CP who, to the best of their knowledge, can confirm the data was

	corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes. • Data validation procedures used.	generated with proper procedures, has been accurately transcribed from the original source and is suitable for use in the resource estimations. • Independent sampling by the CP was discussed earlier in Section 1, under "Verification of sampling and assaying." 3D geological models were prepared for the Vulcan licenses, with the use of extensive 2D seismic data and more limited 3D data. These data were interpreted by Vulcan and represented in modelling software Petrel. Interpreted features included picks for the upper and lower surfaces of the Muschelkalk Formation, Buntsandstein Group and Rotliegend Group, plus fault locations. Model representations were checked by third party modellers (GLJ), with involvement of the CP. In the opinion of the CP, these geological representations, and the seismic data used to develop them are reasonable and appropriate for resource estimation. • Numerous hydrodynamic property studies and data were compiled from throughout the URVBF by Vulcan, to support the selection of appropriate values for Effective Porosity (Phie) and Net to Gross ratio (NTG) to use in resource estimation. In the opinion of the CP, these studies, and the resource estimation parameters that were derived them, are reasonable and appropriate. • Based on the Mineral Resources CP's previous extensive experience in estimating lithium brine resources and reserves, and associated sampling and analytical protocols, the Mineral Resources CP is satisfied with the integrity of the chemistry, geological and hydrodynamic datasets and information sources used to estimate Mineral Resources. • For an additional summary of the lithium analytical results used in the resource estimation, please see ASX announcements by Vulcan dating 4 December 2019 and 20 August 2020. Recent lithium data from the lithium extraction Pilot Plant operations at the Insheim-Landau geothermal wells was materially similar and reinforced the confidence in the average values derived from these original results, within analytical error.
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 visited the Vulcan properties and Karlsruhe offices and laboratory for three full days, from November 8-10, 2022. • The inspection included detailed tours of the two operating sites (Landau and Insheim), a review of the in-progress 3D seismic survey on the Insheim licence, and reconnaissance visits to all the remaining licences. • Independent sampling by the CP was discussed earlier in Section 1, under "Verification of sampling and assaying."
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 addition, and reinterpretation, of new and existing 2D and 3D seismic data, combined with verification of lithium grades over time from lithium pilot plant operations at the geothermal production well sites, significantly increased the Mineral Resources CP's confidence level in the subsurface 3D geological models that supported resource estimation. • The interpreted seismic data and subsequent structural model enabled an independent consultant (GLJ) with participation of the Mineral Resources CP and an additional independent consultant (Mercator) to create detailed Muschelkalk zone, Buntsandstein

	• The use of geology in guiding and controlling Mineral Resource estimation. • The factors affecting continuity both of grade and geology.	Group, Rotliegend Group surfaces. The 2D seismic profiles (including the GeORG data and other more recently acquired data) covered 100% of Vulcan's URVBF licences. The 3D seismic data set over the Taro licence covers approximately 5% of the URVBF area. This will soon be complemented by recently acquired 3D seismic surveys in the Insheim-Landau and Mannheim areas. • Using the seismic profiles, subsurface stratigraphic horizons were correlated throughout the URVBF licences. The marker horizons were validated against wireline logs from wells drilled in the southern and adjacent to the northern portions of the URVBF licence areas. • The fault/fracture zones were distinguished in the seismic profiles. The vertical displacement of the fault zones on the seismic profiles enabled definition of the activity level of the fault zone, with many 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. • The addition of 2D and 3D seismic data significantly increased the confidence level in the subsurface 3D geological model. • Interpretation of a detailed downhole geophysical dataset from the Brühl well, near Vulcan's Ludwig and Mannheim licences in the northern area of the URG, enhanced the analysis of hydrogeological characteristics, including average fracture porosity, within URVBF fault/fracture zones.
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 in the URVBF has a gentle northward dip at the southern end of the field (i.e., at the Ortenau licence area) which transitions to a south-east dip further northwards at the Taro licence area. The top and base surface elevations of the Buntsandstein Group under the URVBF licences are approximately from 2000 m (south) to 3800 m (north) subsea (m SS) with an average thickness range of 310 m in the north and 380 m in the south, up to 475m thick locally. The top and base surface elevations of the Rotliegend Group under the URVBF licences south of the Taro licence are approximately from 2200 m SS to 3300 m SS with an average thickness range of 120 m to 310 m, across the URVBF.
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	*The Lithium Resource is defined as the summation of the following, for all unique units within a given Licence:* *Total Volume of the Brine-Bearing Aquifer (GRV) x Average Effective Porosity (Phie) x Average Net to Gross (NTG) x Average Concentration of Lithium in the Brine (C).* • The parameter values used in the Resource Estimate are summarised in the table below.

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 elements or other non-grade variables of economic significance (e.g., 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.

Licence	Reservoir		Classification	GRV km³	Avg. NTG %	Avg. Phie %	Avg. Li mg/L
Mannheim	BST	FDZ	Indicated	4	90	10	153
	BST	HRM	Inferred	32	65	9	153
Ludwig	BST	FDZ	Indicated	7	90	10	153
	BST	HRM	Inferred	22	65	9	153
Therese	BST	FDZ	Indicated	2	90	10	153
	BST	HRM	Inferred	22	65	9	153
Flaggenturm	BST	FDZ	Indicated	7	90	10	181
	BST	HRM	Inferred	37	65	9	181
Kerner	BST	FDZ	Indicated	5	90	10	181
	BST	HRM	Inferred	13	65	9	181
Kerner Ost	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Indicated	4.3	73	8	181
Taro	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Indicated	14.5	73	8	181
Landau Sued	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Measured	7.4	73	8	181
	BST	FDZ+HRM	Indicated	1.2	90	11	181
Insheim	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Measured	9	73	8	181
Rift	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Measured	10.1	73	8	181
	*MUS, BST, ROT	MUS, ROT FDZ only BST FDZ+HRM	Indicated	11.9	73	8	181
Ortenau	*MUS, BST, ROT	FDZ	Indicated	57	73	8	181
	BST	HRM	Inferred	105	73	8	181

- The workflow implemented for the calculation of the Vulcan lithium-brine resource estimations included the following steps:
  - Based on seismic information, the geometry of the top and bottom surfaces of the Muschelkalk, Buntsandstein, and Rotliegend (where resolvable) were defined.
  - Based on seismic information, the faults within the Muschelkalk, Buntsandstein, and Rotliegend (where resolvable) were defined.
  - A conservative Fault Damage Zone (FDZ) half-width of 200m was defined for all faults based on the average displacement across the faults within the URVBF.
  - Estimation of volumes for applicable matrix bodies (Buntsandstein only) and FDZs within applicable geological units (depending on licence).
  - Identification of applicable Effective Porosity and Net to Gross Values for each of the volumes estimated above. The Effective porosity was based on wireline well log data of three wells within the URVBF (Appenhofen 1, Offenbach GT1, and Brühl GT1) as well as published porosity and permeability

		core plug measurement data within the URG (see Estimation Methodology section for references). In total, there are over 300 effective porosity measurements from core and outcrop analysis, and over 250 permeability measurements and/or interpretations for the Buntsandstein Group. Data points for the Rotliegend group include 62 core plug porosity measurements, as well as over 550 permeability measurements from core plugs. Porosity versus permeability plots using these data help determine cut-offs for effective fluid flow within reservoirs (Canadian Oil and Gas Evaluation Handbook, 2005; Nelson, 1994) achievable because of the availability of production data from producing geothermal and oil and gas wells within the URVBF (Landau 207, 211, Appenhofen 1, Römerberg A to E). For the Permo-Triassic sediments in the URVBF, a porosity cut-off of 5 %, equivalent to a permeability cut-off of 0.02 mD, is reasonable for significant fluid flow to occur. Net thickness is then determined from this relationship by applying the 5 % effective porosity cut-off to the gross interval thickness. Determination of applicable average lithium concentration (C) for each licence, based on Vulcan's brine sampling and interpretation program. Determination of average grade (C) is discussed under "Data Aggregation" Methods" in Section 2. o Spreadsheet compilation of all volumes and applicable parameter values, followed by resource calculation, according to the equation noted above. o Confirmation of reasonable prospects of eventual economic extraction for the identified resource zones. • The current Mineral Resource estimations replace and supersede the previously published estimates for the Insheim, Taro-Lisbeth and Ortenau licences. • The only element being estimated is lithium, and consideration of deleterious elements is beyond the scope of this project and resource estimate. Determination of such factors is dependent on application of specific mineral processing and lithium recovery flowsheet assessments and comprehensive market studies. Based on the lithium extraction piloting that Vulcan has conducted since April 2021, no deleterious elements have been noted which have a materially negative effect on Vulcan's sorption-type lithium extraction process. • In the case of Landau, Insheim and Rift, the extent of the Measured Resource domain was estimated through dynamic modelling of a reasonable, future, full-scale recovery, and injection system. The overall circulation footprint of the system over a 15-year simulation period was used as the outer boundary (footprint) of the Measured Resource domain. This footprint generally conformed with the full spatial extents of the Landau and Insheim licences. In

		the case of Rift, the circulation footprint was considerably less than the licence extent. Portions of Rift that extend beyond the footprint were defined as Indicated Resource. • The average lithium-in-brine concentration used in the resource estimations is 181 mg/L for the central Phase One licences (plus Ortenau in the south) and more conservatively 153 mg/L for the more northerly licences. Derivations of these two concentrations were previously discussed. • No top cuts or capping upper limits have been applied, or are deemed to be necessary, as confined lithium brine deposits typically do not exhibit the same extreme values as precious metal deposits. This statement is applicable to the Permo-Triassic aquifer Lithium brine data in this study. • A cut-off grade / resource quantity analysis was not strictly applicable to the resource, due to the use of average grade in the static resource estimate. However, it is noted that a grade for economic extraction of 100 mg/L has been established on a provisional basis for the lithium extraction process, and that all resources are currently estimated to exceed that grade. As the licences progress to the dynamic Reserve Estimate stage similar to Phase One, the influence of cut-off grade on project viability will be a more integral part of the estimate. Reserve estimation will require evaluation of well locations, deposit size, continuity of mineralisation, assumed mining method, metallurgical processes, costs, and reasonable long-term metal prices. In the dynamic reserve estimation, cut-off grade will be confirmed and will represent the lowest grade, or quality, of mineralized material that is economically mineable. • The unit volumes, parameter values, and resource estimate calculations were checked and validated by the Mineral Resources CP. In the opinion of the CP, the volumes, parameter values and calculations are appropriate and provide Resource Estimate results that are reasonable for the assigned resource categories.
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 in the URVBF is a brine-hosted resource.
Cut-off parameters	• The basis of the adopted cut-off grade(s) or quality parameters applied.	• Cut-off considerations are discussed above.
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	• It is the CPs opinion that geothermal facilities and lithium brine extraction operations represent a feasible co-production opportunity. • Vulcan's lithium brine extraction pilot plants in Landau and Insheim (or future commercial operations) are situated after the heat exchanger, and therefore do not influence the geothermal operations of the plant. Any future plants would follow the same approach. • Assuming the lithium extraction process causes only small compositional changes to the brine (which has been preliminarily shown in the geochemical data), the lithium-removed brine, as well as any evolved gases, could return to the subsurface aquifer via a

	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.	reinjection well. Hence, it is assumed both operating interests (geothermal and lithium) are extracting their own commodity of interest with minimal interference between the two processes. • It is assumed that Vulcan could drill their own production/re-injection wells at the URVBF licences to expand the existing production in the core of Vulcan's field. The 3D 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 the URVBF. • Dilution from re-injected brine has been factored into the production study on Phase One areas conducted by Vulcan, which shows a 1.6% annual reduction on average over the project life. Since this study was limited to brine modelled within the confines of the license area, and since any potential "recharge effect" from basement rocks was also not modelled, this could prove conservative.
Metallurgical factors or assumptions	• The basis for assumptions or predictions regarding metallurgical amenability. It is 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.	• Vulcan uses a sorption-type extraction process, similar to commercially operating sorption processes used on salar-type brines in Argentina and China. Because of environmental and meteorological considerations, Vulcan uses geothermal heat, instead of fossil gas and solar evaporation ponds, to drive the sorption process and drive the subsequent concentration of the lithium eluate respectively. • It is the opinion of the Mineral Resources CP that the extraction of lithium from salar-type brines using sorption is commercially proven having been used since the 1990s, and the use of sorption on the particular Upper Rhine Valley brine chemistry provides no technical impediment to the same process being applied. • Vulcan's lithium engineering team designed, and has since operated, a lithium extraction pilot plant demonstrating the sorption process on its geothermal brine since April 2021. Vulcan Energy Resources has operated its pilot plant at two existing geothermal operations (Insheim and Landau) since April 2021. The results of this operation back up the assumptions used in Vulcan's feasibility study and provide the basis for assumptions and predictions regarding metallurgical amenability. For Phase One of Vulcan's commercial operation, brine from these two geothermal operations, combined with brine from additional planned geothermal production wells in the vicinity, will feed two lithium extraction plants (LEPs), for a combined 24,000 TPY lithium hydroxide monohydrate (LHM) equivalent capacity.
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 environmental impacts of the mining and processing operation. While at this stage the determination of	• German Federal and State policy is targeting net zero power and heating production, and EU policy targets the onshoring and bolstering the sustainability of lithium and other critical raw materials production. It is the opinion of the CP that combined geothermal energy and lithium extraction projects such as Vulcan's Zero Carbon Lithium™ Project have the necessary environmental credentials to enable stakeholder support. • Vulcan's process has been designed to be very low waste and circular, in that all brine produced is re-injected into the reservoir, in materially the same state but just with most of the lithium extracted. The surface footprint of planned operations, being geothermal wells and plant, and lithium extraction plants, are very

	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.	small compared to a traditional mine or salar operations, and sites have been selected to be located on industrial or farming land. It is therefore likely that Vulcan will have a low environmental impact, and in fact will have a net positive effect on the climate by decarbonising the lithium supply chain and energy supply. • In the URVBF, induced seismicity is a potential risk which can be caused by injection of brine. The CP notes that mitigation of such risk may be addressed by the following activities, among others: ○ Performing regular seismic monitoring, as is currently practiced by Vulcan at its Insheim wells and plant; ○ Reducing production flow rates temporarily if 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 measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit. • Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	• Bulk density is not applicable, or necessary to be applied, to the liquid, brine-hosted resource. • Details of the resource calculations are provided above.
Classification	• The basis for the classification of the Mineral Resources into varying confidence categories. • Whether appropriate account has been taken of all relevant factors (i.e., 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 Person's view of the deposit.	• The Vulcan URVBF lithium brine project has reasonable prospects for economic extraction based on aquifer geometry, delineation of fault zones using re-interpreted 2D and 3D seismic data, brine volume, brine composition, hydrogeological characterization, porosity, fluid flow, and the advancement of Vulcan's lithium sorption technology and subsequent testwork through their pilot plants through thousands of hours of continuous processing data. • The updated URVBF lithium brine Mineral Resource estimations are classified as Measured, Indicated and Inferred Mineral Resources, depending on location and availability of data. • Pertinent points to support a Measured and Indicated Mineral Resource classification within the producing core of the Upper Rhine Valley Brine Field, and Indicated classification within the wider fault damage zones include: 1) a greater level of confidence in the subsurface geological model due to Vulcan's acquisition of detailed 2D and 3D seismic data, 2) acquisition of a detailed downhole geophysical dataset to analyse the hydrogeological characteristics of a fault-associated fracture zone within a

		geothermal well, and 3) knowledge of Vulcan's commissioned lithium absorption mineral processing testwork and results, following thousands of hours of testwork conducted over the course of nearly two years, 4) Vulcan's acquisition of production/re-injection wells in the core of the field at Insheim, and agreement to access other production/re-injection wells at the neighbouring Landau geothermal plant, which has resulted in hundreds of additional analyses from live geothermal brine, and 5) Vulcan's integration of extensive reservoir production simulation into its models. • The URVBF Inferred Mineral Resource includes Buntsandstein Group, plus Rotliegend Group and Muschelkalk Group, where applicable. • The lithium-brine Technical Report supporting the current Mineral Resource estimate has been prepared by a multi-disciplinary team that include geologists, hydrogeologists, geothermal specialists, and chemical engineers with relevant experience in Permo-Triassic and other brine geology/hydrogeology and lithium brine processing environments. There is collective agreement that the Vulcan project has reasonable prospects for economic extraction at current and forecast lithium market pricing levels. Technical Report co-authors M. King, P. Geo., and Kim Mohler, P. Eng., take joint responsibility for this statement, as Mineral Resources and Engineering CPs, respectively.
Audits or reviews.	• The results of any audits or reviews of Mineral Resource estimates.	• Vulcan's URVBF lithium brine project consists of one field with numerous project areas at various stages of development. Current resource estimation methodologies have been compared to past estimation methods utilised by APEX Geoscience Ltd. (APEX) to support the 2019 and 2020 mineral resource estimations prepared for Vulcan.
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 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	• In the opinion of the Mineral Resources CP, the URVBF Measured, indicated and Inferred lithium brine Mineral Resource estimations are reasonable for the Permo-Triassic aquifer within the Vulcan URVBF licences. • Risks and uncertainties as they pertain to the lithium brine Mineral Resource estimate include: o Risks and uncertainties associated with deep geothermal brine exploration are linked to the relative lack of deep well data, due to the high cost of deep well drilling. Whilst this is a lower risk in the core of the field where Vulcan has production and re-injection wells already, stepping out to the north and the south there are licenses which rely on off-property well data. Any new wells that are installed in the Permo-Triassic strata at Vulcan's URVBF licences will play a major role in future Mineral Resource updates. As exploration continues, incorporation of associated results will reduce inherent Mineral Resource uncertainty and project risk. o The reader should be aware that the reality of any geothermal or lithium brine recovery program is

	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.	that the extent of brine recovery from the resource estimate zone will be a function of the design of the recovery/reinjection system and the connectivity of the subsurface brine zones. To some extent, it will not be feasible to capture all brine from the subsurface strata included in the resource estimate. ○ The planned brine production system will be based on doublets of recovery and reinjection wells. It is noted that dilution factors caused by injecting the spent brine into the hydraulic system could influence the operational timeline of a given well doublet, beyond the extent to which already modelled. ○ Localized high permeabilities can lead to channelling effects such that the geothermal reservoir potentially becomes inefficient in terms of capturing brine from a broader zone. Thus, the exploitation of fault zones can constitute a trade-off between high permeability and reduced reservoir volumes.

Section 4: Estimation and Reporting of Ore Reserves

Criteria	JORC Code Explanation	Commentary
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 Section 3 above and takes into account the reasonable potential for eventual extraction, based on aquifer geometry, delineation of fault zones using re-interpreted 2-D and 3-D seismic data, brine volume, brine composition, hydrogeological characterization, porosity, fluid flow, and the advancement of Vulcan's lithium sorption technology and subsequent test runs through their pilot plants. • The Mineral Reserve estimate was undertaken by the Mineral Reserves CP as outlined in this section. • Probable Ore Reserves are defined based on the Indicated Mineral Resources, with the Resources in question in the Indicated Category, as required by the JORC Code. • Proven Ore Reserves are defined based on the Measured Mineral Resources for Lionheart, as required by the JORC Code. • All Mineral Resources are reported inclusive of Ore Reserves.
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 Reserves CP conducted a site visit on November 8-10, 2022. The visit included the Insheim geothermal plant, and the Landau geothermal plant which are operational. • The site visit included 3D seismic operations while running Vibroseis equipment in the Insheim area. • The site visit included the Vulcan corporate offices in Karlsruhe to interview Vulcan staff responsible for all aspects of the project to review the dynamic flow modelling, field development plans, drilling plans, geothermal and lithium process engineering design,

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		infrastructure design, regulatory, environmental, costs, economics, marketing, and communications plans.
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 Definitive Feasibility Study (DFS) has been completed by Vulcan for the Zero Carbon Lithium™ Project within the Phase One licence areas, constituting the Lionheart and Taro areas, in January 2023. • A Pre-Feasibility Study (PFS) was previously completed in January 2021, for Taro-Lisbeth and Ortenau licences which reported Probable Mineral Ore Reserves for both licenses in the amount of 0.42 Mt LCE for Taro and 0.70 Mt LCE for Ortenau as derived from Indicated Mineral Resources. Taro has now been revised as part of the Phase One DFS, and Ortenau will be revised as part of ongoing feasibility studies. 2021 PFS figures related to Phase Two should be treated with caution until they are updated with more recent parameters as per Phase One. • The DFS has defined field development plans for both Lionheart and Taro-Lisbeth districts which are based on dynamic flow modelling linked to the geologic models. An iterative approach was taken to define optimal well placement. A well network has been defined for each district which includes 18 wells at Lionheart (includes 2 existing doublets, so 14 new wells) and 9 wells at Taro-Lisbeth. The modifying factors have been tested at several pilots and have high level of certainty with technical and economic viability.
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 production forecasts used in the field development plans. Dilution from the original 181 mg/l Li concentration is included in the forecasts with economic cut-off assumed at 100 mg/l Li.
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 (e.g., pit slopes, stope sizes, etc), grade control and pre-production drilling. • The major assumptions made, and Mineral Resource	• Indicated Mineral Ore Resources from the Taro licences are converted to Probable Mineral Ore Reserves, based on the results of the DFS and consideration of the modifying factors identified in the DFS. The results of the pilot tests for lithium extraction and electrolysis for conversion of LiCl to LHM have been taken into consideration in the DFS level detailed design. • Measured Mineral Ore Resources from the Lionheart licences are converted to Prove Mineral Ore Reserves, based on the results of the DFS and consideration of the modifying factors identified in the DFS. The results of the pilot tests for lithium extraction and electrolysis for conversion of LiCl to LHM have been taken into consideration in the DFS level detailed design. • The mining method is dictated by the deposit type, in which brine is hosted in pore spaces between grains of sediments and within natural faults and fractures. Deep wells are installed to allow for production of lithium enriched geothermal brine from the reservoir fault systems to the wells utilizing a pumping system to overcome hydraulic head. The lithium depleted brine is then reinjected back to the reservoir through injection 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.

	model used for pit and stope optimization (if appropriate). • 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 their inclusion. • The infrastructure requirements of the selected mining methods.	• No brine recharge has been factored into this study due to the nature of the deep brine resource and the stage of the project. This will be monitored when production starts in the future. • 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. The lithium recovery estimated for the DFS lithium extraction process design vary over the project life as lithium concentrations vary but the average recovery is 93.9% of the produced lithium production. • Minimum mining widths are not relevant in the context of this Vulcan Project as there is no open pit mine. • Inferred Resources are not considered for the purposes of the production plan and Reserves for the Lionheart and Taro Phase One districts. • The infrastructure required for brine extraction is the establishment of the proposed well network, multi-well pads, pipeline and power infrastructure, ORC plants, LEP surface facilities, and CLP surface facility.
• **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 testwork 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 testwork 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 Sorption (DLS), using a sorbent-based extraction method, which is a proven technology for lithium extraction as used by several producers worldwide, including in Argentina and China. • The lithium chloride (LiCl) produced from the Lithium Extraction Plant (LEP) is then converted to battery grade lithium hydroxide monohydrate (LHM) at the Central Lithium Plant (CLP). The majority of the proposed equipment is in use in either lithium sorption 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 for the exact same processes using Upper Rhine Valley brines. These technologies are considered appropriate for the production of LHM based on current testwork and the further testwork planned to incorporate into the development plan and engineering design. • Vulcan has conducted thousands of hours of piloting test work with its pilot plant on the Upper Rhine Valley Brine, since April 2021. Substantial metallurgical testwork was carried out with bulk brine samples at vendors, independent laboratories, and Vulcan's laboratory and is considered appropriate for DFS indications of performance to support the Vulcan Project. Further testwork is planned at the soon to be operational Demo Plant, and continued testing at the existing pilots, which will provide inputs to the next stage of bridging engineering design. Vulcan has undertaken a Value Improvement Process with Hatch to identify and incorporate improvements to the design, which is expected to improve operational performance and economics. Samples of the raw geothermal brine at the pilot plant in Insheim were sent for analysis by Inductively Couple Plasma-Optical Emission Spectroscopy (ICP-OES) and Ion Chromatography (IC) at the Vulcan laboratory in Durlach, on a frequent basis. With this data and other historical test data, it shows no significant variation in lithium grade. Similar findings were determined for Landau.

		• Testwork on the pre-treatment of brine was previously carried out by IBZ-SALZChemie, supervised by Vulcan's chemical engineering team. Further investigations have been conducted by Vulcan at its own laboratory based on samples from the pilot plant. Pre-treatment tested removal of silica, impurities, and CO_2. Vulcan has since conducted test work on a pressurised pilot, P1A, which has shown that pre-treatment will not be necessary prior to sorption. This design improvement will be incorporated into the design in the next stage of bridging engineering design. • Sorbent testing was conducted by Vulcan at the pilot plant and laboratory with a number of commercially available sorbents being tested. Vulcan has conducted substantial testing and optimizations to define a sorbent that will be best for their future operations. Vulcan has selected its own internally made sorbent, VULSORB™, as the most optimal for commercial use. Further tests are planned at the Demo Plant which is upscaled from the pilot plant. • Testwork was conducted for the conversion of LiCl to LHM, by Electrosynthesis Co. Inc., USA in 2022. The test was conducted on a small scale using the LiCl product from the pilot plant and proved successful. A scaled demonstration plant is planned to further test the conversion processes to aid in the final design of the CLP. It is expected to be operational in 2023.
• **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 considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.	• No waste rock characterization studies are needed, due to the well-type of lithium brine extraction method proposed. • Consideration has been given to local environmental and social restrictions when planning the well sites, infrastructure, and surface facilities. • Environmental assessments have been undertaken as applicable for various activities like 3D seismic and drilling and are embedded as part of the permitting processes for Phase One. Vulcan is proactive in following the permitting process early and ensuring environmental protection requirements are considered in the project design. Vulcan has been granted preliminary EIA approval, meaning that no full EIA is required, for its planned development wells in the Taro-Lisbeth region. Similar approval is expected for wells in the Lionheart region shortly. Vulcan is in the process of obtaining the necessary permits, including building permits, for its process plants, in accordance with normal regulatory timelines.
• **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 Vulcan Project is in the Upper Rhine Valley, which is an area extremely well serviced by infrastructure for roads, rail, waterways, and power. • There is a large availability of highly skilled labour and accommodations throughout the development areas to support the Vulcan project development. • The decentralised project structure results in special requirements for the transport logistics from the production sites to the LEP, from both raw material suppliers to the LEP and CLP as well as from the LEP to the CLP. Vulcan is planning to use an Interconnecting Pipeline and Power system (ICPP). There will be an

		ICPP in the Lionheart project complex and a separate ICPP in the Taro project area. • The LiCl product from the LEP will be transported by regular road transport to the CLP.
• **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 DFS has used costs based on a detailed cost analysis by Hatch, Turboden, VEE and VER estimates. • The capital costs have taken into consideration the current supply chain challenges and higher than typical costs, plus contingency has been included in the estimates. • Vulcan has estimated the Owners capital costs. • Labour rates were established in accordance with labour agreement information and basic wage data obtained for other similar projects in Germany/Europe. • Operating costs were estimated by Hatch for most of the operational processes except the wells and ORC power plant, which have been defined by Vulcan and Turboden. • 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. • A lithium market study was conducted by experienced industry analyst Fastmarkets in 2022. As well trade statistics were collected and collated by Vulcan's in-house lithium market expert, Vincent Ledoux Pedailles. • All costs were estimated in Euros. • 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. • Vulcan has 5 existing offtake contract agreements and has taken the pricing for these contracts into consideration in the economic analysis. • Since no lithium production currently exists in Germany, royalty rates, if any, will need to be discussed with the state 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". This is also consistent with the project as a geothermal project, which is also exempt from mining royalties.
• **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 head grade has been determined by the resource model which has been developed for the Vulcan Project and is based on regional drilling, geochemistry and seismic data, which was used to produce the Indicated and Measured Resources for Phase One. • Commodity prices are based on forward estimates by experienced industry consultants Fastmarkets and offtake agreement pricing. • All costs were estimated in Euros. For lithium pricing, a Euro-USD conversion rate of 1.05 has been used in calculations.

	• The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.	• Transportation costs are included in the estimation of operating costs. The operating costs include all aspects of the process from brine production from the wells, the ORC plants, the LEPs, and the CLP, plus transportation between the sites. • No allowances for by-product credits, except for HCl, NaCl, and district heating are considered. • Renewable energy produced by the geothermal plants is assumed to be sold into the grid at a fixed feed in tariff rate of €0.252 per kWh, in accordance with the German Renewable Energy Law. It is assumed that the Vulcan operations will sell the geothermal renewable power produced and have to acquire renewable power from the grid. The power pricing is assumed based on Aurora Energy Research power price forecast where prices do not exceed the fee in tariff.
• **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. • Vulcan contracted Fastmarkets to conduct a lithium supply study which included supply, demand, and pricing outlooks. Fastmarkets concluded that Vulcan is strategically well positioned to benefit from the increasing demand for lithium in Europe. DLS production in conjunction with geothermal power is a solution that makes sound economic and environmental sense. • Some weaknesses and threats were identified by Fastmarkets for the lithium market, but none were specific to Vulcan's project, and they are more than offset by the strengths and opportunities that the project's strategy offers. • The Company is well placed on the cost curve, and plans to produce a final battery grade product, unlike many hard rock competitor companies. The Vulcan Project is forecast to fall in the lower part of the cost curve, being competitive with other existing and forecasted new lithium projects. • Fastmarkets average annual prices for lithium hydroxide used in the economic model are €30,283/t LHM realised price, which is taking into consideration the pricing mechanisms concluded by Vulcan with its offtakers. • The pricing model used in the economics also combined the Fastmarkets analysis with the offtake agreement pricing. Vulcan holds 5 offtake agreements with Umicore, Renault, Stellantis, Volkswagen, and LG Energy Solution. • The Vulcan Project is expected to produce battery quality lithium hydroxide monohydrate (LHM), 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.	• Vulcan conducted a DFS level economic analysis using its own financial model with consideration for various business structures, referred to as SPVs (Special Purpose Vehicles). • The SPV1 is the equipment and processes associated with Lionheart and Taro licences in Phase One for wells, ICPP and ORCs. The SPV2 is the LEP and SPV 3 is the CLP. • 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

	• NPV ranges and sensitivity to variations in the significant assumptions and inputs.	discounted by a real risk-adjusted discount rate. Vulcan conformed with this practice. • A discount rate of 8% was applied to the cashflow in line with the industry average for lithium assets. • Sensitivity analyses were conducted to evaluate the LHM prices, exchange rates, OPEX, and CAPEX. The Vulcan Project is generally resilient to most major factors and is most sensitive to lithium pricing. • The economic evaluation was based on the brine flow rates from the production forecast which include dilution of lithium concentrations over time. The LHM production rate after ramp-up is assumed to peak at 23,737 tpy LHM and reduce to 17,590 tpy LHM by 2045, due to dilution effects.
• **Social**	• The status of agreements with key stakeholders and matters leading to social license to operate.	• Vulcan's Communications team has commenced engagement and consultation at local, state and federal levels. They have an extensive communications strategy utilizing multiple communication tools such as social media, open houses, mailings, call centre, etc. • Vulcan has a heat offtake agreement to supply renewable heat to the local community in the Mannheim area and is in discussions to do the same in the Phase One areas. • Vulcan has installed information centres on the Insheim site, in Landau, Durlach and Mannheim.
• **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 DFS has identified a number of risk factors, both related to the natural environment and other aspects of the Vulcan Project. The natural risks identified are considered to be manageable, assisted by the extensive experience of the Vulcan team in historical development of geothermal projects in the Upper Rhine Valley. • Material legal agreements are understood to be in good standing. The properties are granted exploration licenses and production licences at Insheim. Vulcan holds the rights to geothermal energy, brine and lithium in the Phase One areas either directly or through third party agreements. • Vulcan has signed onto 5 offtake agreements for LHM product sales. • Preliminary EIAs have been approved, negating the need for full EIAs, for some drilling sites in the Phase One area. Permit applications for production/re-injection drilling sites are in process of preparation or have been submitted and are waiting on approvals. The permit applications for facility construction and operation are in preparation. Permits have been approved for the 3D seismic program at Insheim and Mannheim. • Whilst there can be no assurance that Vulcan will obtain all the permits it needs on time or at all, no reason is known of by the Company to expect delays to permit approvals based on the consultation that Vulcan has conducted with the regulatory agencies, local communities and other stakeholders. There are therefore reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the DFS. This is further bolstered by the imperative from the German Federal and State governments for decarbonisation of energy, and from the European Union for

		onshoring of sustainable critical raw materials production, in particular lithium as announced as part of the EU Green Deal Industrial Plan.
• **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 Mineral Reserves CP is of the opinion that Vulcan has conducted sufficient geologic and reservoir engineering work, and mineral processing testwork to provide a high level of certainty for the modifying factors so that for Lionheart, Mineral Ore Reserves are estimated for Proved and Probable classifications. With Lionheart having existing brine production from the Insheim and Landau wells, and the pilot tests conducted at Insheim and Landau, there is historical data available to show consistency with the lithium concentration used for the mineral reserves of 181 mg/l Li. • The Mineral Reserves estimates are taken from the Reference Point of the Wellhead or inlet to the LEP. • The Mineral Reserves estimate for Lionheart is Proved at 196 kt LCE, and Probable at 154 kt LCE. The Mineral Reserves for Lionheart are derived from the Measured Mineral Resource mass estimated per Section 3 of this Table 1 of 1939 kt LCE. This includes the licences in Insheim, Rift and Landau. • For Taro-Lisbeth and Kerner, with no existing wells, but with proximity to Lionheart and application of the same modifying factors, Mineral Reserves are estimated in the Probable classification. • The Mineral Reserves estimate for Taro-Lisbeth is Probable at 189 kt LCE. This is derived from the Indicated Mineral Resource mass of 1618 kt LCE which is for the licences of Taro-Lisbeth and Kerner Ost. • The Mineral Reserves estimate for Taro-Lisbeth in the DFS is lower than the one reported in January 2021 for the PFS due to less wells in the DFS development plan, inclusion of dilution of lithium concentration over time and an economic limit of 100 mg/l Li applied to the forecast. • In the PFS of 2021, Mineral Reserves for Ortenau in the Probable classification were attributed as 700kt LCE. This was used using simpler, less refined methodologies in the PFS, and the Ortenau Mineral Reserves will be reviewed and revised as part of ongoing feasibility studies, and until this is completed, PFS Phase Two numbers should be treated with appropriate caution.
• **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 of production forecasts and mineral reserves estimates.
• **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 Proved and Probable Mineral Reserve estimations reported for the DFS are considered to have a reasonable level of confidence based on the quality of data and testwork collected These data were interpreted by a technical team with local and international experience and expertise. This team also defined the field development plan and process engineering design. This level of confidence is further supported by the continuity of mineralization, the geologic characterization, and the demonstration that lithium enriched brine can be pumped from

	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.	deep wells in the Upper Rhine Valley and that lithium can be economically recovered and converted to battery grade LHM. • Modifying factors include, but are not limited to, well design and production plan, geothermal production, mineral processing, metallurgical testing, infrastructure design, surface facility design marketing plan, economic, legal, environmental, social, and government factors. • The pilot tests have provided sufficient testwork results that the CP has a high level of confidence in the DFS design and expected results for the project. Improvements to the design are planned to be incorporated based on further testwork and the scaled-up demonstration plants coming on stream in 2023, as part of the bridging engineering phase. • The permitting of the Vulcan Project by the government, which requires relevant environmental approvals depending on each location and site use, is a modifying factor. It is considered as a potential risk to the schedule, but based on information from the Company, the CPs have reason to believe that there is a reasonable probability for full approvals to meet the schedule start date. • The CP's have relied on data provided by Vulcan and supporting third parties. The accuracy of any Mineral Resources or Reserves estimate is a function of the quality and quantity of available data and of geologic and engineering interpretation and judgment. While Mineral Resources and Reserves and production estimates presented herein are considered reasonable, the estimates should be accepted with the understanding that reservoir performance subsequent to the date of the estimate may justify revision, either upward or downward. • The metallurgical basis for the process engineering design and the design parameters and related costs, were relied upon by the CP as provided by Vulcan and third-party contractors. As the Project moves to the bridging phase and design optimization and potential revisions are undertaken, it is possible that design specifications described in the DFS report will be subject to change and the costs related to these changes will affect the reported economic results. • Revenue projections presented in the DFS report are based in part on forecasts of market prices, currency exchange rates, inflation, market demand and government policy which are subject to many uncertainties and may, in future, differ materially from the forecasts utilized herein. Present values of revenues documented in the DFS report do not necessarily represent the fair market value of the reserves evaluated herein.