

# Equity Research



## Vulcan Energy Resources Limited

**Update**

**„Signal to elevate investors’ attention”**

**12 June 2020**



#### Investment recommendation:

**Buy**

(previous: Buy)

**Price target: AUD 2.45 /  
EUR 1.50**

(previous: AUD 2.45 / EUR 1.45)

**Stock exchange:** Australian Stock Exchange

**Reuters:** VUL.AX

**Bloomberg:** VUL:AU

#### Dual listing

**Stock exchange:** Frankfurt Stock Exchange

**Reuters:** 6KO.DE

**Bloomberg:** 6KO:GR

**ISIN/WKN:** AU0000066086/A2PV3A

**Market capitalisation:** AUD 23.88 million  
EUR 15.13 million

**Number of shares:** 53,67 Mio. (undiluted)

#### Shareholder structure:

Dr Francis Wedin, MD	19.91%
Gavin Rezos	6.86%
Dr Horst Kreuter	1.03%
Pioneer Development Fund	7.70%



#### Closing price ASX (12 June 2020):

AUD 0.445

#### High/low ASX 52 weeks:

AUD 0.530 / AUD 0.120

#### Closing price Frankfurt (11 June 2020):

EUR 0.282

#### High/low Frankfurt since 12 December 2019:

EUR 0.290 / EUR 0.076

#### Issuer website:

[www.v-er.com](http://www.v-er.com)

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## Vulcan Energy Resources Limited

### Signal to elevate investors' attention

- Momentum building towards Pre-Feasibility Study (PFS)
- EU-backing announced for Vulcan Zero Carbon Lithium™ Project
- Bench-scale lithium extraction test results expected soon

The Pre-Feasibility Study (PFS) of the Zero Carbon Lithium™ Project is due to be completed by end of this year. The PFS is a prerequisite as well as signal for everything that follows on the path to commercial Lithium extraction in the Upper Rhine Valley.

With PFS in hand, investors will be provided with by far better means for evaluation purposes, not least since the PFS will elaborate on production data (which was not able to be disclosed as part of the Scoping Study only because the majority of a resource estimate of a total of 13.95 million t lithium carbonate equivalent / LCE so far has been within the Inferred Mineral Resource category). Concerning investors' perception, the PFS will accordingly be the signal to elevate Vulcan onto a much more prominent position.

Peer valuation shows that other companies pursuing Direct Lithium Extraction from deep brines, such as Standard Lithium (TSXV:SLL, OTCQX:STLHF, Frankfurt Exchange:S5L, current market capitalisation: CAD 110 million, respectively AUD 118 million), have seen serious re-ratings after the release of financial data from similar studies. It needs to be emphasized that Vulcan holds a 100% of a larger, higher grade resource, which has the processing advantage of readily available heat than its peer.

Cash of AUD 2.5 million (as per 31 March 2020) means that Vulcan is well-funded towards completion of the PFS, as well as bench-scale testwork currently under way, and a pilot plant operating later this year for testwork on live brine from an operational geothermal site where Vulcan has an agreement with the operator. Beyond this mineral processing testwork, Vulcan intends to purchase an existing 3D survey, existing 2D seismic lines and additional geological information, so that Inferred Resources presumably could be converted into Indicated Resources (option agreed upon to acquire data package for a total of EUR 600 thousand). Geothermal production well targets will be selected through the interpretation of the data. This purchase and use of existing data should significantly accelerate the development of the project.

Vulcan also recently announced a deal with EIT InnoEnergy, an EU-backed group. EIT InnoEnergy will marshal its ecosystem and significant EU-wide resources to drive the Zero Carbon Lithium™ Project forward, with assistance both from a permitting and funding perspective. This came after



Vulcan presented to the Vice-Presidents of the European Commission and European Investment Bank. It is expected that this EU backing will add considerable momentum to the project.

The PFS will set the stage for further refinement of geological and engineering data as well as of the financial road map. At the site of the existing operating geothermal plant (0.72 million t LCE, current category: Indicated Mineral Resource), Vulcan will build a demonstration plant to test enrichment, implementing Direct Lithium Extraction (DLE), a process technology proven effective for more than 20 years in industrial lithium carbonate production. At its Fénix site (2019: 20 thousand t LCE, followed by lithium hydroxide production at sites in the US and China, 22 thousand t), US lithium specialist Livent (spun off from the FMC Corp. group in two stages in 2018 and 2019) uses an upstream adsorption plant for brine extracted from the Salar del Hombre Muerto (Argentina) to remove detrimental impurities. Three DLE plants are currently in operation in China.

PFS and subsequent testwork will eventually be leading to the Definitive Feasibility Study (DFS). Completion of the DFS is scheduled for late 2021. On the basis of the DFS, Vulcan will be able to scale-up the lithium plant so that commercial operation could start by end of 2023. With a CO<sub>2</sub> footprint of "zero", the project is predestined to mark the beginning of the decarbonization of the battery industry.

**Following the ramp-up phase (2022 to 2023), which will be characterised by high capex, with a four-year payback period. We have modelled surpluses in cash inflows for 2024e to 2027e of USD 960 million, which would cover capex of USD 846 million.**

**When the Pre-Feasibility Study is presented (scheduled for the end of 2020), we can likely assume an equity valuation of at least USD 125 million on the capital markets. We have set a price target of EUR 1.50 (equivalent to AUD 2.45) for shares in Vulcan Energy Resources. The investment recommendation is "buy" (unchanged).**

**Analyst:**

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## Overview

The Australian exploration company Vulcan Energy Resources Ltd. has turned its attention to the exploitation of lithium resources in the Upper Rhine Valley, which are also generous by global standards. The concept: to combine the use of thermal water as an energy source (hydrogeothermal energy) with the extraction of the lithium contained in the lithium-rich geothermal brine without polluting the environment with emissions, waste material or toxic substances. With a CO<sub>2</sub> footprint of "zero", the project is predestined to mark the beginning of the decarbonization of the battery industry.

### How a Vulcan Energy Resources hydrothermal power plant works

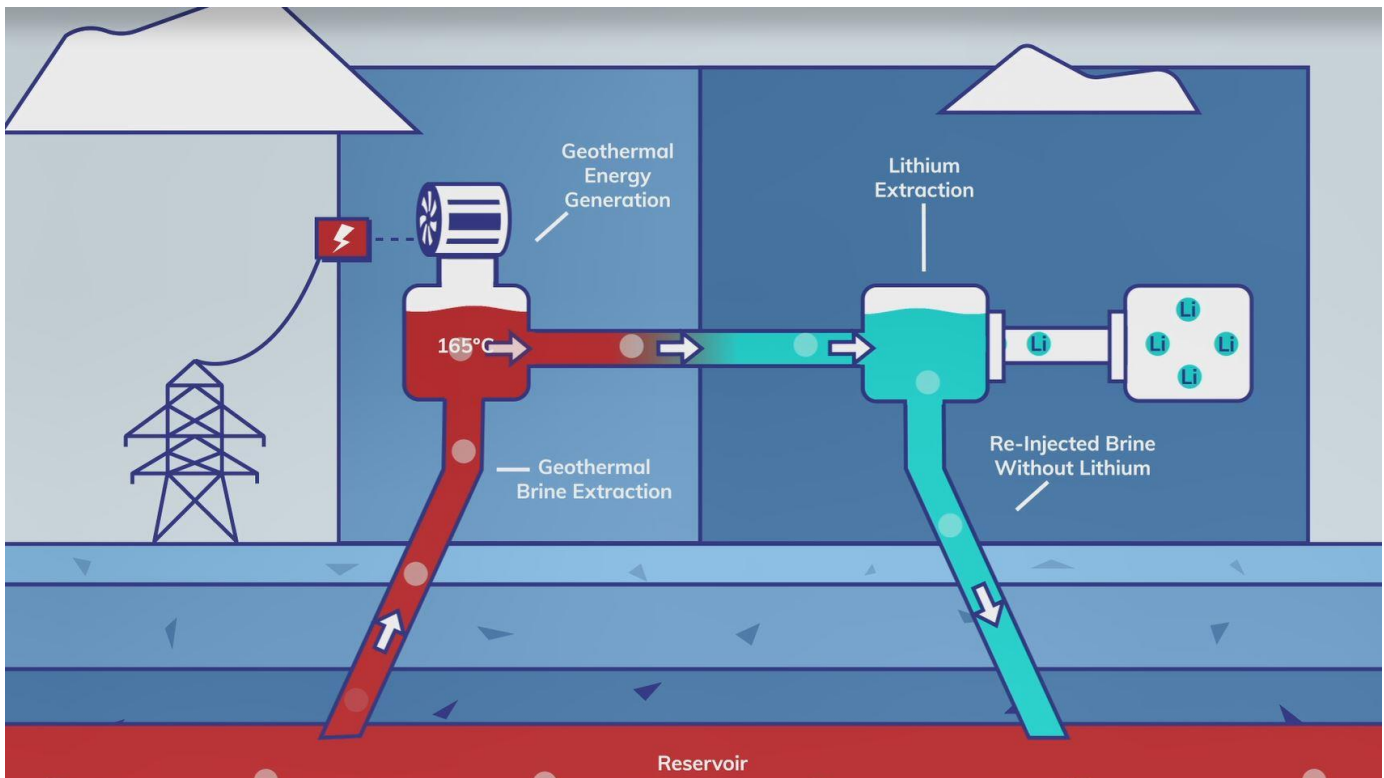
The system consists of an extraction well and an injection well (doublet). Thermal water is obtained via the extraction well. The reinjection well is used to feed the water back into the reservoir after part of the thermal energy stored in it has been extracted and – based on **Vulcan Energy Resources'** power plant design – after the lithium has been separated. In addition to the two wells, the pump and the pipeline system, the geothermal power plant includes the heat exchanger and the power generation infrastructure based on the heat exchanger. The unit for lithium extraction (DLE plant) is then connected.

Most of the projects that competitors are planning for Europe involving the mining of the raw material lithium come with a drawback. As a result, even by the end of the decade, Europe is likely to only have come marginally closer to its goal of establishing an independent lithium supply chain, an objective that is guided by two key aspects: 1) strategic supply security and 2) keeping any emissions that are harmful to the climate and the environment to a minimum. By contrast, we consider the prospects of the Upper Rhine Valley project being implemented successfully to be plausible. In our view, lithium hydroxide/LiOH production of an initial volume of 1.5 thousand t from 2023, and 25 thousand t from 2025 onwards, is a secure baseline scenario.

The Upper Rhine Valley will be accelerated by the cooperation with a German geothermal power plant operator. Pursuant to a Memorandum of Understanding concluded in November 2019, Vulcan Energy Resources will base the pilot plant for lithium production at a geothermal power plant already in operation (stage 1). This will shorten the process involved in both exploration for geothermal energy use and the construction of the geothermal power plant. Implementation will require Vulcan Energy Resources to finance funds in an amount that we estimate to come to around USD 55 million.

In parallel with stage 1, the "Greenfield Project" in Ortenau will be developed as the second stage (stage 2) of the development of a lithium extraction facility in the Upper Rhine Valley. The outlay required for the first resource estimate (December 2019) was comparatively low, as the company was able to use freely available data, or data available for purchase, to document,

among other things, the prevalence of lithium-rich thermal waters. Based on a lithium concentration estimated at 181 mg/l, a resource estimate of a total of approx. 13.95 million t lithium carbonate equivalent/LCE has been indicated for the Upper Rhine Valley Project, which has so far been defined as Stage 1&2 (JORC-compliant: Inferred Mineral Resource, not Mineral Reserve). This puts Vulcan Energy Resources at the very top of the rankings for the peer group of exploration projects in Europe – all of which are based on hard rock deposits.



### Simplified image of Zero Carbon Lithium™ Process

Source: Vulcan Energy Resources, SRH AlsterResearch

Irrespective of how the supply and demand situation in Asia will develop: securing the raw material supply for Europe's battery industry is a challenge that puts a European lithium producer in a strong position. In actual fact, we assume, for the purposes of the baseline scenario that we have applied, that lithium hydroxide produced free of CO<sub>2</sub> emissions in a core industrial region of Europe will benefit from a relevant premium on the reference price calculated for Asia. The European battery industry, which is currently in the process of expanding, will have strong incentives to use the raw material extracted by Vulcan Energy Resources.

Following the start-up phase (2022 to 2023), which is characterised by capex, amortisation will be achieved within four years. Raising the capital remains a key aspect for the implementation of the zero-carbon project in the Upper Rhine Valley - while the funds required for Stage 1 remain relatively lean at around USD 55 million. By discounting our modelled cash flow projection, we consider an enterprise value of USD 770 million to be appropriate.

## SWOT analysis

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>■ Location: Close proximity to the European battery industry which is currently being established, short transportation distance (carbon footprint, 1st aspect)</li> <li>■ Largest JORC-compliant lithium resource in Europe (Inferred and Indicated Mineral Resource)</li> <li>■ Shortened implementation process for pilot plant, as established geothermal site will be used as a basis</li> <li>■ Carbon footprint, 2nd aspect: Lithium production using geothermal energy, without polluting the environment with emissions, waste material or toxic substances.</li> <li>■ Lithium is separated within a matter of hours, eliminating external interference factors</li> </ul>	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>■ Rapid growth in lithium demand among the European battery industry</li> <li>■ Contribution to an independent European lithium supply chain (supply aspect, short transportation distances) creates an incentive for the battery industry to pay a premium over the lithium reference price</li> <li>■ Low-cost asset: Opportunity for operating costs at the lower end/in the lower quartile of the global peer group cost curve</li> <li>■ Income from electricity feed-in as a second source of revenue besides lithium sales</li> </ul>
<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>■ Funds required for project implementation have yet to be raised</li> <li>■ Investment lead time will take more than two years</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>■ Preliminary Feasibility Study (PFS) still outstanding (scheduled for the end of 2020)</li> <li>■ In the short term, the reference price for lithium based on imports in China/Korea/Japan could come under pressure and put a damper on investor sentiment.</li> <li>■ Approval procedures, in particular legal action against authorisations granted, could delay implementation</li> </ul>

Source: SRH AlsterResearch

## Investment recommendation

Irrespective of how the supply and demand situation in Asia will develop: securing the raw material supply for Europe's battery industry is a challenge that puts a European lithium producer in a strong position. In actual fact, we assume, for the purposes of the baseline scenario that we have applied, that lithium hydroxide produced free of CO<sub>2</sub> emissions in a core industrial region of Europe will benefit from a relevant premium on the reference price calculated for Asia. The European battery industry, which is currently expanding, will have strong incentives to use the raw material mined by Vulcan Energy Resources.

The resource statement communicated in January 2020 is also likely to appear in numerous comparative analyses performed by various issuers and, due to its outstanding magnitude - it has been put at a total of approx. 13.95 million t LCE in JORC-compliant terms (Inferred and Indicated Mineral Resource, not Mineral Reserve) - is likely to attract increasing attention among investors.

When the Pre-Feasibility Study is presented (scheduled for the end of 2020), we can likely assume an equity valuation of at least USD 125 million on the capital markets. Three months after the Pre-Feasibility Study was available for the exploration company Advantage Lithium operating in Argentina (lithium production from brine deposits), a takeover offer was submitted by Orocobre (February 2020). Orocobre offered the equivalent of USD 9.1 million per 1 million t of the estimated resource.

Peer valuation also shows that other companies pursuing Direct Lithium Extraction from deep brines, such as Standard Lithium (TSXV:SLL, OTCQX:STLHF, Frankfurt Exchange: S5L), have seen serious re-ratings after the release of financial data from similar studies. Standard Lithium owns 30% of a lithium resource which is considerably smaller and lower grade than Vulcan's (through further expenditure, there is a pathway to owning 70% of the resource). The site in Arkansas/USA lacks the geothermal heat advantage that Vulcan has. Standard Lithium hasn't completed a PFS yet. However, it has been able to release financial data from its Preliminary Economic Assessment (PEA), the North American equivalent to Vulcan's already completed Scoping Study. Standard Lithium has a market capitalisation of AUD 128 million (CAD 110 million), compared to Vulcan's AUD 24 million. With 100% of a larger, higher grade resource, which has the processing advantage of readily available heat, Vulcan should be poised for a re-rate when its PFS is published. News leading up to the completion of the PFS, including lithium extraction testwork, will start to build momentum towards this.

### Comparative Lithium Exploration Projects

Issuer	Abbreviation	Project/Region	Mineral	Resource category	Resource grade mg/l Li	Resource kt	Li kt	LCE kt	Market assessment in MEUR	Market assessment in MAUD
Vulcan Energy Resources	ASX:VUL	Upper Rhine Graben		inferred	181		2,620	13,947	15.46	23.88
<b>American brine resources</b>										
Lithium Americas Corp.	TSX:LAC	Cahchari-Olaroz/Argentina		measured&indicated Inferred	592 592			19,854 4,723	320.09	527.93
Millennial Lithium Corp.	TSXV:ML	Pastos Grandes/Argentina		measured&indicated inferred Reserves	428 428 439			4,100 798 943	53.57	88.35
Orocobre Limited - Production started -	ASX:ORE	Salar d Olaroz/Argentina		measured&indicated	690			6,400	409.93	676.10
E3 Metals Corp.	TSXV:ETMC	Alberta/Canada		inferred	73			6,700	5.45	8.98
Standard Lithium	TSXV:SLL	Arkansas/USA		indicated	168			3,140 2,198	71.52 analog to maximum share of JV	117.95
<b>European Hard rock deposits</b>										
European Metals Holdings Limited	ASX:EMH	Cinovec/Czech Republic Mica (Zinnwaldite)		indicated&inferred	0.42%	696	1,347	7,171	24.39	40.22
Infinity Lithium	ASX:INF	San Jose/Extremadura, Spain Mica (Zinnwaldite)		indicated&inferred	0.61%	111	316	1,681	8.25	13.61
Savannah Resources	AIM:SAV	Mina do Barroso/Portugal Spodumene		measured&indicated inferred	1.06% 1.06%	15 12	74 59	391 316	39.25	64.73
European Lithium	ASX:EUR	Wolfsberg/Austria Spodumene		measured&indicated inferred	1.17% 0.78%	6 5	34 17	182 90	20.88	34.44
Keliber		Severlahti/Finland Spodumene		indicated&inferred Reserves	1.16% 1.04%	9 7	51 36	272 192		
Rio Tinto		Jadar/Serbia Jadarite		indicated&inferred	1.86%	136	1,171	6,232		

Source: Company, SRH AlsterResearch

Following the ramp-up phase (2022 to 2023), which will be characterised by high capex, with a four-year payback period. We have modelled surpluses in cash inflows for 2024e to 2027e of USD 960 million, which would cover capex of USD 846 million. Fundraising remains a key aspect of the implementation of the Upper Rhine Valley project – following the comparatively modest use of funds for stage 1 in the amount of approx. USD 55 million, the first expansion stage in the Ortenau region (four doublets, DLE, also capacity for lithium hydroxide synthesis) will require an investment of USD 425 million (estimates: SRH AlsterResearch). By discounting our modelled cash flow projection, we have put the appropriate enterprise value at USD 770 million (in mid-June 2020, corresponds to around EUR 680 million or AUD 1.1 billion).

Assuming dilution, which will occur in the course of the process involved in raising the additional equity required, we have modelled an appropriate valuation per share of EUR 1.50 (or AUD 2.45).

The investment recommendation is "buy" (unchanged).



## Appendix – Charts

### Upper Rhine Valley resource estimate (established power plant site, Ortenau)

		Stage 1	Stage 2 Ortenau	Stages 1 + 2	- not to be included yet - Mannheim and others (*)	
					min	MAX
Total Volume of Brine Aquifer	km <sup>3</sup>	8,322	144,489		92,422.460	138,633.690
Average Porosity		9.000	9.500		7.600	11.400
Average concentration	mg/l	181	181		126.000	190.000
total elemental Li	mg	13,556,538	248,448,836		88,503,748	300,280,573
total elemental Li	t	136	2,484		885	3,003
Elemental Li	t	136.000	2,484.000	2,620.000	885.037	3,002.806
Lithium Carbonate LCE	t	<b>723.969</b>	13,223.077	<b>13,947.046</b>	4,711.320	15,984.836
Lithium hydroxide	t	822.249	15,018.138	15,840.387	5,350.892	18,154.811
Lithiumoxid	t	292.808	5,348.052	5,640.860	1,905.486	6,465.041

(\*) others: Taro, Ludwig, Rheinaue

Source: Vulcan Energy Resources, SRH AlsterResearch

### Volume yield estimate Upper Rhine Valley (established power plant site, Ortenau)

		Stage 1	Stage 2 Plant 1 Ortenau	Stage 2 Plant 2 Ortenau	Stage 2 Ortenau	Stages 1 + 2
Flow rate per well	m <sup>3</sup> /a	2,112,912	2,680,560	2,680,560		
	l/a	2,112,912,000				
	l/d	5,788,800				
Approach: 8,760 h/anno	l/h	241,200				
	l/s	67.000	85.000	85.000		
average concentration	mg/l	181	181	181		
Day factor (7,884 h of 8,760 h)		0.90	0.90	0.90		
plant recovery		0.900	0.900	0.900		
Share VUL	mg/l	80%	100%	100%		
Li/s	mg	7,858	49,847	74,771		
Li/h	kg	28.29	179.45	269.18		
Li/d	kg	679	4,307	6,460		
Li/a	kg	247,819	1,571,988	2,357,981		
Li/a	t	248	1,572	2,358	3,930	4,178
Lithium carbonate LCE/a	t	1,319	8,368	12,552	20,920	22,240
Lithium hydroxide/a	t	<b>1,498</b>	9,504	14,256	23,760	25,259

Source: SRH AlsterResearch

## Upper Rhine Valley resource estimate (established power plant site, Ortenau)

		Stage 1	Stage 2 Ortenau	Stages 1 + 2	- not to be included yet - Mannheim and others (*)	
					min	MAX
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Lithium hydroxide	t	822.249	15,018.138	15,840.387	5,350.892	18,154.811
Lithiumoxid	t	292.808	5,348.052	5,640.860	1,905.486	6,465.041

(\*) others: Taro, Ludwig, Rheinaue

Source: Vulcan Energy Resources, SRH AlsterResearch

## Volume yield estimation Ortenau

		Basic scenario			Alternative scenario (*)	
		Stage 2 Plant 1 Ortenau	Stage 2 Plant 2 Ortenau	Stage 2 Ortenau	Stage 2 Pl. 1 Ortenau	Stage 2 Pl. 2 Ortenau
number of wells (doublets)		4	6	10	4	6
Flow rate per well	m <sup>3</sup> /a	2,680,560	2,680,560		3,153,600	3,153,600
	l/s	85.000	85.000		100.000	100.000
cumulated, all doublets	m <sup>3</sup> /a	10,722,240	16,083,360	26,805,600	12,614,400	18,921,600
	l/s	340.000	510.000	850.000	400.000	600.000
average concentration	mg/l	181	181	181	181	181
Day factor (7,884 h of 8,760 h)		0.90	0.90		0.90	0.90
plant recovery		0.900	0.900		0.900	0.900
Share VUL	mg/l	100%	100%		100%	100%
Li/s	mg	49,847	74,771	49,847	58,644	87,966
Li/h	kg	179.45	269.18			
Li/d	kg	4,307	6,460			
Li/a	kg	1,571,988	2,357,981			
Li/a	t	1,572	2,358	3,930	1,849	2,774
Lithium carbonate LCE/a	t	8,368	12,552	20,920	9,845	14,767
Lithium hydroxide/a	t	<b>9,504</b>	<b>14,256</b>	<b>23,760</b>	<b>11,181</b>	<b>16,772</b>

(\*) The alternative scenario is not further explored in our assessment

Source: SRH AlsterResearch

## Base scenario revenue and cash flow series Stage 1 & 2

Fiscal year end: 31 Dec.

Figures in USD thousand	Periods									Periods							
	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	as from 2030e	2037e	2038e	2039e	2040e	from 2041e	2053e	2054e
<b>Stage 1</b>																	
CAPEX FX: EUR/USD 1.10	2,000	49,806	0	0	0	0	0	0	0	25,000	0	0	0	0	0	0	
LiOH Volume (t)			1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	1,498	
Price (USD thousand/t)			12.75	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	
Costs (USD thousand/t) well and geothermal			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Cost (USD thousand/t LiOH) Direct extractions and Lithium			3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	
Revenue electricity sales			0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue LiOH			19,103	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	23,898	
Government royalty (5%)			955	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	
Costs geothermal and LiOH			5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	
Working capital (commitment of funds)			5,600	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cash flow contribution Stage 1	-2,000	-49,806	6,948	17,103	17,103	17,103	17,103	17,103	17,103	-7,897	17,103	17,103	17,103	17,103	17,103	17,103	
<b>Stage 2 (Ortenau)</b>																	
CAPEX FX: EUR/USD 1.10	4,000	148,280	497,561	144,756	0	0	0	0	0	0	150,000	0	0	0	0	0	
LiOH Volume (t)			9,504	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760	
Price (USD thousand/t)			15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	15.95	
Costs (USD thousand/t) well and geothermal			1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	
Cost (USD thousand/t LiOH) Direct extractions and Lithium			3.39	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	
Revenue electricity sales			4,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Revenues LiOH			151,594	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	378,984	
Government royalty (5%)			7,580	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	18,949	
Costs geothermal and LiOH			45,031	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	85,277	
Working capital (commitment of funds)			32,200	31,920	0	0	0	0	0	0	0	0	0	0	0	0	
Cash flow contribution Stage 2	-4,000	-148,280	-497,561	-73,972	252,838	284,758	284,758	284,758	284,758	284,758	134,758	284,758	284,758	284,758	284,758	284,758	

Source: SRH AlsterResearch

## DCF model Vulcan Energy Resources

Fiscal year end: 31 Dec.

Figures in USD thousand	Periods									Periods							
	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	as from 2030e	2037e	2038e	2039e	2040e	from 2041e	2053e	2054e
Cash flow contribution Stage 1	-2,000	-49,806	6,948	17,103	17,103	17,103	17,103	17,103	17,103	-7,897	17,103	17,103	17,103	17,103	17,103	17,103	
Cash flow contribution Stage 2	-4,000	-148,280	-497,561	-73,972	252,838	284,758	284,758	284,758	284,758	284,758	134,758	284,758	284,758	284,758	284,758	284,758	
<b>Group data</b>																	
Depreciation	0	400	13,606	46,776	56,427	56,427	56,427	56,427	56,427	56,027	44,488	21,317	11,667	10,000	0	0	
EBT	-4,000	-400	-13,606	56,207	228,332	228,332	228,332	228,332	228,332	228,732	240,271	263,441	273,092	274,758	284,758	284,758	
Income tax (long-term 30%)	-1,200	-120	-4,082	16,862	68,499	68,499	68,499	68,499	68,499	68,619	72,081	79,032	81,928	82,428	85,428	85,428	
Net income	-2,800	-280	-9,524	39,345	159,832	159,832	159,832	159,832	159,832	160,112	168,190	184,409	191,164	192,331	199,331	199,331	
<b>Free cash flow within the DCF model</b>																	
Free cash flow excl. interest	-8,800	-197,966	-486,531	-73,731	201,442	233,362	233,362	233,362	233,362	208,242	79,781	222,829	219,934	219,934	219,434	216,434	
Net present value	-7,436	-151,941	-339,162	-46,683	115,844	121,890	110,708	100,552	91,328	37,744	13,134	33,318	29,868	8,531	7,642	7,642	
<b>Basic data</b>																	
Total net present value 2021e to 2054e	771,016	BETA			1.20												
Net present value period 2020e	-2,605	implied market return			8.75%												
Terminal value (periods from 2055e)	0	risk-free return			2.00%												
Total enterprise value	768,411	Debt ratio			0.00%												
Liabilities (as at the end of 2019)	0						10.60%	700,484		10.20		150,770					
Cash and cash equivalents (end of 2019)	2,213						10.35%	734,761		12.75		423,255					
Equity value	770,624						10.10%	770,624		14.05		562,222					
							9.85%	808,159		15.95		770,624					
		WACC			10.10%		9.60%	847,459		17.20		898,740					

Quelle: SRH AlsterResearch

## Dilution path

	Jun 20	Sep 20	End of 2020	Mid 2021	End of 2021	Mid 2022	End of 2022	Mid 2023	End of 2023	Mid 2024
<b>Required funding (rough), in USD million</b>										
<b>- Provision for future use with a time lead -</b>										
Capital requirements, cumulative, in USD million		2,000	6,000	30,903	129,946	221,309	564,582	701,647	774,025	846,402
Net cash provided by operating activities, cumulative, in USD million									11,030	46,542
Acquisition Equity, accumulated, in USD million		2,000	6,000	31,000	131,000	221,000	566,000	706,000	776,000	811,000
<b>Event</b>										
			<b>PFS</b>		<b>DFS</b>					
Stage 1					<b>DLE Start of construction</b>	<b>Lithium Start of construction</b>	<b>DLE + Lithium Completion</b>			
Stage 2, Plant 1 (Ortenau, 4 wells)							<b>Geothermal energy Start of construction</b>	<b>DLE + Lithium Start of construction</b>	<b>Geothermal + DLE + Lithium Completion</b>	
Stage 2, Plant 2 (Ortenau, 6 wells)							<b>Geothermal energy Start of construction</b>	<b>DLE Start of construction</b>	<b>Geothermal energy + DLE Completion</b>	
<b>Acquisition of equity</b>										
Assumed share price, in EUR	0.20	0.70	1.30	1.35	1.50	1.75	1.80	2.60	2.80	3.05
Capital increase, in EUR million		1,818	3,636	22,727	90,909	81,818	313,636	127,273	63,636	31,818
FX EUR/USD	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Capital increase, in USD million		2,000	4,000	25,000	100,000	90,000	345,000	140,000	70,000	35,000
Capital increase in number of shares (in million)		2.60	2.80	16.84	60.61	46.75	174.24	48.95	22.73	10.43
Number of shares End of period, diluted (in millions)	81.99	84.58	87.38	104.22	164.82	211.58	385.82	434.77	457.50	<b>467.93</b>
Equity valuation stock exchange, in USD million	18	65	125	155	272	407	764	1,243	1,409	1,570
Dilution effect, factor	7.5	2.2	1.2	1.3	1.2	1.3	1.3	1.3	1.3	1.3
Dilution effect, in EUR/share	1.30	0.83	0.31	0.36	0.29	0.49	0.54	0.77	0.74	0.80
Company value according to progressive DCF, in USD million	771	787	829	878	921	1,155	1,206	1,736	1,821	1,981
per share, based on number of shares in mid 2024, in EUR	<b>1.50</b>	1.53	1.61	1.71	1.79	2.24	2.34	3.37	3.54	3.85

Source: SRH AlsterResearch

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Bundesanstalt für Finanzdienstleistungsaufsicht  
Marie-Curie-Straße 24-28  
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## History of investment recommendations for Vulcan Energy Resources Limited

Date	Analyst	Investment recommendation	Price target	Price basis (end of previous day Frankfurt)
12 June 2020	Oliver Drebing	Buy	EUR 1.50	EUR 0.282
4 March 2020	Oliver Drebing	Buy	EUR 1.45	EUR 0.159