

Vulcan Energy Resources

Australia | Basic Materials | MCap AUD 872.6m

5 May 2021

UPDATE



Test work at pilot plant has begun, engineering team expands

What's it all about?

The Australian exploration company Vulcan Energy Resources Ltd. has been on target for becoming a leading supplier of battery grade lithium hydroxide, a material central to vehicle electrification strategies of the automotive industry. Operations of extraction in the lithium-rich geothermal brine of the Upper Rhine Valley in southern Germany and of upgrading lithium to a high purity hydroxide (LiOH) will be combined with the production of hydrogeothermal energy (renewable electricity). With a CO₂ footprint of "zero", the project is predestined to mark the beginning of the decarbonization of the battery industry. As Vulcan Energy provides a rare opportunity in Germany to participate from the strongly growing lithium growth trajectory, we have set a PT of AUD 16.00 (equivalent: EUR 10.30) and reiterate our BUY recommendation. Upside 97%.

BUY (BUY)

Target price	AUD 16.00 (13.30)
Current price	AUD 8.12
Up/downside	97.0%



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Test work at pilot plant has begun, engineering team expands

With economic data on PFS-level on hand, and also with a cash position sufficient for accelerated project development in 2021 and beyond, Vulcan Energy Resources has evolved to be the benchmark and thus preferred partner for stakeholders to promote lithium production in Germany (car / battery industry, electricity utilities).

In April, Vulcan announced that its first pilot plant has been operating, using live geothermal brine from existing wells for Direct Lithium Extraction (DLE) and brine chemistry test work. Vulcan is collaborating with DuPont Water Solutions, to test DLE solutions similar to commercially mature products already used in lithium industry.

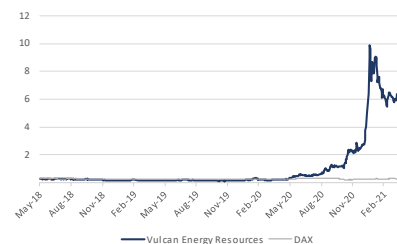
Advancement of the Zero Carbon Lithium™ Project is not dependent on securing further external funds before the stage is set for the final investment decision (FID), a juncture by which risk related discounts will have eased significantly. Even more, ample size of institutional funds (cash position end of March 2021: AUD 117.4m, around USD 91m) gives the additional leeway with which the management is now able to act opportunistically, also to attract the ambitious and competent professionals the project will need, and thus to accelerate the process further.

In February, the geothermal subsurface consultancy company GeoT (GeoThermal Engineering), Karlsruhe, has been integrated into Vulcan. The acquisition of geothermal surface company gec-co (Global Engineering Consulting-Company) with technical teams in Augsburg, Bremen and Karlsruhe is subject to shareholder approval. Both companies allow Vulcan to have, in house, an unparalleled surface and sub-surface geothermal development team (about 40 people) to execute deep geothermal projects. The board has been expanded lately. By assembling experts of geothermal engineering, process technology, battery industry and various aspects of renewable/sustainable businesses, its competence and network are unique.

As Vulcan Energy provides a rare opportunity in Germany to participate from the strongly growing lithium growth trajectory, we have set a PT of AUD 16.00 (equivalent: EUR 10.30) and reiterate our BUY recommendation.

Vulcan Energy Resources in AUDm	2020	2021E	2022E	2023E	2024E	2025E
Sales	0.0	0.0	0.0	0.0	31.0	228.1
<i>Growth yoy</i>	na	na	na	na	>100%	636.8%
EBITDA	-3.3	-6.0	-7.5	-2.9	47.6	236.3
EBIT	-3.6	-6.2	-7.7	-10.0	11.4	161.7
Net profit	-3.6	-4.8	-5.1	-26.4	-24.4	80.9
Net debt (net cash)	-6.4	-113.3	-272.7	-359.1	33.7	397.6
Net debt/EBITDA	1.9x	18.9x	36.1x	124.1x	0.7x	1.7x
EPS recurring	-0.07	-0.04	-0.04	-0.19	-0.15	0.48
DPS	0.00	0.00	0.00	0.00	0.00	0.00
<i>Dividend yield</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross profit margin	na	na	na	na	69.1%	75.3%
EBITDA margin	na	na	na	na	153.9%	103.6%
EBIT margin	na	na	na	na	36.8%	70.9%
ROCE	-40.5%	-5.3%	-2.1%	-0.7%	0.5%	6.5%
EV/EBITDA	-261.5x	-126.5x	-79.5x	-177.4x	19.0x	5.4x
EV/EBIT	-240.7x	-121.8x	-77.7x	-51.3x	79.7x	7.9x
PER	-110.2x	-180.5x	-174.2x	-41.9x	-52.5x	16.7x
FCF yield	-0.4%	-0.6%	-0.6%	-2.3%	-2.2%	5.0%

Source: Company data, AlsterResearch



Source: Company data, AlsterResearch

High/low 52 weeks 14.20 / 0.20
Price/Book Ratio 7.4x

Ticker / Symbols

ISIN AU0000066086
WKN A2PV3A
Bloomberg VUL:AU

Changes in estimates

		Sales	EBIT	EPS
2021	old	00.0	00.0	00.0
	Δ	-	-	-
2022	old	00.0	00.0	00.0
	Δ	-	-	-
2023	old	00.0	00.0	00.0
	Δ	-	-	-

Key share data

Number of shares: (in m pcs) 107.5
Book value per share: (in AUD) 1.09
Ø trading volume: (12 months) 40,000

Major shareholders

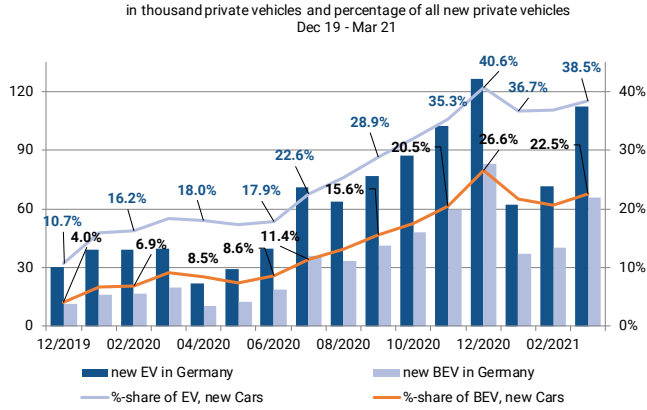
F. Wedin 12.1%
HPPL Group (G. Rinehart) 6.7%
G. Rezos 5.6%
J.L. Hancock 5.0%
Free Float 69.1%

Company description

The Australian exploration company Vulcan Energy Resources Ltd. has been developing a project in the Upper Rhine Valley in Germany that combines the use of thermal water as an energy source (hydrogeothermal energy) with the extraction of the lithium contained in the geothermal brine without polluting the environment with emissions, waste material or toxic substances. With a CO₂ footprint of "zero", the project is predestined to mark the beginning of the decarbonization of the battery industry.

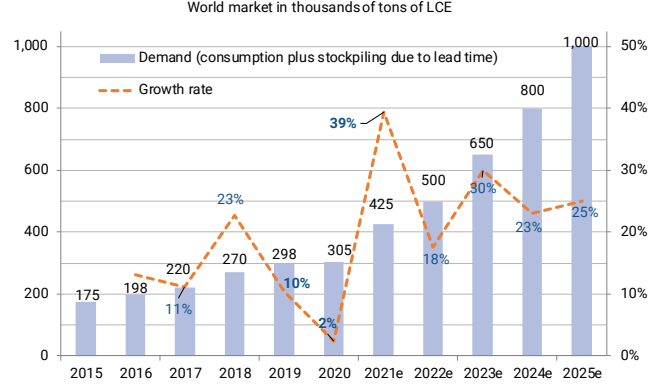
Investment case in six charts

Germany: Electric Vehicles (EV) & Battery Electric Vehicles



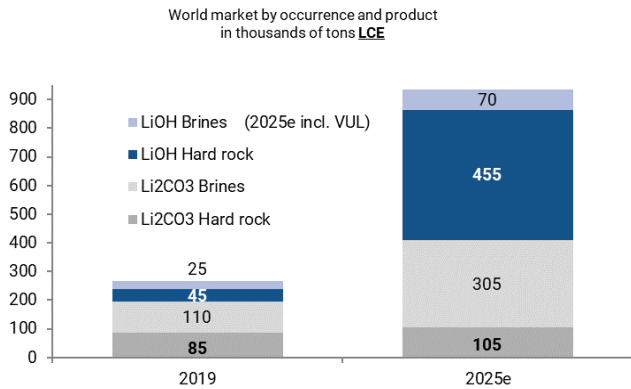
Source: Kraftfahrtbundesamt

World market: Lithium demand



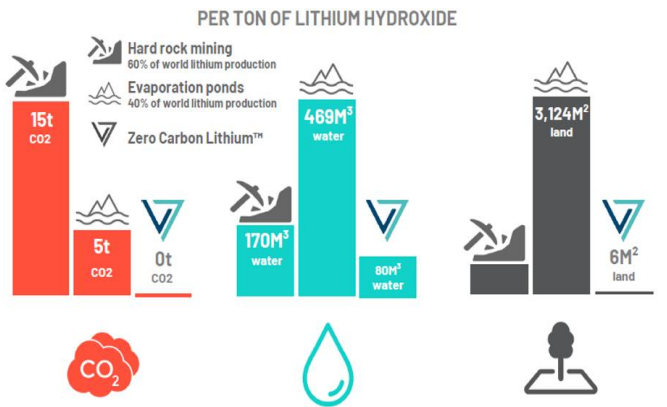
Source: Albemarle (graphic December 2019), Austral. Gov. (Resources and Energy Quarterly Sep 18 to Mar 21), Data processing: SRH AlsterResearch

World market: Structure of Li supply



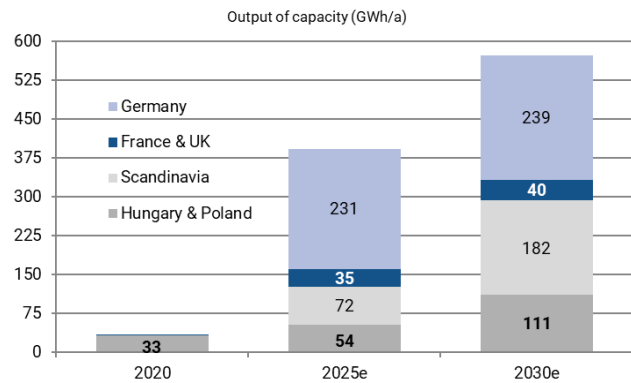
Source: Albemarle (graphic December 2019), Note on VUL/Vulcan Energy Resources: SRH AlsterResearch

Environmental Footprint



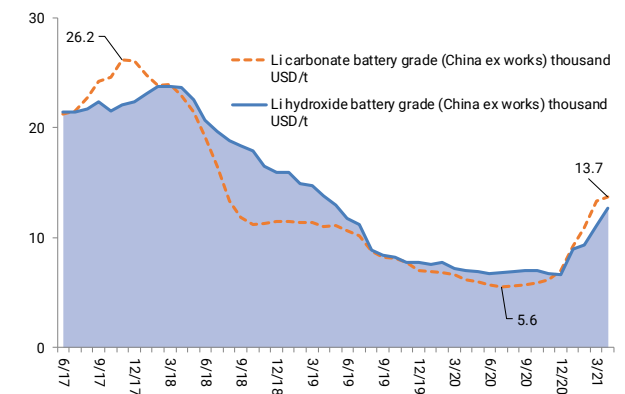
Source: Vulcan Energy Resources

Europe: Lithium-ion battery cell factories



Source: Fraunhofer ISI (January 2020)

Pricing performance Lithium



Source: Deutsche Rohstoffagentur (Preismonitor, data LC prices), Data processing LiOH prices: SRH AlsterResearch

Company background

Product

Battery grade lithium hydroxide from brine sources in Germany – the Australian exploration company has been on target for becoming a leading supplier of a material that is central to vehicle electrification strategies of the automotive industry.

Vulcan's Zero Carbon Lithium™ Project – it rather is a portfolio of projects than just one single – combines operations of extraction in the lithium-rich geothermal brine of the Upper Rhine Valley, of upgrading lithium to a high purity hydroxide (LiOH) as well as the production of hydrogeothermal energy (renewable electricity). Thermal water will be used as energy source, and thus the extraction of lithium contained in the brine will run without polluting the environment with emissions, waste material or toxic substances. With a CO₂ footprint of "zero", the project is predestined to mark the beginning of the decarbonization of the battery industry.

In Vulcan's project areas, a staged development will implement a process technology proven effective for more than 20 years in industrial lithium carbonate production, which is known as Direct Lithium Extraction (DLE). Vulcan is partnering with DuPont Water Solutions to assist Vulcan with input and test work during the project's Definitive Feasibility Study (DFS).

Estimated resources of Vulcan's Upper Rhine Valley Project have reached a total of approx. 15.85 million t LCE in JORC-compliant terms (Inferred and Indicated Mineral Resource, probable Mineral Reserve: 1.12 million t LCE). A portion of 3.62 million t LCE has been classified as Indicated status. 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.

Upper Rhine Valley resource estimate

		MoU Area ^(*) indicated	Taro indicated	Taro inferred	Ortenau indicated	Ortenau inferred	Upper Rhine Valley indicated + inferred
Total Volume of Brine Aquifer	km ³	8,322	8,419	15,924	17,001	117,974	
Average Porosity		9.000	10.227	9.400	12.600	9.500	
Average concentration	mg/l	181	181	181	181	181	
total elemental Li	mg	13,556,538	15,584,136	27,092,171	38,772,481	202,856,293	
total elemental Li	kt	136	156	271	388	2,029	
Lithium carbonate - LCE	kt	722	830	1,442	2,064	10,798	15,855
thereof indicated	kt	722	830		2,064		3,615
thereof inferred	kt			1,442		10,798	12,240
Lithium hydroxide	kt	820	942	1,638	2,344	12,264	18,007
Lithiumoxid	kt	292	336	583	835	4,367	6,413

(*) MoU with German geothermal operators

Sources: Vulcan Energy Resources, SRH AlsterResearch

Lithium-ion batteries are classified based on the composition of the cathode and anode material used. Market-ready innovations in nickel-cobalt-manganese cathodes, in short: NMC cathodes, currently determine the market momentum. Within this group, low-cost nickel that is readily available in good quantities (here: "N") is replacing manganese (here: "M") and cobalt (here: "C") to a large extent. Whereas the ratio of the first NMC generation was 1:1:1 (NMC 111), the new NMC 622 cathode generation is currently proving increasingly popular. Technically, this requires the use of lithium hydroxide (LiOH) instead of lithium carbonate (Li₂CO₃), insofar as cathode synthesis using lithium carbonate requires high temperatures, which in turn are incompatible with a nickel content of 60% and above (vs. 40% cobalt and manganese). Furthermore, the energy density (or specific energy, energy per mass) of lithium hydroxide exceeds that of lithium carbonate. According to Albemarle's estimate, LiOH production from hard rock deposits will have increased tenfold by 2025 and will account for 80% of lithium production from hard rock

deposits (2019: 35%). LiOH production from brine is forecast to treble, meaning that its share of lithium production from brine will remain at 20%.

Due to the Pre-Feasibility Study (PFS), Vulcan's project reaches unparalleled dimension with an envisaged annual LiOH-production target of 39.4 thousand t (34.7 thousand t LCE p.a.).

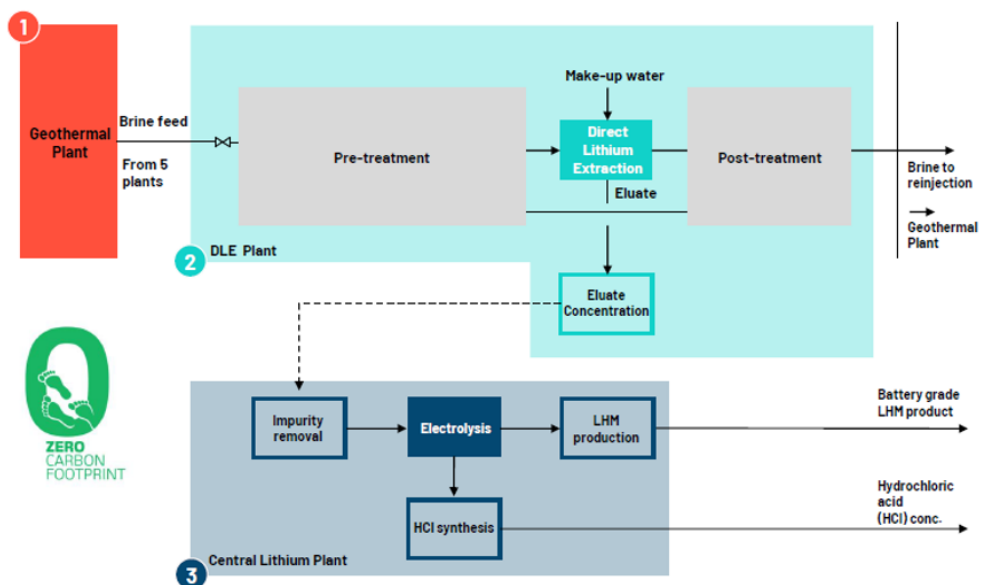
Volume yield estimate Upper Rhine Valley (Taro, Ortenau)

		Taro North (B1)	Taro South (B2)	Ortenau (C1)	Ortenau (C2, C3)	Taro & Ortenau
number of wells (doublets)		3	2	3	6	14
Flow rate per well	m ³ /a	3,153,600	3,784,320	3,153,600	3,153,600	
Approach: 8,760 h/anno	l/d	8,640,000	10,368,000	8,640,000	8,640,000	
	l/h	360,000	432,000	360,000	360,000	
	l/s	100.000	120.000	100.000	100.000	
average concentration	mg/l	181	181	181	181	
Day factor (7,842 h of 8,760 h)		0.90	0.90	0.90	0.90	
DLE plant recovery		0.90	0.90	0.90	0.90	
Lithium refinery plant recovery		0.99	0.99	0.99	0.99	
Share VUL	mg/l	100%	100%	100%	100%	
Li/s	mg	43,126	34,501	43,126	86,253	
Li/h	kg	155.25	124.20	155.25	310.51	
Li/d	kg	3,726	2,981	3,726	7,452	
Li/a	kg	1,360,031	1,088,025	1,360,031	2,720,063	
Li/a	t	1,360	1,088	1,360	2,720	6,528
Lithium carbonate LCE/a	t	7,239	5,791	7,239	14,478	34,748
Lithium hydroxide/a	t	8,222	6,578	8,222	16,444	39,466

Source: SRH AlsterResearch

Simplified image of Zero Carbon Lithium™ Process

- Hot brine extracted from the ground and generates steam that powers turbines and produces renewable electricity
 - Standard geothermal production wells successfully implemented for decades on salars
- Brine flow is diverted, and lithium is extracted from the solution with a Direct Lithium Extraction (DLE) process.
 - Commercially used for decades
- Lithium chloride sent to lithium refining plant which will be converted LiCl to battery quality LiOH
 - Water is recycled, no toxic wastes, no gases are emitted, heat and power from renewable resources, no fossil fuels are burnt



Growth

Vulcan has grown through acquisitions of German geothermal consultancy and engineering businesses. The agreement to acquire 100% of consultancy company GeoT (GeoThermal Engineering), Karlsruhe, was signed in February 2021. GeoT has been established and led to a world-leading consultancy for deep geothermal energy projects by Dr Horst Kreuter. 12 team members of GeoT will have joined Vulcan, forming the core of its energy business development team together 25 team members of gec-co. The acquisition of geothermal surface company gec-co (Global Engineering Consulting-Company) with technical teams in Augsburg, Bremen and Karlsruhe was announced in April 2021 and is subject to shareholder approval.

gec-co has been focused on surface installations and drilling for electricity and heating plant projects in the deep thermal energy sector, involving profound experience in mechanical engineering (energy, environmental, process technology). gec-co supports investors, local authorities and clients throughout permitting, construction and operating phase.

While Dr Horst Kreuter will coordinate public affairs and public relations of the Zero Carbon Lithium™ project, Thorsten Weimann, founder and managing director of gec-co, will be Chief Operating Officer of Vulcan in Germany, responsible for the combined geothermal energy and lithium operations.

Vulcan's in-house team for the development of lithium operations, comprising DLE (Direct Lithium Extraction) as well as the conversion of lithium chloride to lithium hydroxide in the Central Lithium Plant, currently consists of 8 world-leading experts of lithium chemistry and chemical engineering.

Besides counting on its in-house expertise, Vulcan is collaborating with DuPont Water Solutions to test DLE solutions similar to those commercially mature products which are already used in lithium industry. DuPont has several DLE products and assists Vulcan with input and test work during Vulcan's Zero Carbon Lithium™ project DFS. Implemented by a team of its engineers, DuPont has granted access to equipment and material (e.g. resin) at Vulcan's first pilot plant. This input is made available at no cost to Vulcan provided the parties enter into a supply agreement for DLE products following the completion of the DFS.

Customers

Major automotive producing countries have to ramp up battery cell factory capacity within the coming years. The battery comprises as much as 30% to 40% of the vehicle cost. Ensuring that the demand for lithium-ion accumulators for the automotive industry is covered is a matter that has been assigned a high level of priority throughout Europe. Industrial policy ambitions are therefore aimed at establishing a consistently European supply chain. In Germany alone, there are plans to make investments running into the billions in factory complexes for battery cell production. In addition, industrial policy initiatives include the mining of the raw material lithium – which never occurs as a pure element in nature due to its high reactivity – and the processing of the ores/brines.

The need for electric drive systems to have a tolerable carbon footprint in the production phase, too, is a key aspect, and one that has the very highest priority. The supply security argument is also a top priority. For industrial and security policy reasons, Europe has to manage to break away from its current 100% reliance on raw material supplies from South America or Asia.

The Fraunhofer-Gesellschaft estimates European battery cell production to reach a capacity of 396 GWh/a by 2025 and of 576 GWh by 2030 (publication January 2020). Even higher capacity growth is expected by Ultima Media (part of Süddeutscher Verlag, publication March 2021). Ultima Media predicts that Europe will more than double its plant capacity share from 13% in 2020 to 33% by 2030 and reach a capacity of 950 GWh/a, while capacity in Asia is expected to rise to 1,620 GWh/a (projected share of capacity worldwide: 57%).

Competition

Particularly in the south-west of Australia, the mineral spodumene ($\text{LiAlSi}_2\text{O}_6$) is mined from hard rock deposits in the region's pegmatite fields (pegmatites belong to the group of magmatic dyke rocks). The majority of the quantities extracted are shipped as concentrate for processing to China, where they cover 75% of the country's lithium requirements; only China has the infrastructure required to break large quantities of concentrate down using metallurgical processes. Established production processes initially produce lithium carbonate (Li_2CO_3). Lithium carbonate is the feedstock used for the production of lithium hydroxide (LiOH), and also for the production of other intermediates such as lithium chloride (LiCl). Processing in the battery industry requires lithium carbonate purities of 99.5% or

more. The conversion factor LCE (Lithium Carbonate Equivalent), which is common in international trade, refers to lithium carbonate.

Even more significant on a global scale are the deposits of the light metal lithium in salt lakes in South America ("Lithium Triangle" in the Argentina-Bolivia-Chile border region), North America (Nevada, Utah, Searless Lake and Salton Sea/California) and China (Tibetan Plateau). Lithium carbonate and lithium hydroxide is produced from lithium chloride which is extracted from the brines.

Other lithium deposits in Europe are hard rock deposits in pegmatite fields containing spodumene, or in which lithium is bound in certain mixed crystals, such as zinnwaldite and other mica. Another approach to lithium mining in Europe is the mining of the mineral jadarite. The drawback regarding the extraction of lithium from spodumene mined in Europe will be the fact that the concentrate will first of all have to be transported for processing to China's large-scale spodumene conversion plants – a considerable disadvantage in view of the climate policy benefits of electromobility. There has been no industrial capacity for processing zinnwaldite to date.

Various cost advantages owing to geological factors point to the economic viability of Vulcan's lithium project in the Upper Rhine Valley; in addition to the lithium content and a high flow/production rate achieved there, the energy required for the extraction process is significantly lower thanks to what is already a high starting temperature of over 120°C. The most important aspect, however, which also combines cost-effectiveness considerations with the aspect of minimising the "footprint" in terms of the environmental impact, is the immediate proximity to industrial customers. The transportation distance of a few hundred kilometres to existing or planned battery factories and the industrial mobility cluster in the south-west of Germany is a decisive argument that helps to underpin the advantages of Vulcan's battery grade lithium associated with the carbon footprint of the electric drive versus the combustion engine.

Key Shareholders

date: 12 February 2021

	shares (million)	% of issued capital
Dr Francis Wedin Managing Director & Founder, CEO	13.01	12.1%
Hancock Prospecting Pty Ltd and Georgina Hope Rinehart	7.24	6.7%
Gavin Rezos Chair	6.03	5.6%
John Langley Hancock	5.38	5.0%
BNP Energy Transition Fund	1.54	1.4%

The placement of 18.4 million shares at the beginning of February 2021 has put Vulcan ahead in the race to commercialize lithium in Europe. Not only has the transaction provided funds of around AUD 114 million (around USD 88 million), net of fees, but it has brought in strategic ESG-focused institutional investors who can back the Zero Carbon Lithium Project™ further.

Board

Dr Francis Wedin, Managing Director & Founder – CEO
Founder of Vulcan Zero Carbon Lithium™ Project, lithium industry executive since 2014. Three discoveries of JORC Lithium Resources on two continents



Gavin Rezos, Chair
Executive Chair/CEO of two ASX 300-companies. Investment banking Director of HSBC



Dr Horst Kreuter, Board Advisor
Co-Founder of Vulcan Zero Carbon Lithium™, Project, until February 2021 CEO of Geothermal Group and GeoThermal Engineering (GeoT), successful geothermal project development and permitting in Germany and worldwide



Ranya Alkadamani, Non-Executive Director
Communications strategist, Founder of Impact Group International



Annie Liu, Non-Executive Director
Battery expert. Former Tesla Head of Battery and Energy Supply Chain



Dr Heidi Grön, Non-Executive Director
Chemical engineer, since 2007 senior executive with Evonik, responsible for Global product safety, impact assessment and strategy development for sustainability as part of the EU Green Deal and management of Evonik's major investments



Josephine Bush, Non-Executive Director
Expert Renewable/Sustainable Businesses. Member of the EY Power and Utilities Board. Former senior EY Global Renewables Partner



Rob Ierace, CFO/Company Secretary
Chartered Accountant and Chartered Secretary with over 20 years of experience



Julia Poliscanova – Board Advisor
Electromobility expert, member of the board of the Global Battery Alliance



Key Executives

Thorsten Weimann – Chief Operating Officer in Germany
Managing director of gec-co Global Engineering Consulting-Company, expert in geothermal and drilling technology, with more than 25 years of professional experience.



Vincent Ledoux Pedailles – Vice President – Business Development
Previously Executive Director at Infinity, also worked at IHS Markit, where he led the lithium and battery materials research team



SWOT Analysis

Strength

- Location: Close proximity to the European battery industry which is currently being established, short transportation distance (carbon footprint, 1st aspect)
- Largest JORC-compliant lithium resource in Europe (Inferred and Indicated Mineral Resource)
- Carbon footprint, 2nd aspect: Lithium production using geothermal energy, without polluting the environment with emissions, waste material or toxic substances.
- Cash position of close to AUD 120 million sufficient for accelerated project development, including extensive test work and development of pilot plants
- Lithium is separated within a matter of hours, eliminating external interference factors

Weaknesses

- Further funds required for project implementation have yet to be raised
- Investment lead time will take more than two years

Opportunities

- Headstart in the race to commercialize Lithium within Central Europe: Preliminary Feasibility Study (PFS) brings about the leading and – for the time being – a unique position
- Rapid growth in lithium demand among the European battery industry
- 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
- Low-cost asset: Opportunity for operating costs at the lower end/in the lower quartile of the global peer group cost curve
- Income from electricity feed-in as a second source of revenue besides lithium sales

Threats

- The reference price for lithium based on imports in China/Korea/ Japan could come under pressure – as occurred in 2018 and 2019 – and put a damper on investor sentiment
- Approval procedures, in particular legal action against authorisations granted, could delay implementation

Valuation

By using a 40% risk weighting on Equity value, we set our price target at AUD 16.00 per share. Key model assumptions:

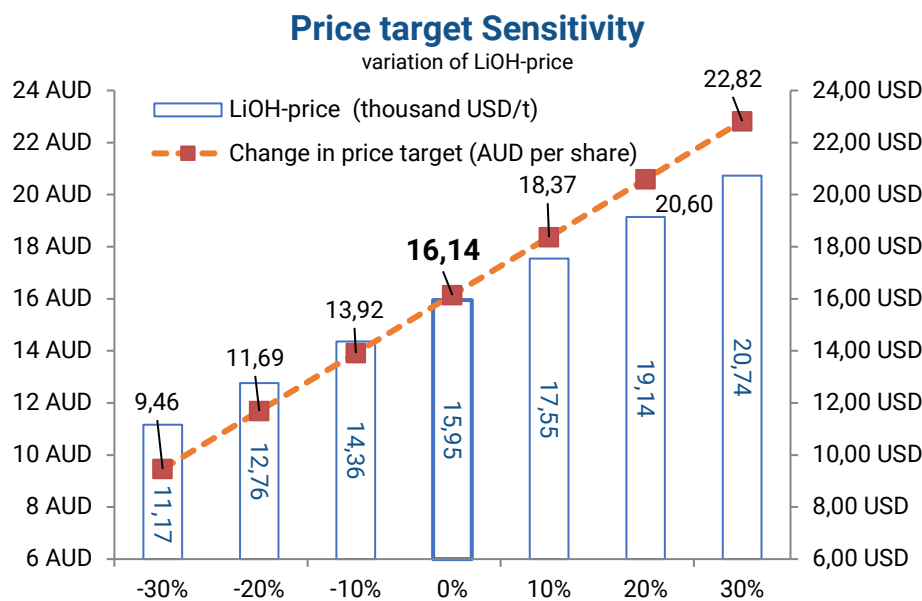
- WACC. We model a weighted average cost of capital of 8.5%, consisting of a 6.0% risk premium beta of 1.1x and 2.0% risk free rate.
- The forecast model is based on revenues of USD 15.95 thousand/t for lithium hydroxide, which encompasses a potential price premium to reference prices.
- A cash position of close to AUD 120 million (just over USD 90 million) is sufficient for accelerated project development in 2021 and beyond. AUD 50m (around USD 40m) will be used for project development, for permitting and feasibility study costs (completion of Definitive Feasibility Study scheduled for mid-2022). This includes extensive text work and the development of pilot plants. AUD 30m (around USD 25m) will be allocated for land access costs and the purchase of long lead drilling items in Germany. Following the ramp-up phase (2022 to 2025), which will be characterized by high capex, with a five-year payback period, we have modelled surpluses in operational cash inflows until 2027e which would cover capex of USD 1,865 million (AUD 2,400 million).
- By discounting our modelled cash flow projection, we have derived the appropriate enterprise value (NPV) at AUD 4,124 million (mid-year adjusted: AUD 4,296 million) and the equity value at AUD 4,411 million. We then have put a 40% risk weighting on our valuation (ex net cash).

DCF (AUD m) (except per share data and beta)	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	Terminal value
NOPAT	-6	-5	-7	8	114	327	490	570	
Depreciation	0	0	7	36	74	93	107	107	
Change in working capital	0	0	0	-5	-17	-27	-18	-8	
Chg. in long-term prov. & accruals	0	0	0	0	0	0	0	0	
Capex	-2	-98	-592	-990	-502	-106	-106	-106	
Cash flow	-8	-103	-592	-951	-332	288	473	563	8,806
Present value	-8	-94	-496	-735	-236	189	286	314	4,905
WACC	8.4%	8.4%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%

DCF per share derived from		DCF avg. growth and earnings assumptions	
Total present value	4,124	Planning horizon avg. revenue growth (2021E - 2028E)	n.a.
Mid-year adj. total present value	4,296	Terminal value growth (2028E - infinity)	2.0%
Net debt (net cash) at start of year	-113	Terminal year ROCE	23.3%
Financial assets	3	Terminal year WACC	8.5%
Provisions and off b/s debt	0		
Equity value	4,411	Terminal WACC derived from	
Max. number of shares (fully diluted)	166.8	Cost of borrowing (before taxes)	6.0%
Discount on PV (ex net cash) per share	10.30	Long-term tax rate	25.0%
Fair value per share (DCF)	16.15	Equity beta	1.10
upside/(downside)	99%	Unlevered beta (industry or company)	1.07
		Target debt / equity	0.16
		Relevered beta	1.19
		Risk-free rate	2.0%
		Equity risk premium	6.0%
		Cost of equity	9.2%
Share price	8.12		

Sensitivity analysis DCF									
Change in WACC (%-points)	Long term growth						Share of present value		
	0%	1.0%	2.0%	3.0%	4.0%	2021E - 2024E	2025E - 2028E	terminal value	
2.0%	7.6	8.8	10.2	12.0	14.3	-32.3%	13.4%	118.9%	
1.0%	9.4	10.8	12.7	15.2	18.6				
0.0%	11.6	13.5	16.1	19.7	24.8				
-1.0%	14.4	17.2	20.9	26.3	34.7				
-2.0%	18.2	22.2	27.8	36.7	52.7				

- The project's advancement is not dependent on securing further external funds before the stage is set for the final investment decision (FID), a juncture by which risk related discounts will have eased significantly. Then, further fundraising remains a key aspect of the implementation of the Upper Rhine Valley project.
- Assuming further dilution (max. number of shares in our model: 167 million), which will occur in the course of the process involved in raising the additional equity required, we derive AUD 26.44 (or EUR 16.97) as a "fair" value per share based on the discounting model. At this juncture (May 2021), we have used a risk related discount of 0.40x (Equity value ex net cash), which has brought us to an appropriate valuation per share of AUD 16.14 (or EUR 10.36). Valuation of such a project (or even a portfolio of projects) is not exact science, let there be the possibility of a delayed implementation in course of approval procedures, in particular legal action. We have set a PT of AUD 16.00 (equivalent: EUR 10.25).
- Two geothermal engineering companies that were acquired, GeoT (announced February 2021) and gec-co (April 2021), are already generating revenues with external customers. For now, our model omits this cash contribution.
- Our cash flow projection ends 2054e.



Source: Company data; AlsterResearch

Due to the fact that companies rarely bear sufficient resemblance to peers in terms of geographical exposure, size or competitive strength and in order to adjust for the pitfalls of weak long-term visibility, an Adjusted Free Cash Flow analysis (Adjusted FCF) has been conducted.

The adjusted Free Cash Flow Yield results in a fair value of AUD 13.20 per share based on 2025 estimates. Hence, our DCF based fair value calculation is supported by our FCF yield methodology.

The main driver of this model is the level of return available to a controlling investor, influenced by the cost of that investors' capital (opportunity costs) and the purchase price – in this case the enterprise value of the company. Here, the adjusted FCF yield is used as a proxy for the required return and is defined as EBITDA less minority interest, taxes and investments required to maintain existing assets (maintenance capex).

FCF yield in AUDm	2021E	2022E	2023E	2024E	2025E
EBITDA	-6,0	-7,6	-2,9	47,9	234,3
- Maintenance capex	0,2	0,2	6,6	35,7	70,0
- Minorities	0,0	0,0	0,0	0,0	0,0
- tax expenses	-0,4	-2,2	-11,3	-10,5	33,9
= Adjusted Free Cash Flow	-5,8	-5,6	1,9	22,6	130,4
Actual Market Cap	874	874	874	874	874
+ Net debt (cash)	-113,3	-255,3	-300,8	105,4	472,9
+ Pension provisions	0,0	0,0	0,0	0,0	0,0
+ Off balance sheet financing	0,0	0,0	0,0	0,0	0,0
- Financial assets	2,6	2,6	2,6	2,6	2,6
- Accumulated dividend payments	0,0	0,0	0,0	0,0	0,0
<i>EV Reconciliations</i>	<i>-115,9</i>	<i>-257,9</i>	<i>-303,3</i>	<i>102,9</i>	<i>470,4</i>
= Actual EV'	758	616	570	977	1.344
Adjusted Free Cash Flow yield	-0,8%	-0,9%	0,3%	2,3%	9,7%
base hurdle rate	6,0%	6,0%	6,0%	6,0%	6,0%
ESG adjustment (score 100/100)	1,0%	1,0%	1,0%	1,0%	1,0%
adjusted hurdle rate	5,0%	5,0%	5,0%	5,0%	5,0%
Fair EV	-117	-111	37	453	2.608
- <i>EV Reconciliations</i>	-116	-258	-303	103	470
Fair Market Cap	-1	147	341	350	2.138
No. of shares (million)	109,0	114,2	134,7	153,3	161,8
Fair value per share in EUR	0,0	1,3	2,5	2,3	13,2
Premium (-) / discount (+) in %	-100,1%	-83,2%	-61,0%	-60,0%	144,7%

Sensitivity analysis fair value						
	3,0%	-0,7	0,6	2,7	4,2	24,0
	4,0%	-0,3	1,0	2,6	3,0	17,2
Adjusted hurdle rate	5,0%	0,0	1,3	2,5	2,3	13,2
	6,0%	0,2	1,4	2,5	1,8	10,5
	7,0%	0,3	1,6	2,4	1,4	8,6

Source: Company data; AlsterResearch

Simply put, the model assumes that investors require companies to generate a minimum return on the investor's purchase price. The required after-tax return equals the model's hurdle rate of 6%. Anything less suggests the stock is expensive; anything more suggests the stock is cheap. **ESG adjustments might be applicable, based on the overall Leeway ESG Score. A high score indicates high awareness for environmental, social or governance issues and thus might lower the overall risk an investment in the company might carry. A low score on the contrary might increase the risk of an investment and might therefore trigger a higher required hurdle rate.**

Peer group analysis

Company name			Market data			
	Sales	ROCE	Share price	% of		EV
				52 wk high	Market Cap	
2020	2020	EUR	EURm	EURm	EURm	
LITHIUM AMERICAS CORP.	-	-10,6%	12,41	-48%	1.407	1.452
Orocobre Limited	30	-1,5%	4,41	-2%	1.518	1.594
Standard Lithium Ltd	-	-12,4%	3,12	-2%	414	394
Millennial Lithium Corp	-	-6,3%	2,22	-37%	193	182
European Metals Holdings Ltd	0	-17,7%	0,86	-30%	150	150
Median		-10,6%			414	394
Mean		-9,7%			736	754
Vulcan Energy Resources	0	na	5,33	-42%	573	569

Source: AlsterResearch

Based on a lithium concentration that is estimated to come to 181 mg/l, a resource estimate of a total of approx. 15.86 million t LCE (JORC-compliant) has been indicated for the Vulcan Energy Resources Upper Rhine Valley project. 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. Among the exploration projects being forged ahead with in North and South America, especially in Argentina, involving lithium-rich groundwater (brine), Lithium Americas stands out with a resource estimate of 24.6 million t LCE.

Lithium Americas Corp., formerly Western Lithium USA Corp., is a resource company. The Company is focused on development of two lithium development projects: the Cauchari-Olaroz project, which is located in Jujuy province of Argentina and the Lithium Nevada project, which is located in north-western Nevada, the United States. Its segments are Organoclay, Lithium Nevada, Cauchari-Olaroz and Corporate. The Cauchari-Olaroz project is a lithium brine mineral project. The Lithium Nevada project is a smectite clay-based lithium project. In addition, its plant facility located in Fernley, Nevada, is constructed to manufacture specialty organoclay products (Hectatone products), derived from hectorite and other clays.

Orocobre Limited is engaged in the operation of lithium business and development the of lithium deposits. The principal activities of the Company are the production and development of industrial chemicals in Argentina. It also includes the operations of Boraxlts Olaroz Lithium Facility is located in the Puna region of Jujuy Province in northern Argentina, over 230 kilometers northwest of the capital city of Jujuy. Borax Argentina operates its open-pit mines in Tincalayu and Sijes. Borax Argentina produces products, including minerals, such as ulexite, colemanite and hydroboracite; refined products, such as borax decahydrate, borax pentahydrate and borax anhydrous, and boric acid.

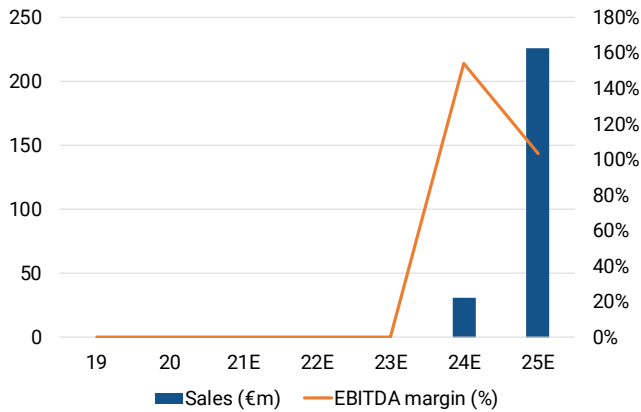
Standard Lithium Ltd is a Canada-based company engaged in the production of Lithium. The Company is focused on the exploration and development of the Bristol Dry Lake Lithium Project located in the Mojave region of San Bernardino County, California, the United States. The Company is also commencing due diligence and resource evaluation on more than 30,000 acres of brine leases located in the Smackover Formation in southern Arkansas, the United Sates.

Millennial Lithium Corp, is a Canada-based exploration and development company. The Company is focused on lithium assets located in Argentina. The Company also owns Lincoln Lithium Property, Nevada.

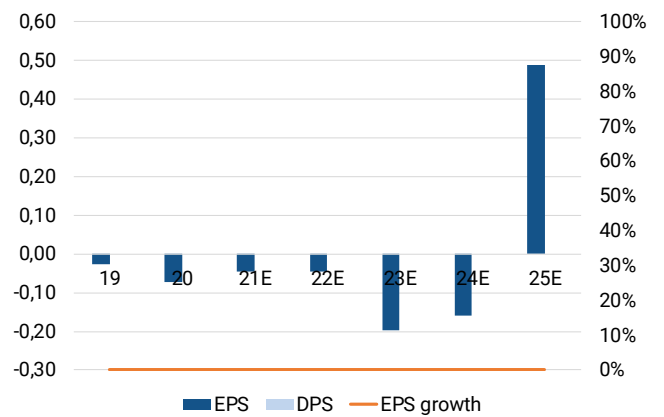
European Metals Holdings Limited is primarily involved in the development of a lithium and tin project Cinovec in the Czech Republic. The project is located approximately 100 kilometers north west from Prague on the border with Germany.

Financials in six charts

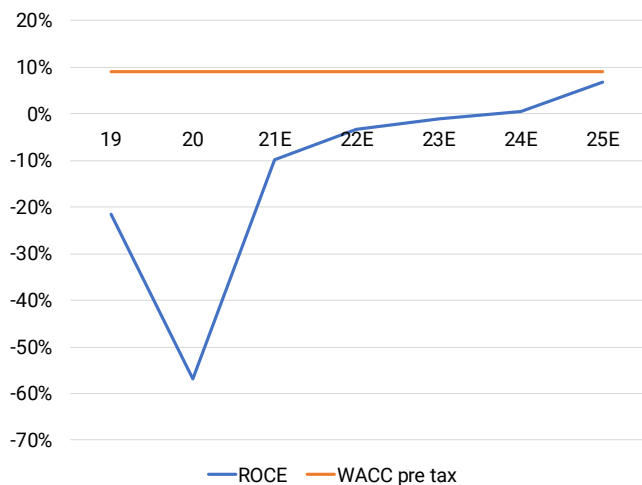
Sales vs. EBITDA margin development



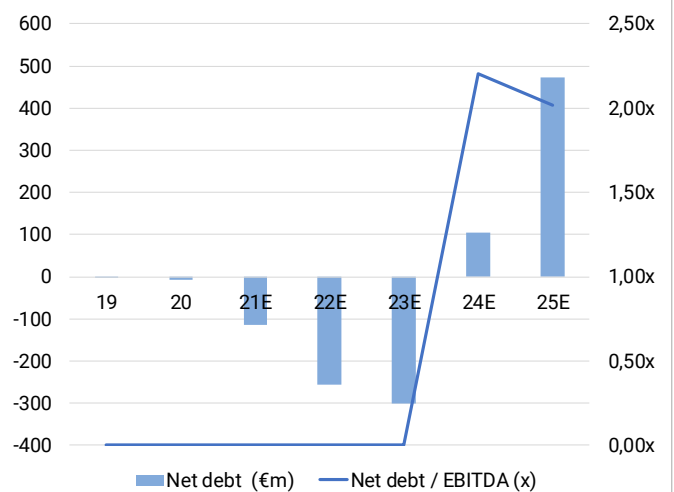
EPS, DPS in AUD & yoy EPS growth



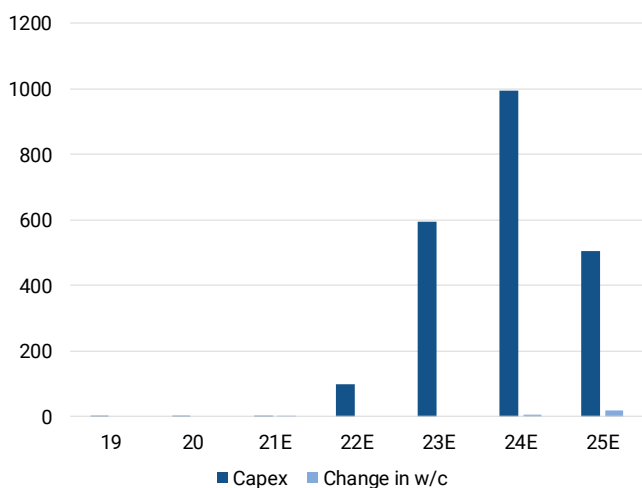
ROCE vs. WACC (pre tax)



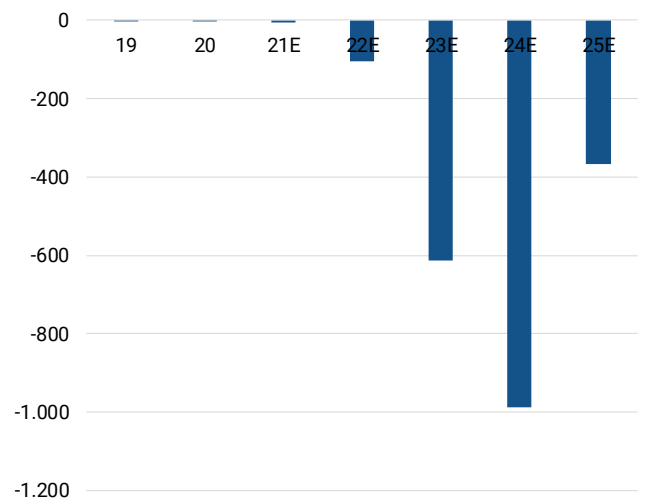
Net debt and net debt/EBITDA



Capex & chgn in w/c requirements in AUDm



Free Cash Flow in AUDm



Financials

Profit and loss (EUR m)	2020	2021E	2022E	2023E	2024E	2025E
Sales	0.0	0.0	0.0	0.0	31.0	228.1
Sales growth	na	na	na	na	>100%	636.8%
Cost of sales	0.0	0.0	0.0	0.0	9.6	56.4
Gross profit	0.0	0.0	0.0	0.0	21.4	171.7
SG&A expenses	3.4	6.6	7.7	10.0	10.0	10.0
Research and development	0.0	0.0	0.0	0.0	0.0	0.0
Other operating expenses (income)	-0.1	-0.4	0.0	0.0	0.0	0.0
EBITDA	-3.3	-6.0	-7.5	-2.9	47.6	236.3
Depreciation	0.3	0.2	0.2	6.6	35.6	73.8
EBITA	-3.6	-6.2	-7.7	-9.5	12.0	162.5
Amortisation of goodwill and intangible assets	0.0	0.0	0.0	0.5	0.7	0.8
EBIT	-3.6	-6.2	-7.7	-10.0	11.4	161.7
Financial result	0.0	1.0	0.5	-27.7	-46.2	-46.2
Recurring pretax income from continuing operations	-3.6	-5.2	-7.2	-37.7	-34.8	115.5
Extraordinary income/loss	0.0	0.0	0.0	0.0	0.0	0.0
Earnings before taxes	-3.6	-5.2	-7.2	-37.7	-34.8	115.5
Taxes	0.0	-0.4	-2.2	-11.3	-10.4	34.7
Net income from continuing operations	-3.6	-4.8	-5.1	-26.4	-24.4	80.9
Result from discontinued operations (net of tax)	0.0	0.0	0.0	0.0	0.0	0.0
Net income	-3.6	-4.8	-5.1	-26.4	-24.4	80.9
Minority interest	0.0	0.0	0.0	0.0	0.0	0.0
Net profit (reported)	-3.6	-4.8	-5.1	-26.4	-24.4	80.9
Average number of shares	48.23	107.46	112.82	136.22	157.72	166.81
EPS reported	-0.07	-0.04	-0.04	-0.19	-0.15	0.48

Profit and loss (common size)	2020	2021E	2022E	2023E	2024E	2025E
Sales	na	na	na	na	100%	100%
Cost of sales	na	na	na	na	31%	25%
Gross profit	na	na	na	na	69%	75%
SG&A expenses	na	na	na	na	32%	4%
Research and development	na	na	na	na	0%	0%
Other operating expenses (income)	na	na	na	na	0%	0%
EBITDA	na	na	na	na	154%	104%
Depreciation	na	na	na	na	115%	32%
EBITA	na	na	na	na	39%	71%
Amortisation of goodwill and intangible assets	na	na	na	na	2%	0%
EBIT	na	na	na	na	37%	71%
Financial result	na	na	na	na	-149%	-20%
Recurring pretax income from continuing operations	na	na	na	na	-113%	51%
Extraordinary income/loss	na	na	na	na	0%	0%
Earnings before taxes	na	na	na	na	-113%	51%
Taxes	na	na	na	na	-34%	15%
Net income from continuing operations	na	na	na	na	-79%	35%
Result from discontinued operations (net of tax)	na	na	na	na	0%	0%
Net income	na	na	na	na	-79%	35%
Minority interest	na	na	na	na	0%	0%
Net profit (reported)	na	na	na	na	-79%	35%

Source: Company data; AlsterResearch

Balance sheet (AUD m)	2020	2021E	2022E	2023E	2024E	2025E
Intangible assets (excl. Goodwill)	0.0	1.3	2.6	3.4	4.0	4.5
Goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Property, plant and equipment	0.0	0.6	97.4	681.3	1,634.9	2,061.8
Financial assets	2.6	2.6	2.6	2.6	2.6	2.6
FIXED ASSETS	2.6	4.5	102.6	687.2	1,641.4	2,068.8
Inventories	0.0	0.0	0.0	0.0	5.5	24.2
Accounts receivable	0.1	0.0	0.0	0.0	1.3	9.4
Other current assets	0.0	0.0	0.0	0.0	0.0	0.0
Liquid assets	6.4	113.3	272.7	828.8	744.8	380.9
Deferred taxes	0.0	0.0	0.0	0.0	0.0	0.0
Deferred charges and prepaid expenses	0.0	0.0	0.0	0.0	0.0	0.0
CURRENT ASSETS	6.5	113.3	272.7	828.8	751.6	414.4
TOTAL ASSETS	9.1	117.8	375.3	1,516.0	2,393.0	2,483.3
SHAREHOLDERS EQUITY	8.9	117.8	375.3	1,046.3	1,612.6	1,693.5
MINORITY INTEREST	0.0	0.0	0.0	0.0	0.0	0.0
Long-term debt	0.0	0.0	0.0	469.7	778.5	778.5
Provisions for pensions and similar obligations	0.0	0.0	0.0	0.0	0.0	0.0
Other provisions	0.0	0.0	0.0	0.0	0.0	0.0
Non-current liabilities	0.0	0.0	0.0	469.7	778.5	778.5
short-term liabilities to banks	0.0	0.0	0.0	0.0	0.0	0.0
Accounts payable	0.2	0.0	0.0	0.0	1.9	11.3
Advance payments received on orders	0.0	0.0	0.0	0.0	0.0	0.0
Other liabilities (incl. from lease and rental contracts)	0.0	0.0	0.0	0.0	0.0	0.0
Deferred taxes	0.0	0.0	0.0	0.0	0.0	0.0
Deferred income	0.0	0.0	0.0	0.0	0.0	0.0
Current liabilities	0.2	0.0	0.0	0.0	1.9	11.3
TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	9.1	117.8	375.3	1,516.0	2,393.0	2,483.3

Balance sheet (common size)	2020	2021E	2022E	2023E	2024E	2025E
Intangible assets (excl. Goodwill)	0%	1%	1%	0%	0%	0%
Goodwill	0%	0%	0%	0%	0%	0%
Property, plant and equipment	0%	1%	26%	45%	68%	83%
Financial assets	28%	2%	1%	0%	0%	0%
FIXED ASSETS	28%	4%	27%	45%	69%	83%
Inventories	0%	0%	0%	0%	0%	1%
Accounts receivable	1%	0%	0%	0%	0%	0%
Other current assets	0%	0%	0%	0%	0%	0%
Liquid assets	71%	96%	73%	55%	31%	15%
Deferred taxes	0%	0%	0%	0%	0%	0%
Deferred charges and prepaid expenses	0%	0%	0%	0%	0%	0%
CURRENT ASSETS	72%	96%	73%	55%	31%	17%
TOTAL ASSETS	100%	100%	100%	100%	100%	100%
SHAREHOLDERS EQUITY	98%	100%	100%	69%	67%	68%
MINORITY INTEREST	0%	0%	0%	0%	0%	0%
Long-term debt	0%	0%	0%	31%	33%	31%
Provisions for pensions and similar obligations	0%	0%	0%	0%	0%	0%
Other provisions	0%	0%	0%	0%	0%	0%
Non-current liabilities	0%	0%	0%	31%	33%	31%
short-term liabilities to banks	0%	0%	0%	0%	0%	0%
Accounts payable	2%	0%	0%	0%	0%	0%
Advance payments received on orders	0%	0%	0%	0%	0%	0%
Other liabilities (incl. from lease and rental contracts)	0%	0%	0%	0%	0%	0%
Deferred taxes	0%	0%	0%	0%	0%	0%
Deferred income	0%	0%	0%	0%	0%	0%
Current liabilities	2%	0%	0%	0%	0%	0%
TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	100%	100%	100%	100%	100%	100%

Source: Company data; AlsterResearch

Cash flow statement (AUD m)	2020	2021E	2022E	2023E	2024E	2025E
Net profit/loss	-1.4	-4.8	-5.1	-26.4	-24.4	80.9
Depreciation of fixed assets (incl. leases)	0.0	0.2	0.2	6.6	35.6	73.8
Amortisation of goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Amortisation of intangible assets	0.0	0.0	0.0	0.5	0.7	0.8
Others	0.1	0.0	0.0	0.0	0.0	0.0
Cash flow from operations before changes in w/c	-1.3	-4.6	-4.9	-19.3	11.9	155.4
Increase/decrease in inventory	0.0	0.0	0.0	0.0	-5.5	-18.6
Increase/decrease in accounts receivable	0.0	0.1	0.0	0.0	-1.3	-8.1
Increase/decrease in accounts payable	0.0	-0.2	0.0	0.0	1.9	9.4
Increase/decrease in other w/c positions	0.0	0.0	0.0	0.0	0.0	0.0
Increase/decrease in working capital	0.0	-0.1	0.0	0.0	-4.9	-17.4
Cash flow from operating activities	-1.3	-4.7	-4.9	-19.3	7.0	138.0
CAPEX	-1.2	-2.1	-98.2	-591.8	-990.5	-501.9
Payments for acquisitions	0.0	0.0	0.0	0.0	0.0	0.0
Financial investments	0.0	0.0	0.0	0.0	0.0	0.0
Income from asset disposals	0.0	0.0	0.0	0.0	0.0	0.0
Cash flow from investing activities	-1.2	-2.1	-98.2	-591.8	-990.5	-501.9
Cash flow before financing	-2.6	-6.9	-103.1	-611.0	-983.5	-363.9
Increase/decrease in debt position	0.0	0.0	0.0	469.7	308.8	0.0
Purchase of own shares	0.0	0.0	0.0	0.0	0.0	0.0
Capital measures	5.6	113.8	262.5	697.4	590.6	0.0
Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	0.0	0.0	0.0
Effects of exchange rate changes on cash	-0.0	0.0	0.0	0.0	0.0	0.0
Cash flow from financing activities	5.6	113.8	262.5	1,167.1	899.5	0.0
Increase/decrease in liquid assets	3.1	106.9	159.4	556.1	-84.0	-363.9
Liquid assets at end of period	6.4	113.3	272.7	828.8	744.8	380.9

Source: Company data; AlsterResearch

Regional sales split (EURm)	2020	2021E	2022E	2023E	2024E	2025E
Domestic	0.0	0.0	0.0	0.0	31.0	228.1
Europe (ex domestic)	0.0	0.0	0.0	0.0	0.0	0.0
The Americas	0.0	0.0	0.0	0.0	0.0	0.0
Asia	0.0	0.0	0.0	0.0	0.0	0.0
Rest of World	0.0	0.0	0.0	0.0	0.0	0.0
Total sales	0.0	0.0	0.0	0.0	31.0	228.1

Regional sales split (common size)	2020	2021E	2022E	2023E	2024E	2025E
Domestic	na	na	na	na	100.0%	100.0%
Europe (ex domestic)	na	na	na	na	0.0%	0.0%
The Americas	na	na	na	na	0.0%	0.0%
Asia	na	na	na	na	0.0%	0.0%
Rest of World	na	na	na	na	0.0%	0.0%
Total sales	na	na	na	na	100%	100%

Source: Company data; AlsterResearch

Ratios	2020	2021E	2022E	2023E	2024E	2025E
Per share data						
Earnings per share reported	-0.07	-0.04	-0.04	-0.19	-0.15	0.48
Cash flow per share	-0.03	-0.05	-0.04	-0.19	-0.18	0.41
Book value per share	0.18	1.10	3.33	7.68	10.22	10.15
Dividend per share	0.00	0.00	0.00	0.00	0.00	0.00
Valuation						
P/E	-110.2x	-180.5x	-174.2x	-41.9x	-52.5x	16.7x
P/CF	-242.0x	-176.7x	-181.4x	-42.8x	-44.8x	19.9x
P/BV	42.3x	7.4x	2.4x	1.0x	0.8x	0.8x
Dividend yield (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
FCF yield (%)	-0.4%	-0.6%	-0.6%	-2.3%	-2.2%	5.0%
EV/Sales	na	na	na	na	29.3x	5.6x
EV/EBITDA	-261.5x	-126.5x	-79.5x	-177.4x	19.0x	5.4x
EV/EBIT	-240.7x	-121.8x	-77.7x	-51.3x	79.7x	7.9x
Income statement (EURm)						
Sales	0.0	0.0	0.0	0.0	31.0	228.1
yoy chg in %	na	na	na	na	na	636.8%
Gross profit	0.0	0.0	0.0	0.0	21.4	171.7
Gross margin in %	na	na	na	na	69.1%	75.3%
EBITDA	-3.3	-6.0	-7.5	-2.9	47.6	236.3
EBITDA margin in %	na	na	na	na	153.9%	103.6%
EBIT	-3.6	-6.2	-7.7	-10.0	11.4	161.7
EBIT margin in %	na	na	na	na	36.8%	70.9%
Net profit	-3.6	-4.8	-5.1	-26.4	-24.4	80.9
Cash flow statement (EURm)						
CF from operations	-1.3	-4.7	-4.9	-19.3	7.0	138.0
Capex	-1.2	-2.1	-98.2	-591.8	-990.5	-501.9
Maintenance Capex	0.3	0.2	0.2	6.6	35.6	70.0
Free cash flow	-2.6	-6.9	-103.1	-611.0	-983.5	-363.9
Balance sheet (EURm)						
Intangible assets	0.0	1.3	2.6	3.4	4.0	4.5
Tangible assets	0.0	0.6	97.4	681.3	1,634.9	2,061.8
Shareholders' equity	8.9	117.8	375.3	1,046.3	1,612.6	1,693.5
Pension provisions	0.0	0.0	0.0	0.0	0.0	0.0
Liabilities and provisions	0.0	0.0	0.0	469.7	778.5	778.5
Net financial debt	-6.4	-113.3	-272.7	-359.1	33.7	397.6
w/c requirements	-0.1	0.0	0.0	0.0	4.9	22.1
Ratios						
ROE	-40.0%	-4.1%	-1.3%	-2.5%	-1.5%	4.8%
ROCE	-40.5%	-5.3%	-2.1%	-0.7%	0.5%	6.5%
Net gearing	-72.3%	-96.2%	-72.7%	-34.3%	2.1%	23.5%
Net debt / EBITDA	1.9x	18.9x	36.1x	124.1x	0.7x	1.7x

Source: Company data; AlsterResearch

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Company	Disclosure
Vulcan Energy Resources	2, 8

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