
RFC Ambrian
Lithium Projects Review
Lithium Equity Market Report
November 2023
END

Contents

All prices in the report are as of 16th November 2023.
Front picture: Manono, AVZ Minerals.

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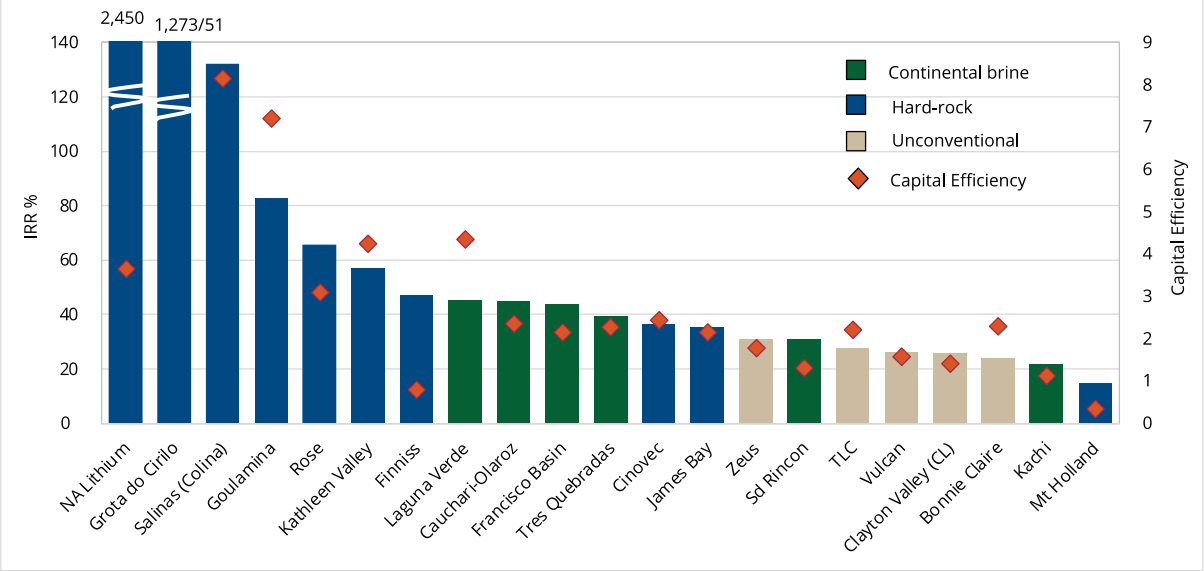
Figure 7. High-Profile Lithium Projects — Post Tax IRR (%) and Capital Efficiency (NPV/LoM Capex)



Source: Company data, RFC Ambrian.

Capital Expenditure

Similarly, comparing the capex for each project across the whole lithium industry is not valid because the level of capex will depend to some degree on the final lithium product produced. The capex requirements and capital intensity for each project has been analysed but are compared within each ore type group and presented in the Appendices 1 to 3.

Financial Returns

Figure 7 shows the internal rate of return (IRR) and the capital efficiency (NPV/LoM capex) of the high-profile projects. The levels of post-tax IRRs are generally high with only one project having an IRR of less than 20% and the median being 40%. Similarly, the capital efficiency of the projects is generally high, with only two projects having a capital efficiency of less than 1.0x and the median being 2.3x. Generally, the hard-rock projects have the highest IRRs and capital efficiency. A discount rate of 8% is mainly used in the project feasibility studies. However, from an investor's perspective, this rate generally fails to take account of geopolitical risk. In Table 5 we have listed the latest country risk ratings from S&P Global for the 20 countries where the 62 projects are located and have used them in our rankings in Table 6. The political risks should not be underestimated. Recent examples in the lithium industry include the Mexican government cancelling Ganfeng Lithium's Sonora mining concessions, AVZ Minerals having difficulties progressing its exploration rights for the Manono project in DRC, and the Government of Serbia revoking Rio Tinto's licences related to the Jadar project.

Project Ranking Methodology

As stated, the list of high-profile lithium projects has been compiled from the project comparisons and top-third rankings for each of the ore type groups in Appendix 1 to 3. Each of the ranking tables is based on ten project factors that we believe investors may consider when investing in the operator, or another company may consider when looking at acquisitions. The factors are listed in the box.

In Appendices 1 to 3 the projects have been ranked within each ore type group. For the first seven factors, the projects were ranked relative to each other based on the underlying data, and then given a traffic light rating, with green ranked highest and red ranked lowest. A blank has been left in the table where no data is available.

The next two factors (8 and 9) were ranked more subjectively but based on company reports and our understanding of the project, and again with green the most positive and red the least positive. For the final factor, green represents a project where the

operator is essentially a junior lithium company with no significant shareholder group, orange a project where the operator has a significant shareholder and/or some Chinese interest, and red a project where the operator is a company with multiple assets or is Chinese owned.

To calculate the overall ranking in each ore type, we double weighted the resource size and equally weighted all the other project factors to produce an overall score.

The top 21 projects in our high-profile list (shown in Table 6) comprises 10 hard-rock, six brine and five unconventional projects. In this ranking we have re-rated factors 1 to 4 relative to each of the 21 projects, but the rating for the other six factors have been kept the same as in the ore type groupings. Again, we have double weighted the resource size to calculate the overall ranking.

The lists of lithium projects in Appendices 1 to 3 and the high-profile project list provide one approach to ranking the projects, but other approaches and weighting could be considered. This project list is biased towards larger projects and negatively weights the projects that are owned by mining companies with multiple assets or that are Chinese owned as these are not considered as potential takeover candidates for this report.

1. Lithium resources.
2. LoM lithium production annual capacity.
3. Internal rate of return.
4. Capital efficiency - NPV/LoM capex.
5. Capex intensity LoM.
6. Cash cost of production.
7. Geopolitical risk.
8. Access and Infrastructure.
9. Current activity and project progress.
10. Company ownership status.

Table 6. High-Profile Lithium Projects Based on 10 Project Factors

Rank	Project	Project Factors									
		1	2	3	4	5	6	7	8	9	10
1	Grota do Cirilo	🟠	🟢	🟢	🟢	🟢	🟠	🟠	🟢	🟢	🟢
2	Bonnie Claire	🟢	🟠	🔴	🟠	🔴	🟠	🟢	🟢	🟢	🟢
3	Kathleen Valley	🟠	🟢	🟢	🟢	🟠	🟠	🟢	🟢	🟢	🟠
4	Zeus	🟠	🟠	🟠	🟠	🟢	🟢	🟢	🟢	🟢	🟢
5	TLC	🟢	🟠	🔴	🟠	🟠	🔴	🟢	🟢	🟢	🟢
6	Goulamina	🟠	🟢	🟢	🟢	🟢	🟢	🔴	🟠	🟢	🔴
7	Salinas (Colina)	🔴	🟢	🟢	🟢	🟢	🔴	🟠	🟢	🟢	🟢
8	Cauchari-Olaroz	🟢	🟠	🟠	🟠	🟢	🟠	🔴	🟢	🟢	🔴
9	Cinovec	🟠	🔴	🟠	🟠	🟢	🟠	🟢	🟢	🟢	🟠
10	Clayton Valley (CL)	🟠	🔴	🔴	🔴	🟢	🟢	🟢	🟢	🟢	🟢
11	Sd Rincon	🟢	🟢	🔴	🔴	🟠	🟢	🔴	🟢	🟢	🔴
12	Kachi	🟢	🟢	🔴	🔴	🟢	🔴	🔴	🟠	🟢	🟢
13	Vulcan	🟢	🔴	🔴	🔴	🔴	🟠	🟢	🟢	🟢	🟢
14	James Bay	🔴	🟢	🟠	🟠	🟠	🟢	🟢	🟢	🟢	🔴
15	Rose	🔴	🟠	🟢	🟢	🔴	🔴	🟢	🟢	🟢	🟢
16	Finniss	🔴	🔴	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🟠
17	Tres Quebradas	🟢	🔴	🟠	🟠	🟠	🟢	🔴	🟠	🟢	🔴
18	Mt Holland	🟠	🟠	🔴	🔴	🟠	🟢	🟢	🟢	🟢	🔴
19	NA Lithium	🔴	🔴	🟢	🟢	🔴	🔴	🟢	🟢	🟢	🟢
20	Laguna Verde	🔴	🔴	🟠	🟢	🟠	🟠	🟠	🟢	🟢	🟢
21	Francisco Basin	🔴	🔴	🟠	🟠	🟠	🟠	🟠	🟢	🟢	🟢

Source: RFC Ambrian. 1-4 boxed ranked relative to this peer group, 5 and 6 ranked relative to deposit type peer group.

The project rankings are not a reflection of our view of the valuation of the individual companies owning the projects, only of the parameters of the projects themselves. As a result, Table 6 should not be considered as a standalone investment guide to the project operators, but rather as a first step of analysis. Other weightings could be applied to a range of factors and many other corporate and valuation factors need to be taken into consideration by investors.

These lists will also be dynamic, as they have been during the compiling of this report. Many earlier-stage projects will expand their resources through further exploration and refine and optimise their mine designs with more detailed feasibility studies. As a result, capex, operating costs, and input prices will also likely change.

A summary profile of the 15 high-profile projects that are considered as potential takeover targets can be found in Appendix 4.

5. Development Company Valuations

The 21 high profile lithium projects outlined in section 4 are owned by publicly listed companies, however, six are owned by companies that we believe are unlikely takeover candidates. The remaining 15 projects are owned by 15 companies (two projects are owned by one company and another project is owned by two companies).

Eight of the companies have a primary Australian listing, six have a Canadian listing and one company a London listing. Details of the 15 listed companies are shown in Table 7. We have not analysed these companies directly in terms of being takeover targets, but rather focused on the project(s) underlying these companies. As a result, we believe these junior companies have the potential to be involved in some sort of corporate activity based on assessments of their projects shown in Table 6.

The table shows the market capitalisation and Enterprise Value (EV) of these companies and a crude comparative valuation based on EV/t LCE resources, and EV/NPV of the projects.

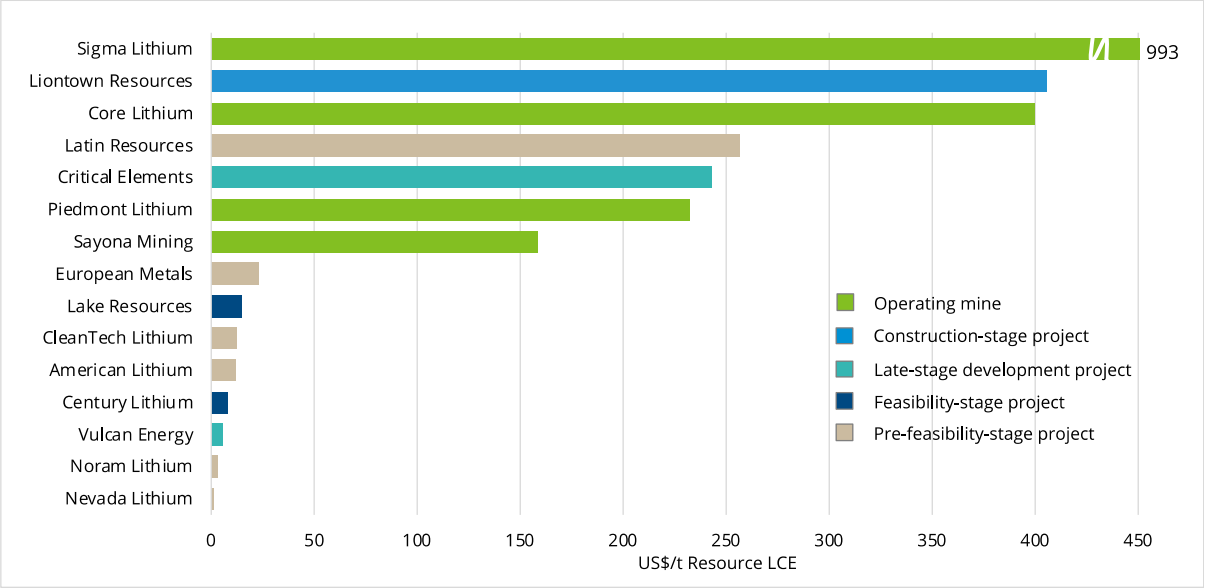
Figure 8 shows the companies ranked by EV per tonne LCE resource and the project stage is highlighted. This is only one factor to consider in valuation as discussed below, but generally a higher valuation is given to more advanced projects, as broadly demonstrated in the chart.

Table 7. Companies Owning High-Profile Lithium Projects Ranked by EV

	Market	Ticker	Company	Mkt Cap	EV	EV/t LCE Resource	EV/NPV
				US$m	US$m	US$/t	
1	TSXV	SGML	Sigma Lithium	3,019	3,012	993	20%
2	ASX	LTR	Liontown Resources	2,441	2,244	406	79%
3	ASX	PLL	Piedmont Lithium	596	502	232	13%
4	ASX	SYA	Sayona Mining	561	400	158	39%
5	ASX	CXO	Core Lithium	538	399	400	347%
6	ASX	LRS	Latin Resources	402	378	256	14%
7	TSXV	LI	American Lithium	263	244	12	6%
8	TSXV	CRE	Critical Elements	205	182	243	9%
9	ASX	VUL	Vulcan Energy	315	154	6	6%
10	ASX	LKE	Lake Resources	162	120	15	16%
11	ASX	EMH	European Metals	87	84	23	4%
12	TSXV	LCE	Century Lithium	73	58	8	6%
13	LON	CTL	CleanTech Lithium	39	33	12	1%
14	CSE	NVLH	Nevada Lithium	30	23	1	2%
15	TSXV	NRM	Noram Lithium	28	19	3	1%

Source: Company data, RFC Ambrian.

Figure 8. Lithium Company EV per tonne LCE Resource (US$/t)



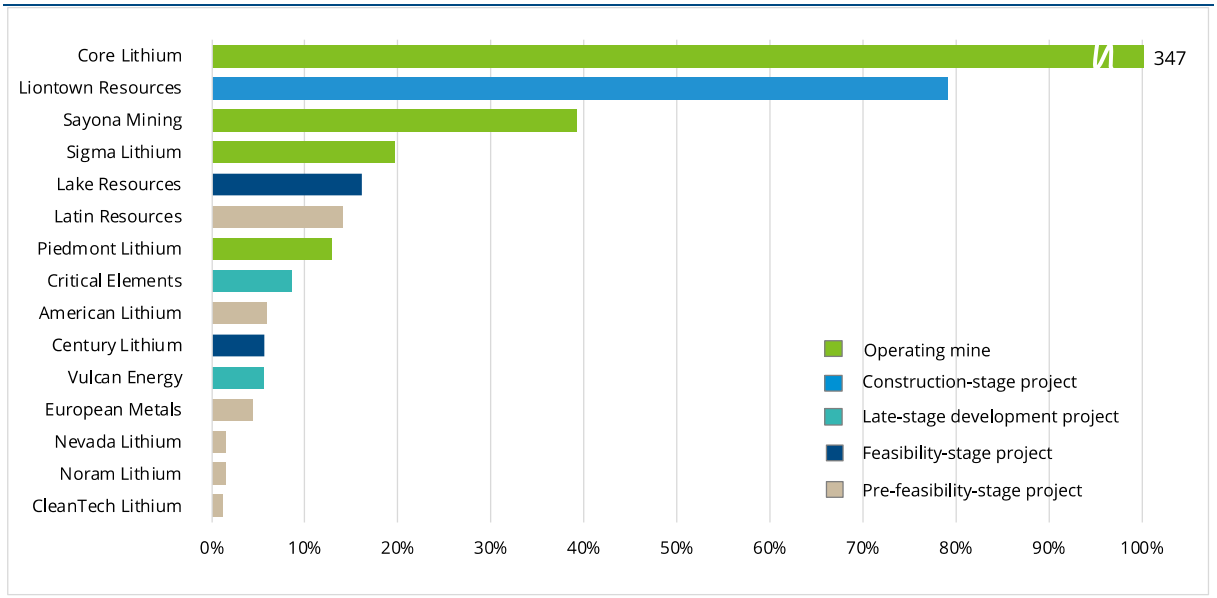
Source: Company data, RFC Ambrian.

Discounted Cash Flow

Resource or production-based valuation measures can be a useful starting point, but a better valuation can be determined by looking at the discounted cashflow of the underlying project, if a feasibility study has been produced.

However, with all feasibility studies, the data reported is subject to assumptions made by the companies and these vary across the group. These include assumed commodity price forecasts and discount rates which can have the largest impact on the economic outcomes. In addition, the feasibility study economic assessments do not take into account geopolitical, permitting, and environmental risks inherent in each project. Further, the feasibility reports have been compiled at different times which will also impact the economics, particularly on the cost side.

Figure 9. Lithium Company EV/NPV of Projects



Source: Company data, RFC Ambrian.

Also, a DCF valuation is an assessment of a mineral asset's future net economic benefit based on a future course of actions and expenditures at the current moment in time. This is a technical value and not a market value of the asset. A company holding a single mining asset will usually trade at a significant discount to the calculated NPV of the underlying asset depending on its stage of development. The share price of the company may be also reflecting a range of factors discussed previously, as well as views about input data used to arrive at the NPV, perceptions about the project risks, and perceptions about country risk. Figure 9 shows the EV/NPV for the companies.

Junior Company Risks

Some caution should be taken when using these valuation metrics. These valuation measures are still relatively simplistic. Furthermore, share prices and valuations of junior exploration companies can be volatile and often reflect excitement or disappointment about recent drilling results, or other specific or geopolitical events, rather than being a reflection of the current value of the underlying resources.

Most generalist investors and Institutional asset managers shy away from mining and construction risk and even specialist mining investors are sometimes constrained by market capitalisation and trading liquidity limits, characteristics often typical of single asset junior mining companies.

Another factor affecting valuations of some exploration companies beyond the main project is that they may have other early-stage assets that carry value. Finally, some companies are currently undergoing further exploration work on their main project with indications or expectations that the resource size is larger than currently reported and that can be already factored to some degree into the share price.

Figure 10. Lithium Development Projects TLC and Grota do Cirilo

Source: American Lithium, Sigma Lithium

Appendix 1 – Hard-rock Project Analysis

This appendix evaluates the characteristics of 31 hard-rock lithium projects shown in Table 8 and includes comparison of the size of the resource, the size of the planned production, various financial measures, exploration and development progress, geopolitical risk, access and infrastructure, and the operating company's shareholder structure.

Table 8. Lithium Hard-rock Projects Ranked by Resource Size

	Project	Country	Operating Company	Project Stage	Resource LCE Mt	Grade % Li_2O	Feasibility Date
1	Manono	DRC	AVZ Minerals	Feas. Complete	16.530	1.62	21/04/2020
2	Cinovec	Czech Rep.	European Metals/CEZ	PEA/PFS	7.394	0.42	19/01/2022
3	Goulamina	Mali	Ganfeng Lithium	Constr. Started	7.149	1.37	06/12/2021
4	Mt Holland	Australia	Wesfarmers/SQM	Constr. Started	6.719	1.52	25/05/2022
5	Kathleen Valley	Australia	Liontown Res.	Constr. Started	5.174	1.34	11/11/2021
6	Grota do Cirilo	Brazil	Sigma Lithium	Operating	3.033	1.43	16/01/2023
7	Pakeagama Lake	Canada	Frontier Lithium	PEA/PFS	2.179	1.50	31/05/2023
8	Arcadia	Zimbabwe	Zhejiang Huayou	Operating	1.997	1.11	14/12/2021
9	NA Lithium	Canada	Sayona Mining	Operating	1.766	1.23	14/04/2023
10	Nemaska	Canada	Livent	Constr. Planned	1.724	1.30	31/07/2019
11	San Jose	Spain	Infinity Lithium	PEA/PFS	1.682	0.61	14/10/2021
12	Salinas (Colina)	Brazil	Latin Resources	PEA/PFS	1.475	1.32	28/09/2023
13	Uis	Namibia	Andrada Mining	PEA/PFS	1.462	0.73	01/04/2022
14	James Bay	Canada	Allkem	Constr. Planned	1.395	1.40	21/12/2021
15	Carolina Lithium	USA	Piedmont Lithium	Feas. Complete	1.175	1.08	31/12/2022
16	Ewoyaa	Ghana	Atlantic Lithium	Feas. Complete	1.091	1.25	29/06/2023
17	Finniss	Australia	Core Lithium	Operating	0.997	1.31	26/07/2021
18	Manna	Australia	Global Lithium Res.	PEA/PFS	0.819	1.01	13/02/2023
19	Zinnwald	Germany	Zinnwald Lithium	Feas. Complete	0.757	0.76	07/09/2022
20	Rose	Canada	Critical Elements	Constr. Planned	0.749	0.92	11/10/2023
21	Barroso	Portugal	Savannah Res.	PEA/PFS	0.721	1.04	12/06/2023
22	Bougouni	Mali	Kodal Minerals	Feas. Complete	0.585	1.11	29/09/2022
23	Zulu	Zimbabwe	Premier African Min.	Operating PP	0.527	1.06	20/11/2017
24	Keliber	Finland	Sibanye Stillwater	Constr. Started	0.370	1.03	28/11/2022
25	Separation Rapids	Canada	Avalon Adv. Mat.	PEA/PFS	0.351	1.39	21/08/2018
26	Georgia Lake	Canada	Rock Tech Lithium	PEA/PFS	0.335	0.91	16/11/2022
27	Pioneer Dome	Australia	Develop Global	PEA/PFS	0.319	1.16	06/02/2023
28	Wolfsberg	Austria	European Lithium	Feas. Complete	0.319	1.00	08/03/2023
29	Trelavour	UK	Cornish Lithium	PEA/PFS	0.303	0.24	24/06/2022
30	Karibib	Namibia	Lepidico	Constr. Planned	0.154	0.51	22/11/2022
31	Sirmac	Canada	Vision Lithium	PEA/PFS	0.011	1.33	21/02/2023

Source: RFC Ambrian. Company data. PP = Pilot plant

The 31 projects comprise 26 hard-rock lithium projects at the development stage as well as five hard-rock projects that have come into production this year. We have not included or analysed a further five projects in the comparison, four of which have insufficient available project data (Centenario-Ratones, Salar de Los Angeles, Uyuni Salt Flat, and Lijiagou), and Fort Cady which is primarily a boron project.

Within this group, six projects (darker shaded) are unlikely to be a takeover target (unless it is by a significantly larger mining group) because they are already owned by a mining company with multiple assets or are Chinese owned. The remaining 25 projects are owned by junior lithium companies with a limited number of additional assets, most of which are early-stage exploration projects. These 25 projects are our focus. However, all 31 projects have been included in our comparison charts below to provide a better benchmark.

Characteristics of Hard-rock Projects

Looking at the 31 hard-rock lithium projects, the market has access to detailed project development data for all of these, mostly from Canadian and Australian technical reports, although two companies do not report after-tax NPVs and IRRs. We have compiled this data to try and provide further insight into some of the selected projects.

The data also provides a benchmark to investors for other new projects. In some charts we have separated the spodumene producers from the lithium chemical producers to give better like-for-like comparisons.

Of the 31 projects, 18 plan to produce a spodumene concentrate for direct sale, and two more plan to produce a petalite or lepidolite concentrate. Eleven projects are planning to produce a final product of lithium hydroxide, of which two are planning to produce both lithium hydroxide and lithium carbonate. Five of the projects started production this year, a further four have started construction and three have construction planned.

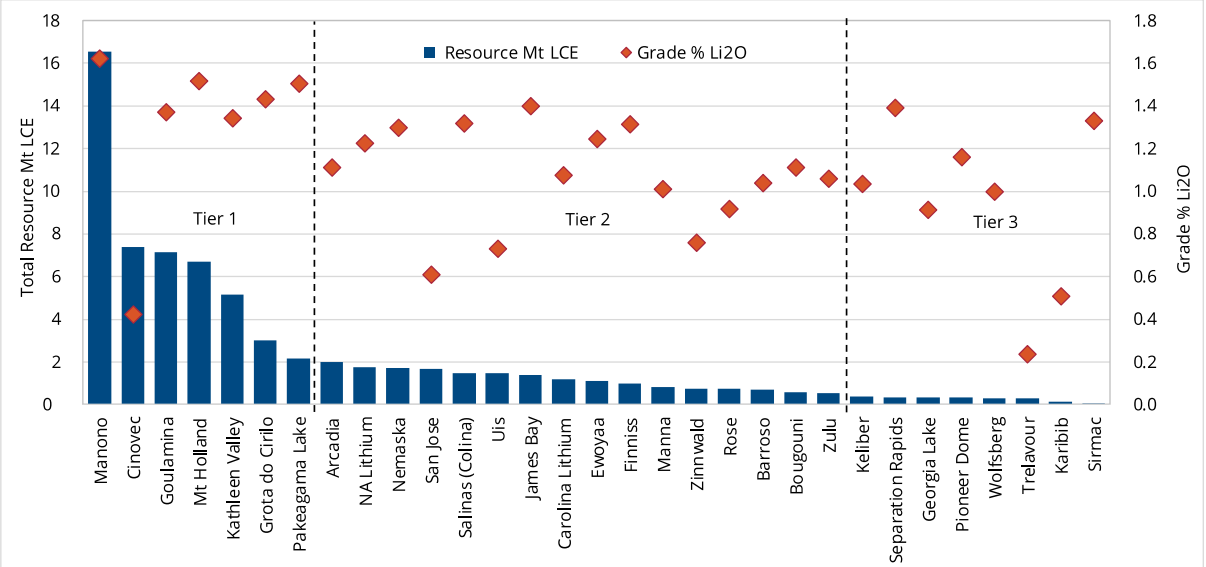
Resources and Grades

We have arbitrarily created three resource tiers to provide a benchmark for the resource size of hard-rock lithium projects. The resource tiers are:

- Resource Tier 1 >=2.0 Mt LCE
- Resource Tier 2 <2.0, >=0.5 Mt LCE
- Resource Tier 3 <0.5 Mt LCE

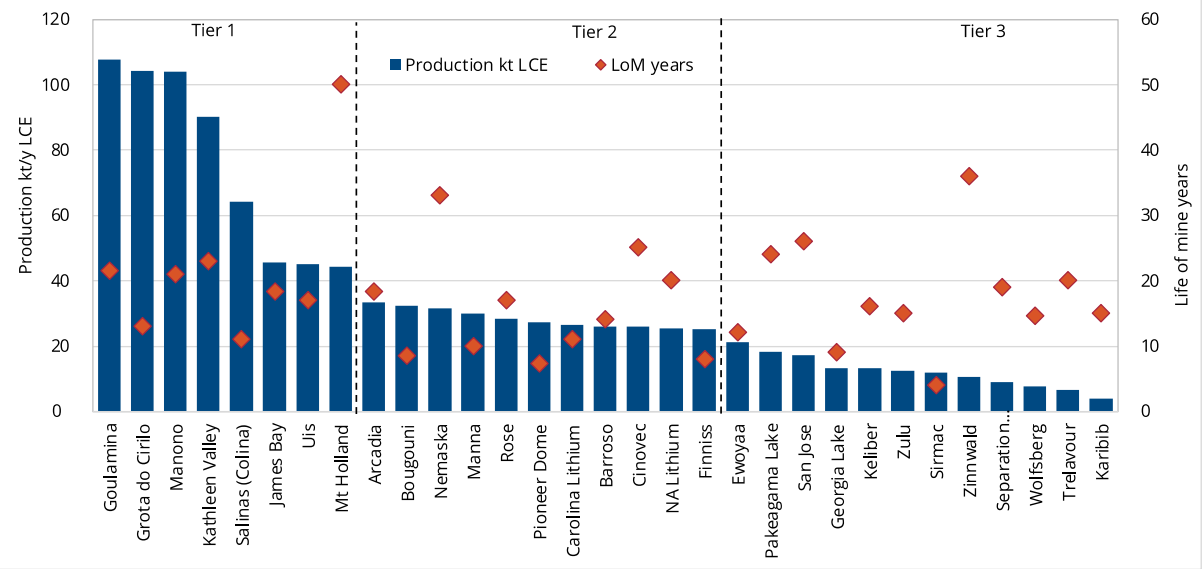
Figure 11 shows the total lithium resource size of each of the 31 hard-rock projects project together with the project's grade (% Li_2O). There are seven Tier 1 projects, 16 Tier 2 projects, and eight Tier 3 projects. Most of the projects have a grade of 0.9 to 1.5% Li_2O, with an average of 1.1% Li_2O.

Figure 11. Hard-rock Lithium Projects - Resource Size (Mt LCE) and Grade (%Li_2O)



Source: RFC Ambrian, Company data.

Figure 12. Hard-rock Lithium Projects — Average Annual Production (kt/y LCE) and LoM (years)



Source: RFC Ambrian, Company data.

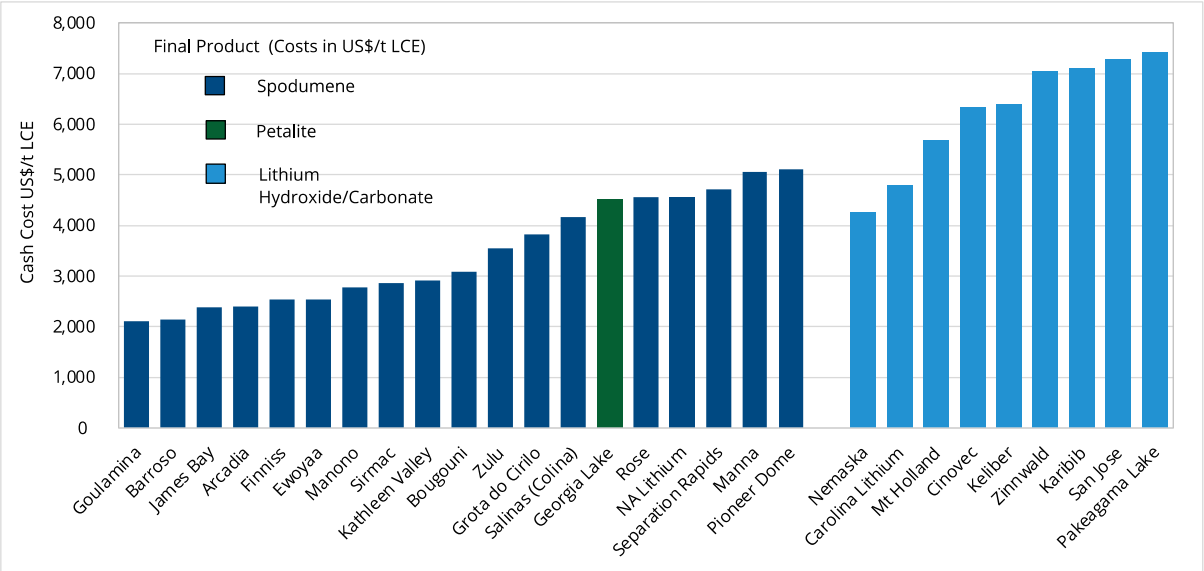
Production Levels

Figure 12 shows the average annual lithium production (kt/y LCE equivalent) over the life of mine of each of the 31 hard-rock projects together with the project's mine life in years. There are eight Tier 1 projects, 11 Tier 2 projects, and 12 Tier 3 projects. There is a broad range of production levels across the group with the average being 34.3 kt/y but this is skewed by a few very large projects. The average life of mine is 18 years.

Operating Costs

Figure 13 shows the cash operating costs taken from the feasibility studies, in US dollars per tonne LCE. The spodumene producers have been separated from the lithium chemical producers because comparing these two groups is not valid because the chemical producers carry additional costs to convert the spodumene to lithium chemicals. A more appropriate comparison is an industry margin curve.

Figure 13. Hard-rock Lithium Projects — Operating Costs (US$/t LCE)



Source: Company data, RFC Ambrian estimates.

There is a broad spread of costs across both groups. The average cost of producing spodumene is US$3,464/t and US$6,253/t for lithium chemicals.

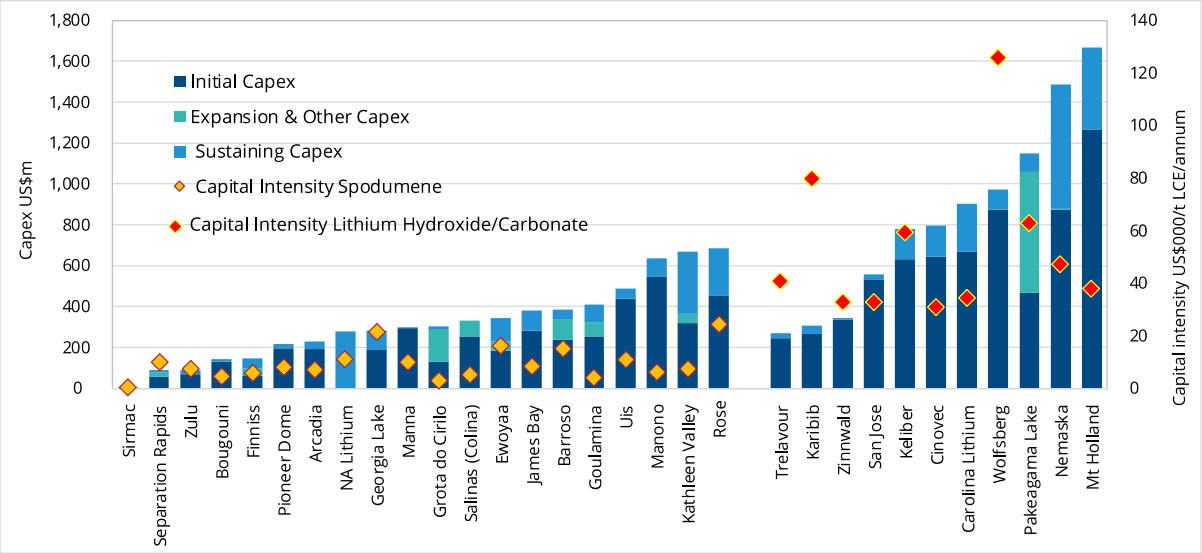
Capital Expenditure

Figure 14 shows the initial, expansion, sustaining, and total capex requirements for each of these projects over the life of the mine, where they are reported. While the initial capex is obviously important (because this sum needs to be financed to get the project up and running) the chart shows how the initial capex can sometimes give a misleading picture of the overall capex requirements (a key factor in the overall profitability). Sustaining capex can often be a significant factor in the overall cost but is occasionally not mentioned in some studies.

The capital intensity of a project is also interesting but can reflect a number of factors that impact the capex and lithium output including whether the mine is underground or open pit, stripping ratios, processing methods, grade and recoveries, the degree of processing, and infrastructure requirements. Mining development companies typically show the initial capex relative to the headline annual lithium production for capital intensity. However, this can be misleading when looking at the project as a whole and so in Figure 14 we have also shown capital intensity on the basis of the LoM capex relative to the average annual production over the LoM.

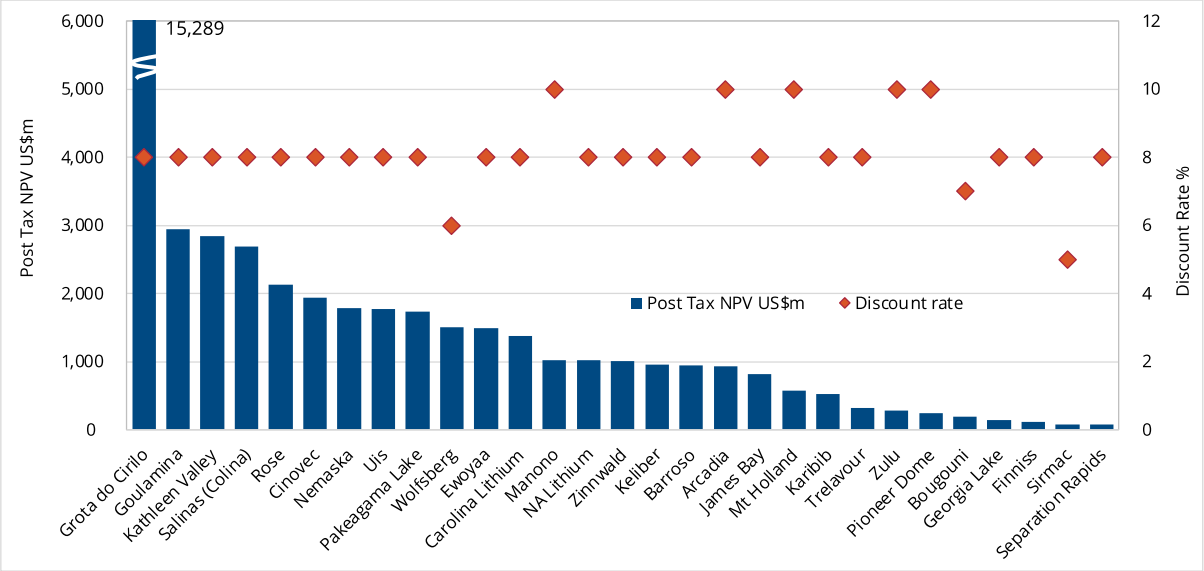
Once again, we have separated the spodumene producers from the lithium chemical producers. This clearly shows the difference in capital intensity of the two groups and that the capital requirements are generally significantly larger for the chemical producers due to the additional processing step. The average capital intensity for the spodumene projects is US$9,229/t/y LCE and US$52,982/t/y LCE for the chemical projects. While producing chemical lithium likely increases the overall return, it may make raising initial capital more difficult.

Figure 14. Hard-rock Lithium Projects — Projected Capex LoM (US$m) with Capital Intensity ($/t/y LCE)



Source: Company data, RFC Ambrian estimates.

Figure 15. Hard-rock Lithium Projects — Post Tax NPV (US$m) and Discount rate (%)



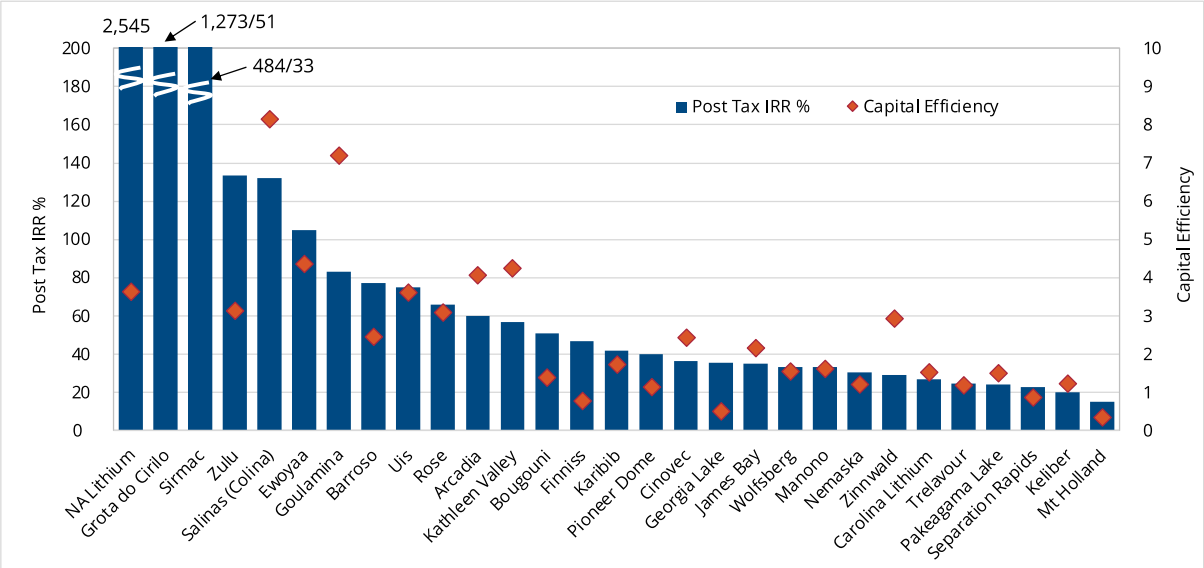
Source: Company data, RFC Ambrian.

Financial Returns

Figure 15 shows the post-tax NPV of each hard-rock project as defined in the feasibility studies along with the discount rate used (principally 8%). The NPV is usually most sensitive to the commodity input price and the discount rate. The input lithium price varies across the base case of each project and averages US$1,359/t for the spodumene projects and US$23,230/t for the lithium hydroxide projects.

The NPV valuation measures are useful, although they usually fail to capture the benefits of longer life projects, and 'blue sky' potential. This might be recognised by investors and reflected in the share price of the project development company but is hard to quantify explicitly. Figure 16 shows the internal rate of return (IRR) and the capital efficiency of the hard-rock projects. The levels of IRRs are generally very high with only one project having an IRR of less than 20%.

Figure 16. Hard-rock Lithium Projects — Post Tax IRR (%) and Capital Efficiency (NPV/LoM Capex)



Source: Company data, RFC Ambrian.

The median post-tax IRR is 42% (the average is distorted by a few large values). Similarly, the capital efficiency of the projects (NPV/LoM capex) is generally very high, with only four projects having a capital efficiency of less than 1.0x. Figure 15 shows that two projects, one of the smallest and one of the largest projects, have extremely high capital efficiencies.

Hard-rock Project Rankings

To provide a ranking of the hard-rock projects, based on factors that investors may consider when investing in the operator, or another company may consider when looking at acquisitions, we have constructed a matrix of ten project factors (listed in the box).

These are shown in Table 9 and represent what we consider to be important underlying characteristics of the 31 projects. For the first seven factors, the projects were ranked relative to each other based on the underlying data, and then divided into three groups to give a traffic light rating, with green ranked highest and red ranked lowest. Where appropriate the spodumene and lithium chemical producers were ranked separately relative to the two separate groups. A blank has been left in the table where no data is available.

The next two factors (8 and 9) were ranked slightly more subjectively based on our understanding of the project, and again with green the most positive and red the least positive. For the final factor, green represents a project where the operator is essentially a junior lithium development company, orange a project where the operator has a significant shareholder and/or some Chinese interest, and red a project where the operator is a mining company with multiple assets or Chinese owned.

To calculate the ranking, we have double weighted the resource size and equally weighted all the other project factors to produce an overall score with the listing order shown in Table 9. While this list of hard-rock lithium projects provides one approach to ranking the projects, other approaches and weighting could be considered. This project list is biased towards larger projects and negatively weights the projects that are owned by mining companies with multiple assets or that are Chinese owned as these are not considered as potential takeover candidates.

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6. Cash cost of production.
7. Geopolitical risk.
8. Access and Infrastructure.
9. Current activity and project progress.
10. Company ownership status.

Figure 17. Lithium Development Projects Goulamina and Cauchari-Olaroz

Source: Leo Lithium, Lithium Argentina

Table 9. Hard-rock Lithium Projects Ranked on 10 Project Factors

Rank	Project	Project Factors									
		1	2	3	4	5	6	7	8	9	10
1	Grota do Cirilo	●	●	●	●	●	●	●	●	●	●
2	Kathleen Valley	●	●	●	●	●	●	●	●	●	●
3	Cinovec	●	●	●	●	●	●	●	●	●	●
4	Goulamina	●	●	●	●	●	●	●	●	●	●
5	Salinas (Colina)	●	●	●	●	●	●	●	●	●	●
6	Finniss	●	●	●	●	●	●	●	●	●	●
7	Mt Holland	●	●	●	●	●	●	●	●	●	●
8	James Bay	●	●	●	●	●	●	●	●	●	●
9	NA Lithium	●	●	●	●	●	●	●	●	●	●
10	Rose	●	●	●	●	●	●	●	●	●	●
11	Barroso	●	●	●	●	●	●	●	●	●	●
12	Carolina Lithium	●	●	●	●	●	●	●	●	●	●
13	Ewoyaa	●	●	●	●	●	●	●	●	●	●
14	Sirmac	●	●	●	●	●	●	●	●	●	●
15	Uis	●	●	●	●	●	○	●	●	●	●
16	San Jose	●	●	○	○	●	●	●	●	●	●
17	Arcadia	●	●	●	●	●	●	●	●	●	●
18	Zinnwald	●	●	●	●	●	●	●	●	●	●
19	Pakeagama Lake	●	●	●	●	●	●	●	●	●	●
20	Manna	●	●	○	○	●	●	●	●	●	●
21	Nemaska	●	●	●	●	●	●	●	●	●	●
22	Zulu	●	●	●	●	●	●	●	●	●	●
23	Manono	●	●	●	●	●	●	●	●	●	●
24	Bougouni	●	●	●	●	●	●	●	●	●	●
25	Pioneer Dome	●	●	●	●	●	●	●	●	●	●
26	Wolfsberg	●	●	●	●	●	○	●	●	●	●
27	Trelavour	●	●	●	●	●	○	●	●	●	●
28	Karibib	●	●	●	●	●	●	●	●	●	●
29	Georgia Lake	●	●	●	●	●	●	●	●	●	●
30	Separation Rapids	●	●	●	●	●	●	●	●	●	●
31	Keliber	●	●	●	●	●	●	●	●	●	●

Source: RFC Ambrian.

Appendix 2 – Continental Brine Project Analysis

This appendix evaluates the characteristics of 17 continental brine lithium projects shown in Table 10. The comparison includes the size of the resource, the size of the planned mine, various financial measures, exploration and development progress, geopolitical risk, access and infrastructure, and the shareholder structure.

The 17 projects comprise 15 brine lithium projects with feasibility study data as well as two brine projects that have come into production this year. Within this group, eight projects (shaded) are unlikely to be a takeover target. The remaining nine projects are owned by junior lithium companies. These nine continental brine projects are our focus. However, all 17 projects have been included in our comparison charts below to provide a better benchmark.

Characteristics of Brine Projects

Of the 17 brine projects, 13 are in Argentina, three are in Chile and one is in the US. The dominance of Argentina is striking and its importance in the lithium supply chain will accelerate as these projects come on-stream.

Within the group, seven of the projects have just started or are expected to start production in the near future. Cauchari-Olaroz came on-stream this year and Rincon is being commissioned. Three other projects have started construction and a further two have construction planned.

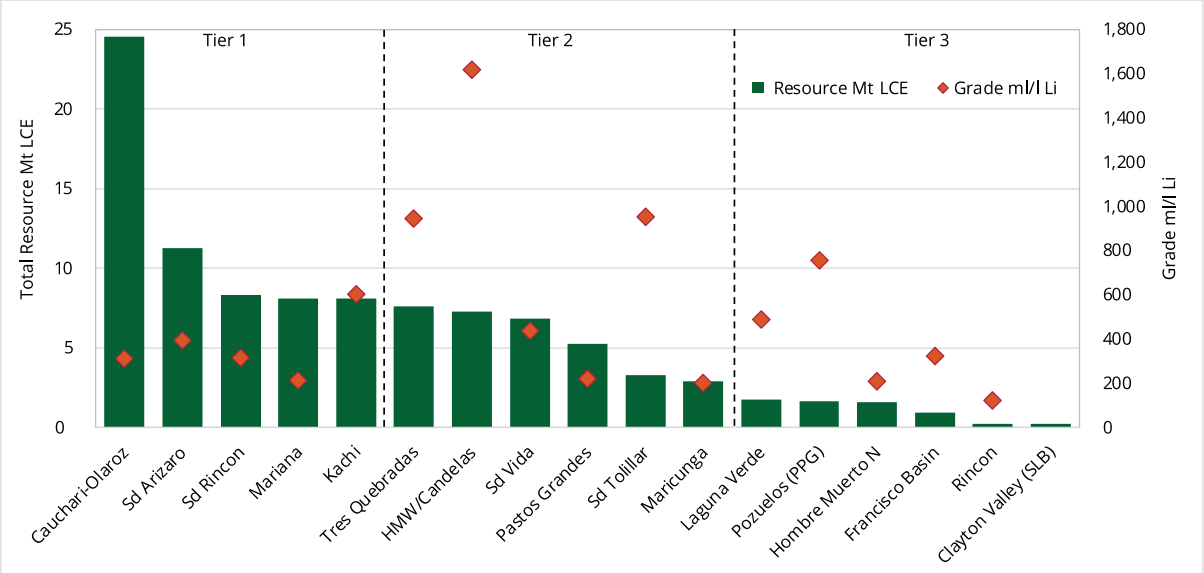
Of the 17 projects, 16 plan to produce lithium carbonate (the first chemical product produced from brine operations - with six planning to use direct lithium extraction (DLE)), and one project (Clayton Valley) plans to lithium hydroxide.

Table 10. Lithium Brine Projects Ranked by Resource Size

	Project	Country	Operating Company	Project Stage	Resource LCE Mt	Grade ml/l	Feasibility Date
1	Cauchari-Olaroz	Argentina	Ganfeng/Lithium Arg.	Operating	24.574	592	19/10/2020
2	Sd Arizaro	Argentina	Lithium Chile	PEA/PFS	11.277	312	08/08/2023
3	Sd Rincon	Argentina	Rio Tinto	Feas. Complete	8.337	393	07/07/2016
4	Mariana	Argentina	Ganfeng Lithium	Constr. Started	8.116	315	06/12/2018
5	Kachi	Argentina	Lake Resources	Feas. Underway	8.112	211	30/04/2020
6	Tres Quebradas	Argentina	Zijin Mining	Constr. Started	7.623	601	26/10/2021
7	HMW/Candelas	Argentina	Galan Lithium	Feas. Underway	7.260	946	09/12/2021
8	Sd Vida	Argentina	Allkem	Constr. Started	6.845	1,618	04/04/2022
9	Pastos Grandes	Argentina	Lithium Argentina	Constr. Planned	5.258	439	26/08/2019
10	Sd Tolillar	Argentina	Alpha Lithium	PEA/PFS	3.279	221	10/08/2023
11	Maricunga	Chile	Lithium Power Int.	Constr. Planned	2.886	953	20/01/2022
14	Laguna Verde	Chile	CleanTech Lithium	Scoping	1.789	200	05/01/2023
12	Pozuelos (PPG)	Argentina	Ganfeng Lithium	PEA/PFS	1.651	489	04/12/2018
13	Hombre Muerto N	Argentina	Lithium South Dev.	PEA/PFS	1.583	756	29/04/2019
15	Francisco Basin	Chile	CleanTech Lithium	Scoping	0.919	208	24/08/2023
16	Rincon	Argentina	Argosy Minerals	Commissioning	0.245	325	28/11/2018
17	Clayton Valley (SLB)	USA	Schlumberger	PEA/PFS	0.218	123	26/06/2017

Source: Company data.

Figure 18. Brine Lithium Projects - Resource Size (Mt LCE) and Grade (ml/l Li)



Source: RFC Ambrian, Company data.

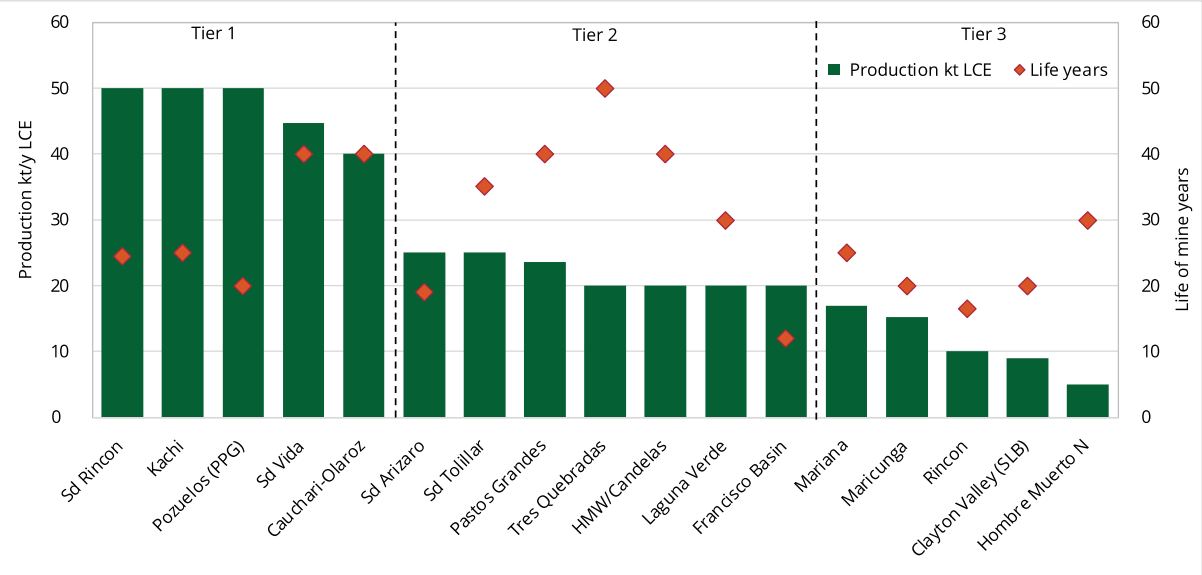
Resources and Grades

We have arbitrarily created three resource tiers to provide a benchmark for the resource size of brine lithium projects and mines. The resource tiers are:

- Resource Tier 1 >=8.0 Mt LCE
- Resource Tier 2 <8.0, >=2.0 Mt LCE
- Resource Tier 3 <2.0 Mt LCE

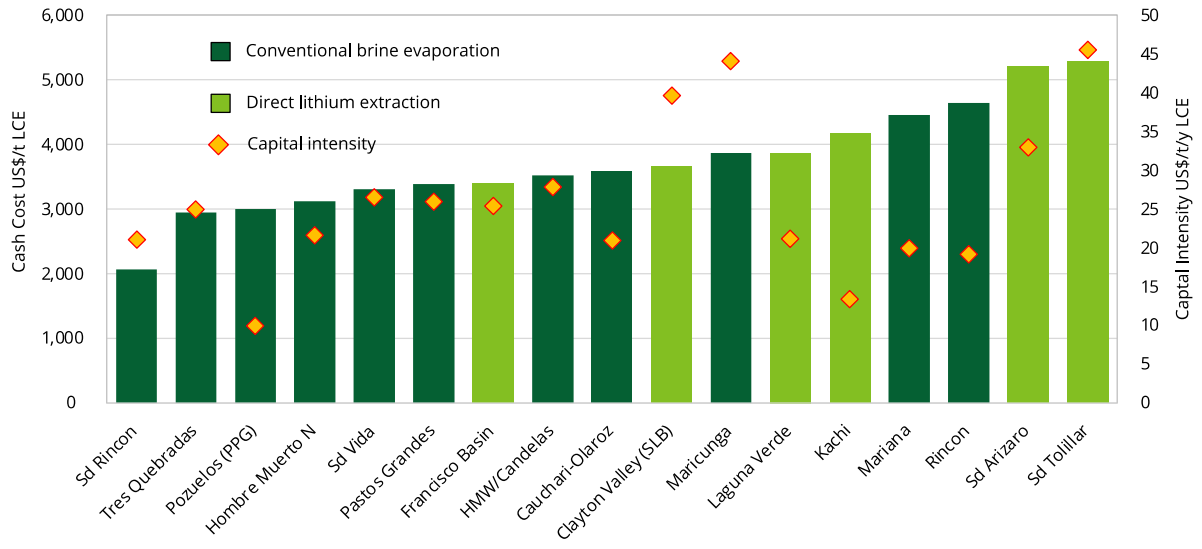
Figure 18 shows the total lithium resource size of each of the 17 brine projects project together with the project's grade (ml/l Li). There are five Tier 1 projects, six Tier 2 projects, and six Tier 3 projects. The projects have a wide range of grade variation from 123 to 1,618 ml/l Li, with an average of 512 ml/l Li. The four largest resources have some of the lowest grades.

Figure 19. Brine Lithium Projects — Average Annual Production (kt/y LCE) and LoM (years)



Source: RFC Ambrian, Company data.

Figure 20. Brine Lithium Projects — Operating Costs (US$/t LCE) and Capital intensity (US$/t/y LCE)



Source: Company data, RFC Ambrian estimates.

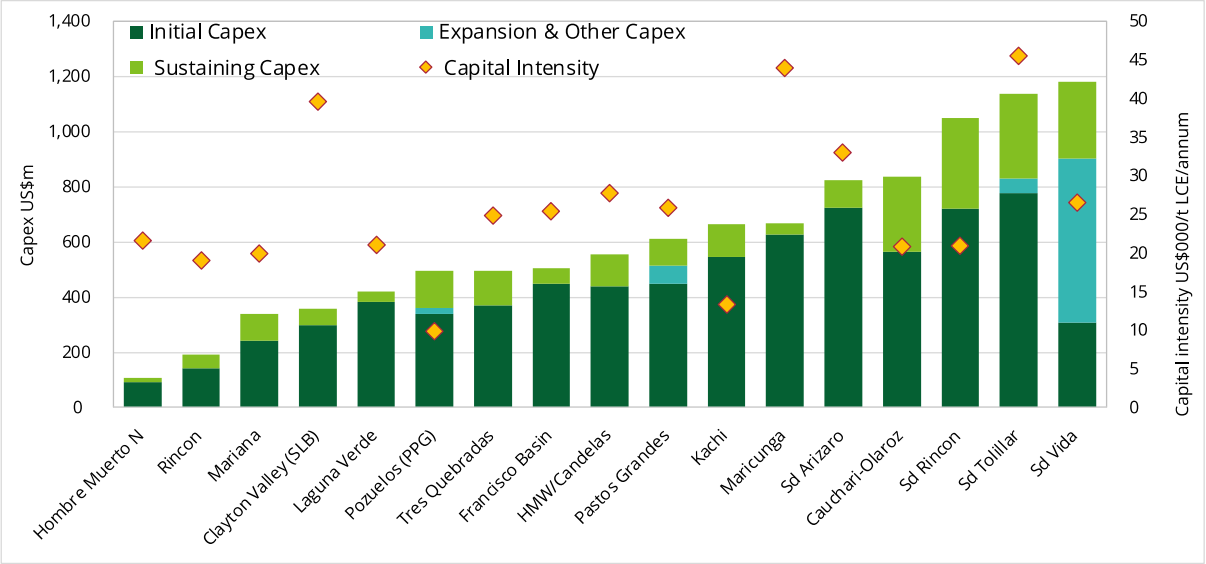
Production Levels

Figure 19 shows the average annual lithium production (kt/y LCE equivalent) over the life of mine of each of the 17 brine projects together with the project's mine life in years. There are five Tier 1 projects, seven Tier 2 projects, and five Tier 3 projects. There is a broad range of production levels across the group with an average of 26.1 kt/y LCE and the average life of mine is 29 years.

Operating Costs

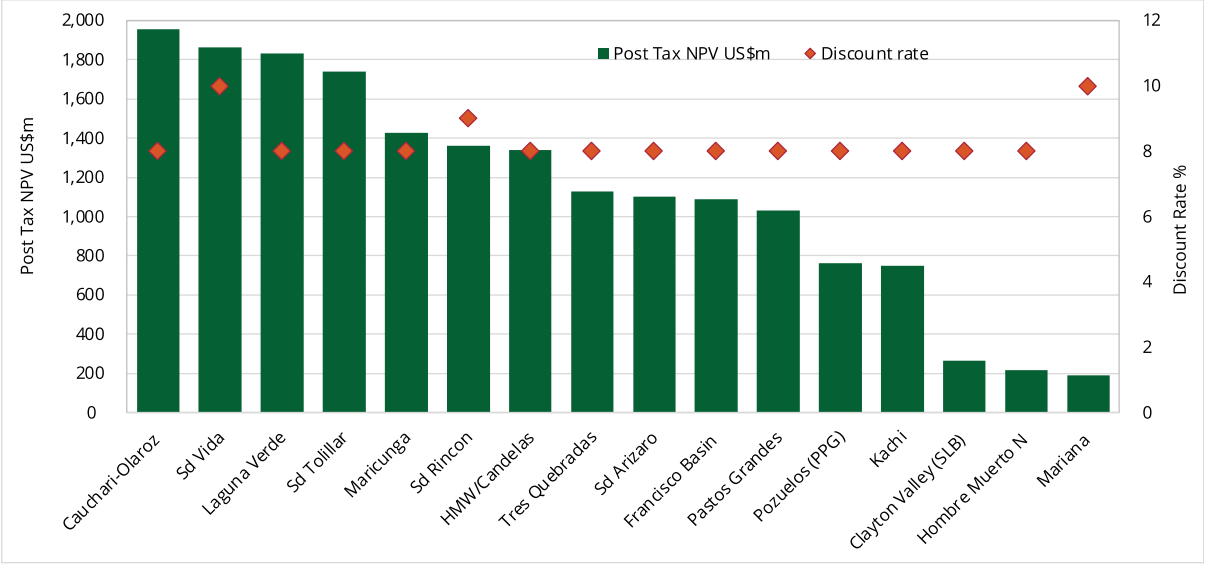
Figure 20 shows the cash operating costs taken from the feasibility studies, in US dollars per tonne LCE. Once again there is a broad spread of costs across the group. The average cost of production is US$3,735/t LCE. This is a significantly lower operating cost than the US$6,253/t LCE for the hard-rock projects directly producing lithium chemicals.

Figure 21. Brine Lithium Projects — Projected Capex LoM (US$m) with Capital Intensity (US$/t/y LCE)



Source: Company data, RFC Ambrian estimates.

Figure 22. Brine Lithium Projects — Post Tax NPV (US$m) and Discount rate (%)



Source: Company data, RFC Ambrian.

Capital Expenditure

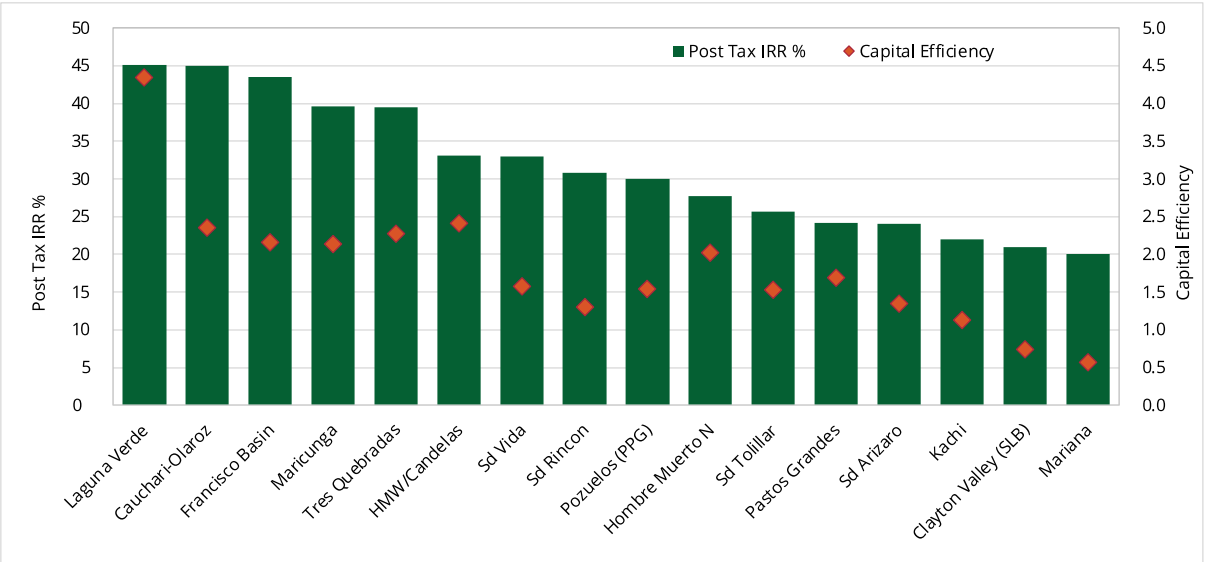
Figure 21 shows the initial, expansion, sustaining, and total capex requirements for each of the brine projects over the life of the mine, where they are reported. It also shows the capital intensity based on the LoM capex relative to the average annual production over the LoM. The average capital intensity for the brine projects is US$25,822/t/y LCE, compared with US$52,983/t/y LCE for the hard-rock lithium chemical projects.

Financial Returns

Figure 22 shows the post-tax NPV of each brine project as defined in the feasibility studies along with the discount rate used. The input lithium price varies across the base cases of each project and averages US$15,502/t for the lithium hydroxide projects.

Figure 23 shows the internal rate of return (IRR) and the capital efficiency of the brine projects. The levels of IRRs are generally very high, with all the projects

Figure 23. Brine Lithium Projects — Post Tax IRR (%) and Capital Efficiency (NPV/LoM Capex)



Source: Company data, RFC Ambrian.

having an IRR of least 20%. The median post-tax IRR is 30%. Similarly, the capital efficiency of the projects (NPV/LoM capex) is generally very high, with only two projects having a capital efficiency of less than 1.0x.

Brine Project Rankings

In order to provide a ranking of the brine projects, based on factors that investors may consider when investing in the operator, or another company may consider when looking at acquisitions, we have constructed a matrix of ten project factors (listed in the box). These are shown in Table 9 and represent what we consider to be important underlying characteristics of the 17 projects. These are ranked the same way as the hard-rock projects were ranked in Appendix 1.

While this list of brine lithium projects provides one approach to ranking the projects, other approaches and weighting could be considered. This project list is biased towards larger projects and negatively weights the projects that are owned by mining companies with multiple assets or that are Chinese owned as these are not considered as potential takeover candidates.

1. Lithium resources.
2. LoM lithium production annual capacity.
3. Internal rate of return.
4. Capital efficiency - NPV/LoM capex.
5. Capex intensity LoM.
6. Cash cost of production.
7. Geopolitical risk.
8. Access and Infrastructure.
9. Current activity and project progress.
10. Company ownership status.

Table 11. Continental Brine Lithium Projects Ranked on 10 Project Factors

Rank	Project	Project Factors									
		1	2	3	4	5	6	7	8	9	10
1	Cauchari-Olaroz	●	●	●	●	●	●	●	●	●	●
2	Sd Rincon	●	●	●	●	●	●	●	●	●	●
3	Laguna Verde	●	●	●	●	●	●	●	●	●	●
4	Francisco Basin	●	●	●	●	●	●	●	●	●	●
5	Kachi	●	●	●	●	●	●	●	●	●	●
6	Tres Quebradas	●	●	●	●	●	●	●	●	●	●
7	Sd Vida	●	●	●	●	●	●	●	●	●	●
8	HMW/Candelas	●	●	●	●	●	●	●	●	●	●
9	Pozuelos (PPG)	●	●	●	●	●	●	●	●	●	●
10	Sd Arizaro	●	●	●	●	●	●	●	●	●	●
11	Maricunga	●	●	●	●	●	●	●	●	●	●
12	Mariana	●	●	●	●	●	●	●	●	●	●
13	Pastos Grandes	●	●	●	●	●	●	●	●	●	●
14	Hombre Muerto N	●	●	●	●	●	●	●	●	●	●
15	Rincon	●	●	○	○	●	●	●	●	●	●
16	Sd Tolillar	●	●	●	●	●	●	●	●	●	●
17	Clayton Valley (SLB)	●	●	●	●	●	●	●	●	●	●

Source: RFC Ambrian.

Appendix 3 – Unconventional Project Analysis

This appendix evaluates the characteristics of 14 unconventional lithium projects shown in Table 12. The comparisons include the size of the resource, the size of the planned mine, various financial measures, exploration and development progress, geopolitical risk, access and infrastructure, and the shareholder structure.

These projects are essentially modified forms of hard-rock or brine operations, but they do not clearly fit into those categories for comparison, and so we have grouped them into their own 'unconventional' category. The 14 projects comprise one geothermal brine project, five oilfield brine projects, and eight sedimentary projects which all have feasibility study data.

Within this group, one project (darker shaded) is unlikely to be a takeover target. The remaining 13 projects are owned by junior lithium companies. However, all 14 projects have been included in our comparison charts below to provide a better benchmark.

Characteristics of Selected Projects

Of the 14 unconventional projects, nine are in the United States, two are in Canada and one is in each of the countries Peru, Germany, and Mexico. One project is already under construction and two projects have construction planned, including the large geothermal resource in Germany.

Thacker Pass in the United States will be the first unconventional lithium project to come on-stream. Successful implementation of the large number of unconventional lithium projects in the United States will be important in developing the country's lithium supply chain.

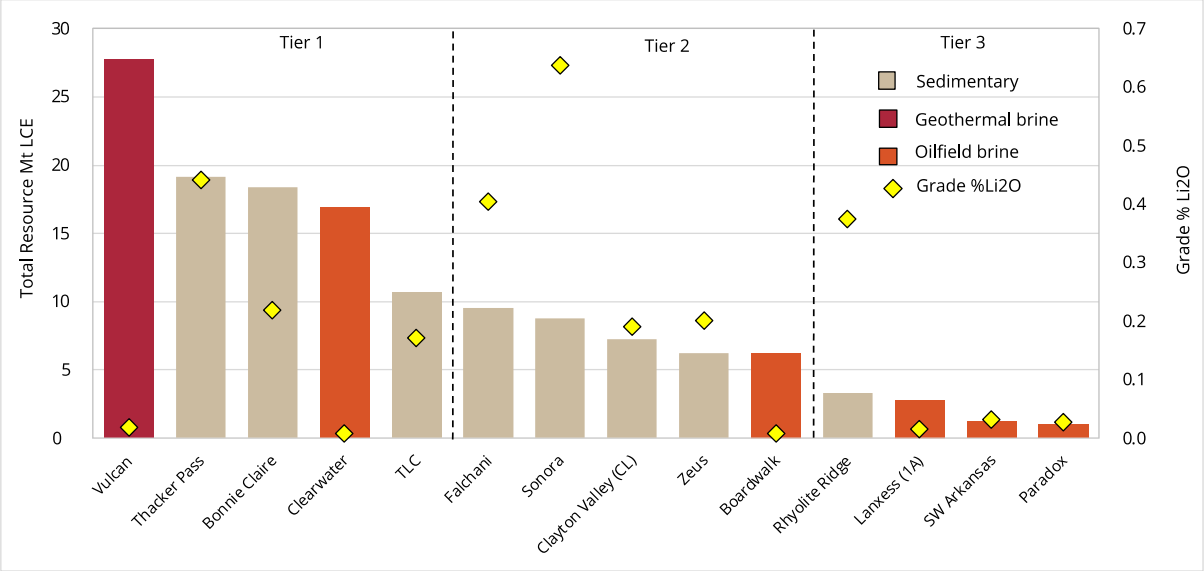
These unconventional lithium projects are mostly relatively low-grade projects, with generally high upfront capex requirements, but are still economic. Of the 14 unconventional lithium projects, 10 plan to produce lithium carbonate, and four projects plan to produce lithium hydroxide. Six of the projects are planning to use direct lithium extraction (DLE).

Table 12. Unconventional Lithium Projects Ranked by Resource Size

	Project	Country	Operating Company	Project Stage	Resource LCE Mt	Grade % Li_2O	Feasibility Date
1	Vulcan	Germany	Vulcan Energy	Constr. Planned	27.708	0.018	13/02/2023
2	Thacker Pass	USA	Lithium Americas	Constr. Started	19.141	0.441	31/01/2023
3	Bonnie Claire	USA	Nevada Lithium	PEA/PFS	18.369	0.218	13/10/2021
4	Clearwater	Canada	E3 Lithium	PEA/PFS	16.920	0.008	16/11/2020
5	Falchani	Peru	American Lithium	PEA/PFS	11.623	1.464	04/02/2020
6	TLC	USA	American Lithium	PEA/PFS	10.688	0.170	01/02/2023
7	Sonora	Mexico	Ganfeng Lithium	Constr. Planned	8.809	0.637	12/12/2017
8	Clayton Valley (CL)	USA	Century Lithium	Feas. Underway	7.237	0.190	19/05/2020
9	Zeus	USA	Noram Lithium	PEA/PFS	6.265	0.200	08/12/2021
10	Boardwalk	Canada	LithiumBank Res.	PEA/PFS	6.205	0.007	25/05/2023
11	Rhyolite Ridge	USA	Ioneer	Feas. Complete	3.331	0.374	30/04/2020
12	Lanxess (1A)	USA	Standard Lithium	Feas. Complete	2.816	0.015	06/09/2023
13	SW Arkansas	USA	Standard Lithium	PEA/PFS	1.195	0.031	12/10/2021
14	Paradox	USA	Anson Resources	Feas. Complete	1.039	0.027	08/09/2022

Source: Company data.

Figure 24. Unconventional Lithium Projects - Resource Size (Mt LCE) and Grade (% Li2O)



Source: RFC Ambrian, Company data.

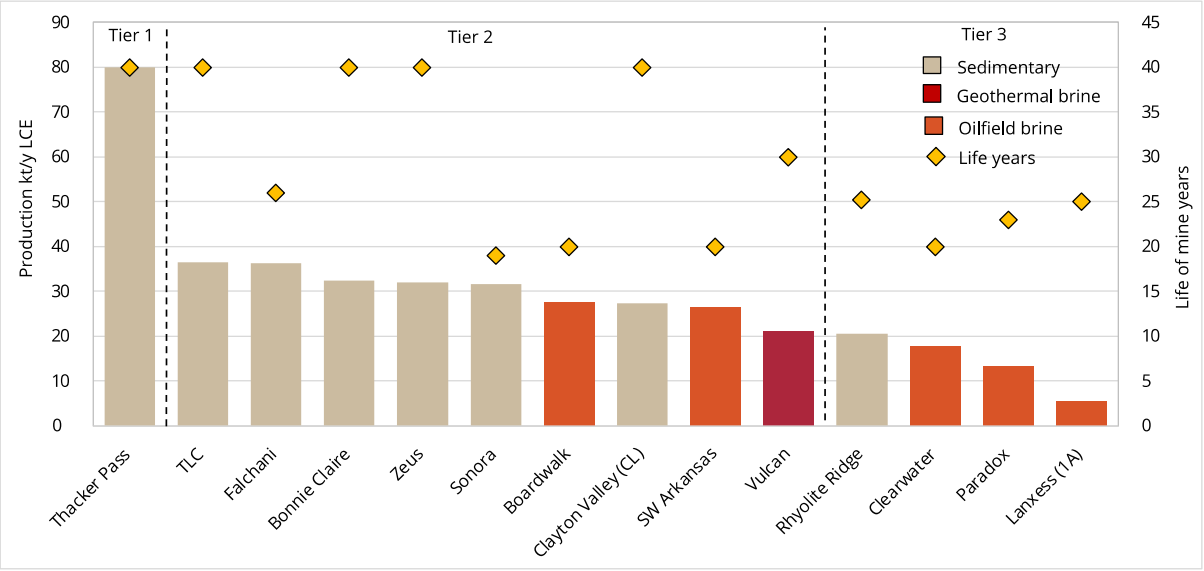
Resources and Grades

We have arbitrarily created three resource tiers to provide a benchmark for the resource size of these lithium projects and mines. The resource tiers are:

- Resource Tier 1 >=10.0 Mt LCE
- Resource Tier 2 <10.0, >=5.0 Mt LCE
- Resource Tier 3 <5.0 Mt LCE

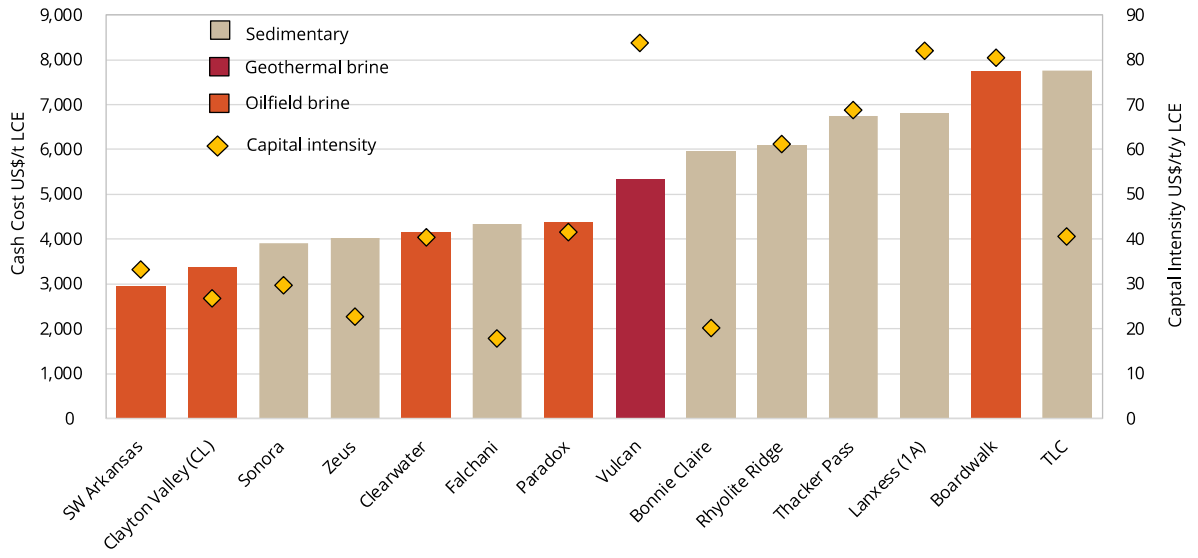
Figure 24 shows the total lithium resource size of each of the 14 projects project together with the project's grade (% Li_2O). There are five Tier 1 projects, five Tier 2 projects, and four Tier 3 projects. The projects have a wide range of grades with an average of 0.27% Li_2O.

Figure 25. Unconventional Lithium Projects — Average Annual Production (kt/y LCE) and LoM (years)



Source: RFC Ambrian, Company data.

Figure 26. Unconventional Projects — Operating Costs (US$/t LCE) and Capital intensity (US$/t/y LCE)



Source: Company data, RFC Ambrian estimates.

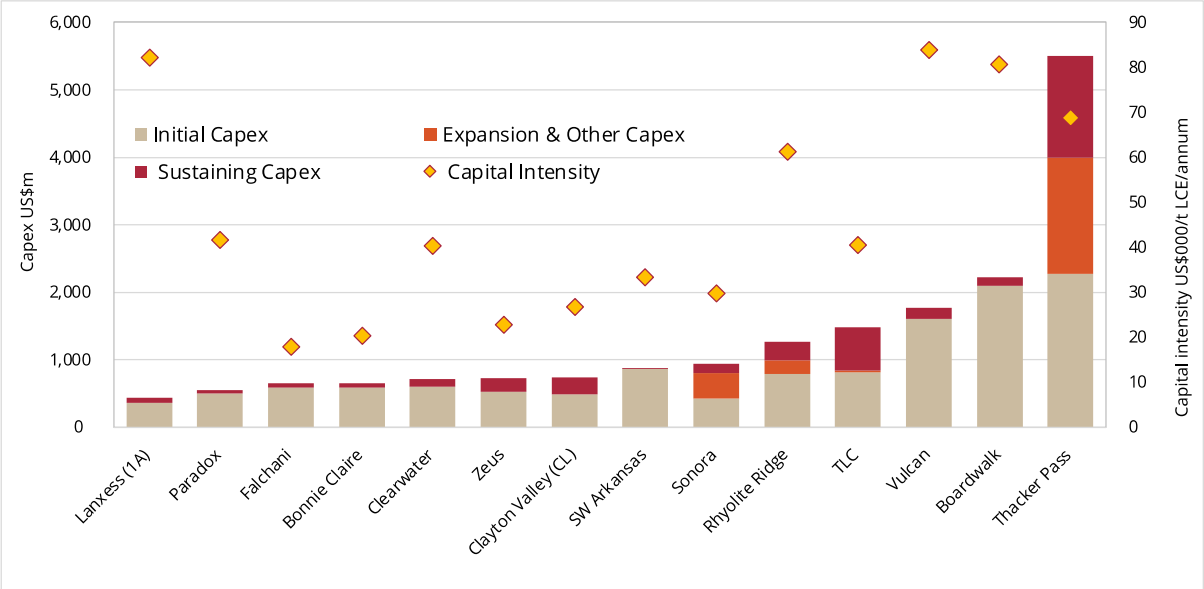
Production Levels

Figure 25 shows the average annual lithium production (kt/y LCE equivalent) over the life of mine of each of the 14 unconventional projects together with the project's mine life (years). There is one Tier 1 project, nine Tier 2 projects, and four Tier 3 projects. There is a broad range of production levels across the group with the average being 29.1 kt/y LCE and the average life of mine is 29 years.

Operating Costs

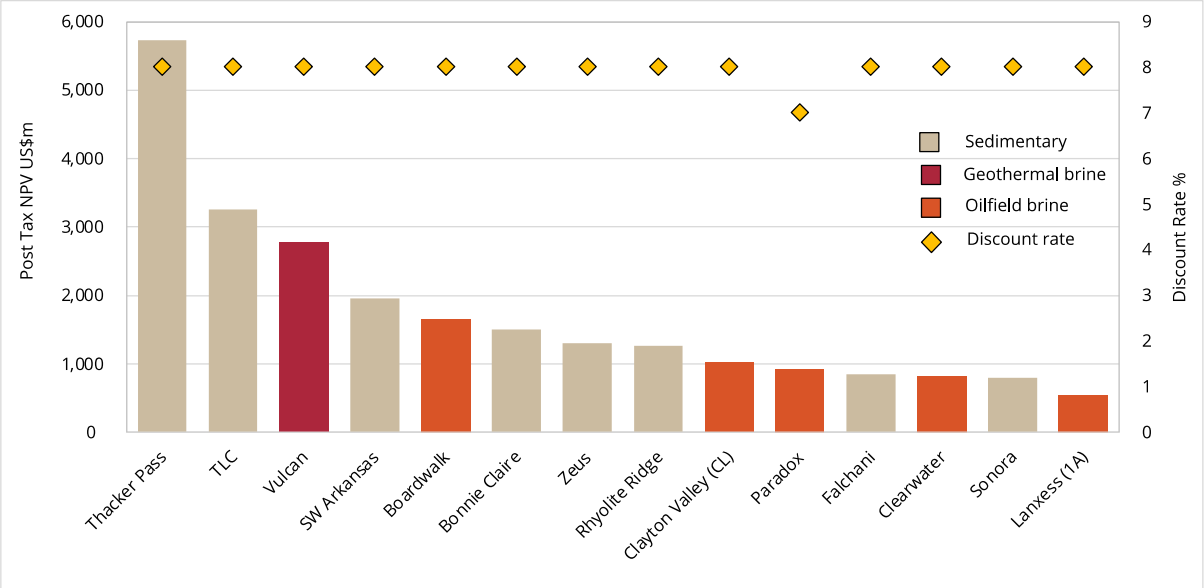
Figure 26 shows the cash operating costs taken from the feasibility studies, in US dollars per tonne LCE. Once again there is a broad spread of costs across the group. The average cost of production for the unconventional projects is US$5,254/t LCE. This compares with US$3,735/t LCE for brine projects and US$6,253/t LCE for the hard-rock projects directly producing lithium chemicals.

Figure 27. Unconventional Lithium Projects — Projected Capex LoM and Capital Intensity



Source: Company data, RFC Ambrian estimates.

Figure 28. Unconventional Lithium Projects — Post Tax NPV (US$m) and Discount rate (%)



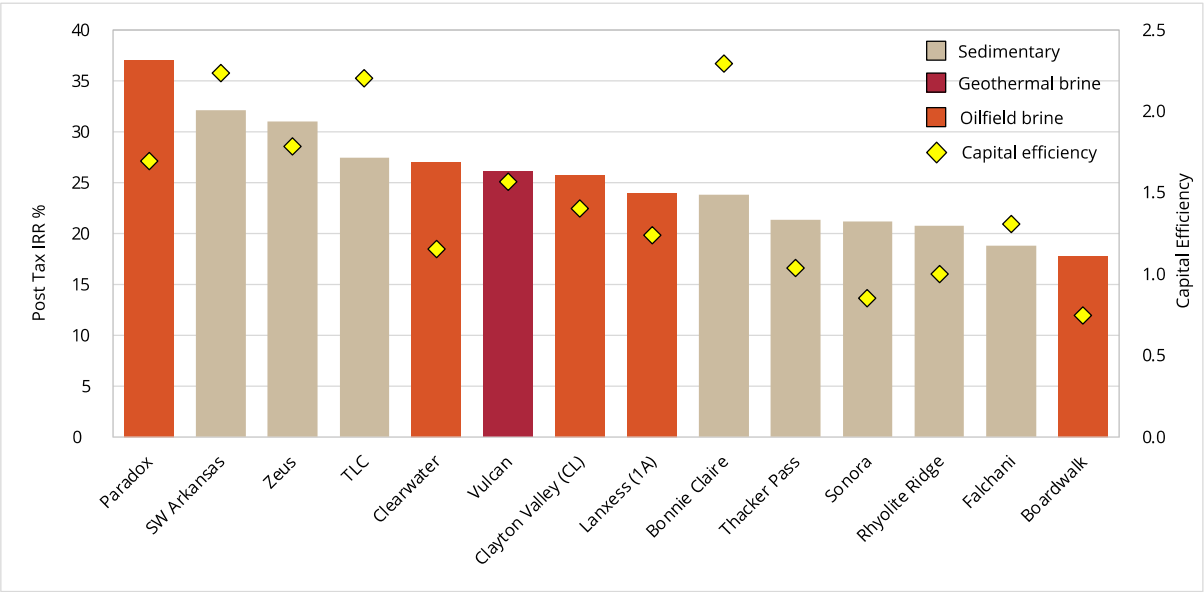
Source: Company data, RFC Ambrian.

Capital Expenditure

Figure 27 shows the initial, expansion, sustaining, and total capex requirements for each of the unconventional projects over the life of the mine, where they are reported. It also shows the capital intensity on the basis of the LoM capex relative to the average annual production over the LoM. The total capex required for Thacker Pass is significantly larger than the other projects.

The average capital intensity for the unconventional projects is US$46,416/t/y LCE. This compares with US$25,822/t/y LCE for the brine projects and US$52,983/t/y LCE for the hard-rock lithium chemical projects.

Figure 29. Unconventional Lithium Projects — Post Tax IRR (%) and Capital Efficiency (NPV/Capex)



Source: Company data, RFC Ambrian.

Financial Returns

Figure 28 shows the post-tax NPV of each brine project as defined in the feasibility studies along with the discount rate used. The NPV is usually most sensitive to the commodity input price and the discount rate. The input lithium price varies across the base cases of each project and averages US$16,160/t for the lithium carbonate projects and US$21,216/t for the lithium hydroxide projects.

Figure 29 shows the internal rate of return (IRR) and the capital efficiency. The levels of IRRs are generally high with all the projects having an IRR of at least 18%. The median post-tax IRR is 25%. Similarly, the capital efficiency of the projects (NPV/LoM capex) are generally high, with only two projects having a capital efficiency of less than 1.0x.

Unconventional Project Rankings

In order to provide a ranking of the unconventional projects, based on factors that investors may consider when investing in the operator, or another company may consider when looking at acquisitions, we have constructed a matrix of ten project factors (listed in the box). These are ranked the same way as the hard-rock projects were ranked in Appendix 1 to produce an overall score with the listing order shown in Table 13.

1. Lithium resources.
2. LoM lithium production annual capacity.
3. Internal rate of return.
4. Capital efficiency - NPV/LoM capex.
5. Capex intensity LoM.
6. Cash cost of production.
7. Geopolitical risk.
8. Access and Infrastructure.
9. Current activity and project progress.
10. Company ownership status.

While this list of unconventional lithium projects provides one approach to ranking the projects, other approaches and weighting could be considered. This project list is biased towards larger projects and negatively weights the projects that are owned by mining companies with multiple assets or that are Chinese owned as these are not considered as potential takeover candidates.

Table 13. Unconventional Lithium Projects Ranked on 10 Project Factors

Rank	Project	Project Factors									
		1	2	3	4	5	6	7	8	9	10
1	Bonnie Claire										
2	Zeus										
3	TLC										
4	Clayton Valley (CL)										
5	Falchani										
6	Vulcan										
7	SW Arkansas										
8	Clearwater										
9	Thacker Pass										
10	Paradox										
11	Boardwalk										
12	Sonora										
13	Lanxess (1A)										
14	Rhyolite Ridge										

Source: RFC Ambrian.

Appendix 4 – High-Profile Project Overviews

1. Grota do Cirilo

The Grota do Cirilo hard-rock spodumene project is located in Minas Gerais, Brazil and is 100%-owned by Canadian-listed **Sigma Lithium** (TSXV SGML: C$36.97 | US$3.02 bn). This is a large, high-grade resource with scope for expansion. Following the latest exploration program, Sigma announced in November 2023 that it expects to increase the resource by 25%.

Sigma Lithium is currently focused on constructing the mine in a phased approach, with Phase 1 production having commenced from the Xuxa deposit in April 2023. Phase 1 of the project is expected to produce 36.7 kt/y LCE and Phases 2 & 3 are expected to increase output to 104.2 kt/y LCE in 2024. Initial capex for the three phases is US$285 m with a low capital intensity.

The project uses 100% renewable energy, 100% recycled water, and produces 100% dry-stacked tailings. The concentrator plant is designed to initially produce a 6.0% Li_2O spodumene concentrate from an ore grade of 1.46% Li_2O (diluted) using dense media separation (DMS).

This is an extremely large project with extremely high returns and with good potential for resource expansion. As a result, we believe that it may be of interest to a third party in the medium term.

2. Bonnie Claire

The Bonnie Claire project located in Nevada, United States is 100% owned by **Nevada Lithium** (CSE NVLH: C$0.19 | US$29.9 m). It is a very large unconventional deposit comprising of sediment hosted lithium. The mine plans to produce 32.3 kt/y of battery grade lithium carbonate. The project is at PEA stage.

The project has a high capital efficiency with a low initial capex of US$584 m and a post-tax NPV_8 of US$1.5 bn and an IRR of 24%. Nevada Lithium acquired the outstanding 50% of the project in July 2023 and is currently undertaking a core drilling program designed to support a PFS.

The project has a long life and good financial returns and gives exposure to the US market which may be attractive to some companies. As a result, we believe that it may be of interest to a third party in the medium term.

3. Kathleen Valley

The Kathleen Valley spodumene project is located in Western Australia and is 100% owned by **Liontown Resources** (ASX LTR: A$1.47 | US$2.44 bn). It is a large, high-grade resource expected to commence production in mid-2024. Construction started in 2022. The open pit and underground mine plans to produce a 6.0% Li_2O spodumene concentrate equivalent to 90.2 kt/y LCE over the LoM. Liontown has a A$300 m finance facility with Ford and also has offtake agreements with Tesla and LG Energy. A study for downstream processing has commenced in alliance with Sumitomo.

Liontown has already been the subject of a takeover proposal by Albemarle but it withdrew its US$4.2 bn offer in October 2023 due to "the growing complexities associated with executing the transaction" and followed an announcement by Hancock Prospecting that it had acquired a 19.9% stake in Liontown.

This is an extremely large, long-life project with very high returns. Given its quality, we believe that it may still be of interest to a third party and could be acquired by Hancock or a majority position could be acquired by another company.

4. Zeus

The Zeus project located in Nevada, United States is 100% owned by **Noram Lithium** (TSXV NRM: C$0.42 | US$27.9 m). Zeus is a Tier 2 sediment hosted lithium project based on current resource and planned production levels but has very strong financial returns. The mine plans to produce 31.9 kt/y of battery grade lithium carbonate. The project is at PEA stage and a PFS is underway.

The project has a low strip ratio and plans to use dry-stack tailings. The initial capex is US$528 m and the project has an after-tax NPV_8 of US$1.3 bn and a 31% IRR.

This mid-sized US-based project has strong returns and potential for resource expansion. As a result, we believe that it may be part of industry consolidation in the medium term.

5. TLC

The TLC project is located in Nevada, United States and is 100% owned by **American Lithium** (TSXV LI: C$1.64 | US$263 m). TLC is a very large, long-life claystone deposit with good financial returns. The project is at PEA stage with a PFS underway and the mine plans to produce 36.5 kt/y of lithium carbonate.

The initial capex is US$819 m and the project has an after-tax NPV_8 of US$3.2 bn and a 28% IRR. American Lithium is also developing the Falchani hard-rock lithium project in Peru.

This large US-based project has good returns and may be of interest to a third party in the medium term. The company's Falchani project is also looking promising.

6. Clayton Valley (CL)

The Clayton Valley (CL) project is located in Nevada, United States and is 100% owned by **Century Lithium** (TSXV LCE: C$0.66 | US$73 m). The project is a large, long-life claystone deposit with strong financial returns. A PFS was completed in March 2021 and the mine plans to produce 27.4 kt/y of battery grade lithium carbonate utilizing a DLE plant. A pilot DLE plant is currently operating, and a feasibility study is expected to be completed in 2H 2023.

Based on the PFS, the initial capex is US$493 m and the project has an after-tax NPV_8 of US$1.0 bn and a 26% IRR.

The upcoming feasibility study should provide a better view of the potential of this large US-based project. We believe that it may be of interest to a third party in the medium term.

7. Salinas (Colina)

The Salinas (Colina) hard-rock project is located in Minas Gerais, Brazil and is 100% owned by Australian-based **Latin Resources** (ASX LRS: A$0.21 | US$402 m). Colina is a mid-size deposit but is planning a high production level based on a low-capital, two-phased operation to produce a 5.5% spodumene concentrate and a 3% spodumene tails concentrate (64.2 kt/y LCE). The mine will utilise hydroelectricity and dry-stack tailings.

The project has very strong returns with initial capex of US$303m, an after-tax NPV_8 of US$2.5bn and after-tax IRR of 132%. An updated resource is expected in 4Q 2023 and a DFS is expected to be completed mid-2024.

With significant expansion potential to expand the resources and mine life, the returns on this project are attractive. As a result, we believe that it may be of interest to a third party in the medium term.

8. Cinovec

The Cinovec hard-rock lithium and tin project is located in the Czech Republic and is 51% owned by **CEZ Group** (PR CEZ: PLN178 | EUR20.5bn) and 49% owned by **European Metals** (AIM & ASX EMH: A$0.61 | US$87 m). It is the largest hard-rock lithium project in Europe. A DFS is underway and due for completion in 4Q 2023. A recent pilot programme has confirmed the industrial viability of the process flowsheet.

The underground project intends to produce 22.5 kt/y of lithium carbonate over the first 20 years. The project plans to use solar energy and green hydrogen and use an electric mining fleet. The initial capex is US$644 m and the project has an after-tax NPV_8 of US$1.9 bn and a 36% IRR.

This is a significant hard-rock lithium deposit planning a reasonable production level with good returns and plans to produce lithium carbonate. However, any full takeover would depend on the position of CEZ which is an integrated energy group owned 70% by the Czech Republic.

9. Kachi

The Kachi brine project is located in Argentina and 100% owned by **Lake Resources** (ASX LKE: A$0.165 | US$162 m). Kachi is a large, higher grade brine resource with solid returns and plans to produce 50 kt/y battery grade lithium carbonate in two phases. It plans to utilize ion-exchange DLE technology which has a low capital intensity, higher recoveries than conventional brine extraction, and less impact on the environment.

A pre-feasibility study was completed in 2020 and the initial capex is US$544 m and the project has an after-tax NPV_8 of US$748 m and a 22% IRR. A definitive feasibility study is targeted for December 2023.

The large resource still has exploration upside and on successful implementation of the DLE processing technology it could be attractive to a third party.

10. Vulcan

The Vulcan geothermal brine project is located in the Upper Rhine Valley of Germany and is operated by **Vulcan Energy Resources** (ASX/FSE VUL: A$2.71 | US$315 m). A DLE pilot plant is being installed and plans are underway for the financing and construction of a 24 kt/y lithium hydroxide plant. This is an extremely large, low-grade resource that will utilize DLE and benefit from geothermal energy in the process and secondary sale. The initial capex is high at US$1.6 bn but the project has an after-tax NPV_8 of US$2.8 bn and a 26% IRR.

Auto company Stellantis has invested US$52m for an 8% stake in Vulcan Energy. Other offtake partners include Volkswagen, Renault, Umicore and LG Energy Solution.

This large lithium resource is scalable for production and could be of interest to a third party looking for exposure to geothermal energy and the European lithium market.

11. Rose

The Rose hard-rock lithium and tantalum project is located in Quebec, Canada and is 100% owned by **Critical Elements Lithium** (TSXV CRE: C$1.26 | US$205 m). Rose is a Tier 2 lithium project based on current resource and planned production levels but has very strong financial returns.

A feasibility study was completed in October 2023 and the mine plans to produce 28.3 kt/y LCE of technical and chemical grade spodumene concentrate. The mine will be powered by hydroelectricity. The initial capex is US$456 m and the project has an after-tax NPV_8 of US$2.1 bn and a 66% IRR.

This mid-sized Canadian-based project has strong returns and potential for resource expansion to depth. As a result, we believe that it may be part of industry consolidation in the medium term.

12. Finniss

The Finniss mine is located in Northern Territory, Australia and is 100% owned by **Core Lithium** (ASX CXO: A$0.365 | US$538 m). Core completed construction in February 2023 and is currently ramping up commercial production. Output is a 5.5% spodumene concentrate (25.1 kt/y LCE). Core has secured four-year offtake agreements with Sichuan Yahua and Ganfeng Lithium. Sichuan Yahua (4%) and Ganfeng Lithium (5%) hold an interest in Core Lithium.

The existing economics are based on open-pit and underground at Grant's and BP33 with a 12-year mine life. Core is also assessing adding downstream processing opportunities in the Northern Territory.

This is a mid-tier project, but it has a low capital intensity and operating costs. The Chinese interests may prevent a full takeover and limit alternative offtake, but it may be part of industry consolidation in the medium term.

13. North American Lithium

The North American Lithium (NAL) project is located in Quebec, Canada and is 75% owned by **Sayona Mining** (ASX SYA: A$0.079 | US$561 m) and 25% by **Piedmont Lithium** (ASX PLL: A$0.45 | US$596 m). In March 2023, Sayona announced the successful restart of production at NAL and the mine is currently ramping up production to nameplate

capacity to produce 25.4 kt/y LCE of spodumene concentrate over the life of mine.

NAL is a Tier 2 lithium project but forms the key part of Sayona's Abitibi hub along with the nearby Authier and Tansim lithium projects and offers resource expansion. With no initial capex the project has an after-tax NPV_8 of US$1.0 bn and has extremely high financial returns. The mine is powered by hydroelectricity.

This Canadian project is currently mid-tier but has high financial returns and significant potential for resource expansion and may be part of industry consolidation in North America.

14. Laguna Verde

The Laguna Verde brine project is located in Chile and is 100% owned by **CleanTech Lithium** (AIM CTL: £$0.31 | US$39 m). This is a Tier 3 project, but it is at an early stage and new wells are planned to increase the resource estimate. A scoping study was completed in December 2022 and a DLE pilot plant is due to be commissioned in 4Q 2023. By using DLE the project has a low capital intensity, higher recoveries than conventional brine extraction, and less impact on the environment. Drilling has also indicated a strong geothermal influence on the brines at Laguna Verde, at ideal temperatures for the DLE process to produce 20 kt/y of battery grade lithium carbonate.

The initial capex is US$384 m and the project has an after-tax NPV_8 of US$1.8 bn and a 45% IRR. A PFS is underway and expected in 1Q 2024.

This is an early-stage asset but with a growing resource, low costs, and strong returns. Combined with the Francisco Basin project, also owned by Cleantech Lithium, this may be of interest to a third party in the medium term.

15. Francisco Basin

The Francisco Basin brine project is located in Chile and is 100% owned by **CleanTech Lithium** (AIM CTL: £$0.31 | US$39 m). This is an early-stage Tier 3 project with a scoping study completed in September 2023. New wells are planned to increase the resource estimate and the project plans to utilise a DLE process to produce 20 kt/y of battery grade lithium carbonate.

The initial capex is US$450 m and the project has an after-tax NPV_8 of US$1.1 bn and a 44% IRR. A PFS is underway and expected by the end of 2024.

This is another early-stage asset but with a growing resource, low costs, and strong returns. Combined with the Laguna Verde project, also owned by Cleantech Lithium, this may be of interest to a third party in the medium term.

Figure 38. Lithium Development Projects Zeus and Kachi

Source: Noram Lithium and Lake Resources

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