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The Lithium Report

The Next 10 Years 2025 – 2035

Everything you need to know about upstream lithium supply

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World Summary

Overview

World lithium production in 2024 is dominated by three countries, Australia, Chile and China which collectively account for 80% of global mine output. Australia accounts for half of that amount, i.e. 39% of global output. **Total world production in 2024 was about 1.27 Mt LCE.**

By 2030 the situation will change significantly, with total production set to increase to 4.3 Mt LCE. **This is equivalent to a CAGR of 22.8% from 2024 to 2030.**

While Australia will increase production by 85% and Chile by 60%, **China will increase production by 326% to become the second largest producer.** This will maintain China's share of world production at 19% while the share held by Chile and Australia will fall by half. Africa and Argentina will overtake Chile, with **Africa set to become the third largest producer in the world.**

While our projections show growth then slowing after 2030,to 5.7% CAGR, reaching 5.7 Mt LCE in 2035, this is due to the effect of the smaller number of potential new and expansion projects that can currently be foreseen. As long as the economics of lithium mining justify it, production could continue to increase at a higher rate during the 2030s fuelled by brine resources in particular.

If mine production reaches 4.3 Mt LCE in 2030, this would be sufficient in very broad terms for approximately 57 million electric vehicles equipped with a 60 kWh battery[1]. That figure **is equivalent to the current combined size of the European, Chinese and US car market**. Therefore growth of the order of 20% p.a. in lithium production is by no means excessive – it is in line with what is required to keep pace with the planned energy and transport transition.

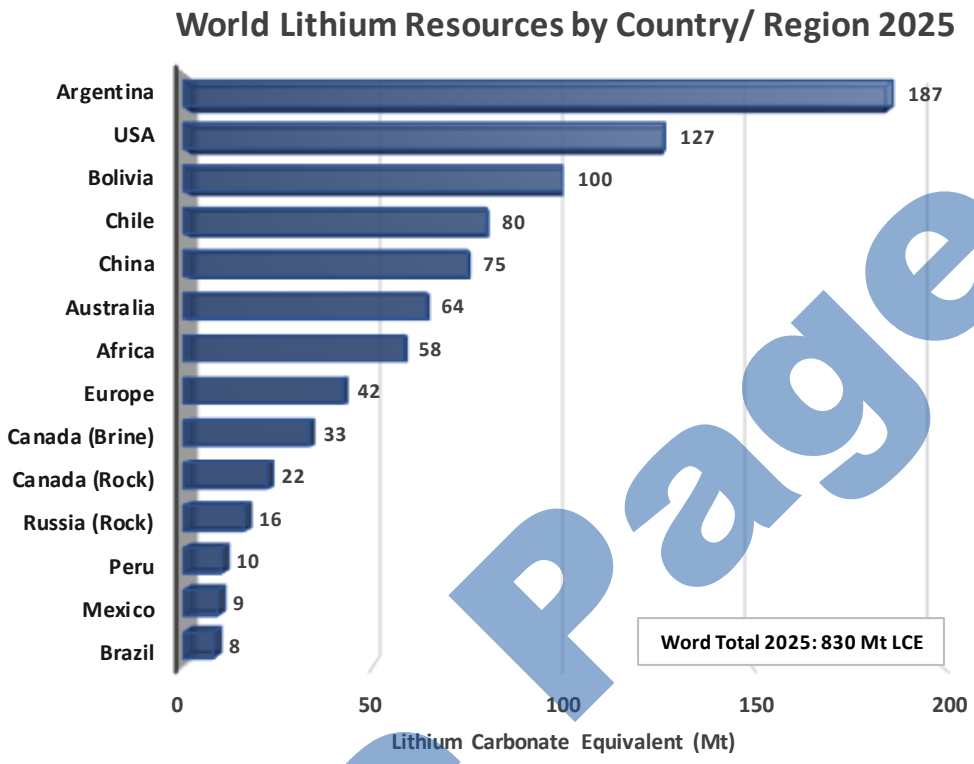
In reality, the amount of lithium available for EVs will be less than the headline total production due to the use of lithium for other purposes. If we consider that 80% of lithium production is available for EVs, some **46 million electric vehicles with a 60 kWh battery would be able to be produced in 2030**.

Therefore the production increases which are currently anticipated between 2025 and 2030 appear to be able to make up for a large part of the shortfall that has been predicted between lithium supply and demand up to that point in time but further expansion and new projects will be required in the second half of the ten year period (i.e. from 2030 - 2035) to continue the energy transition, if it continues to be based on lithium ion batteries. Brine and clay resources are the largest deposits in terms of absolute size and will have to form the mainstay of future lithium production increases during the 2030s.

When production reaches 5 Mt LCE per year from 2032 onwards, nearly 1% of the total global resource base will be extracted per year. Considering that extractible or minable reserves will be much lower than the total resource, 2% or more of the global minable resource would be extracted per year which would not be sustainable. This will increase interest in the one major resource that this report highlights which has not yet received wider appreciation outside of the Russian Federation, namely the **Central Siberian Platform (CSP). The CSP resource potentially contains up to 20 times as much lithium as the rest of the world's resources put together.**

Resources by Country

The total lithium mine resources of each country are illustrated in the following chart.



- The total World lithium resource is therefore currently 830 Mt LCE.

Argentina how holds the largest resource with 25 salar projects making up the total.

The USA also holds a large resource base due to its clay deposits in Nevada and the Salton Sea geothermal field, i.e. with 4 deposits in the 20 Mt LCE class.

Chile of course holds the Salar de Atacama (57 Mt LCE) but its other resources are limited.

China has a very large number of deposits (54 identified in this report) but only four of them contain more than 5 Mt LCE. Australia is better endowed with six deposits holding 5 Mt LCE or more.

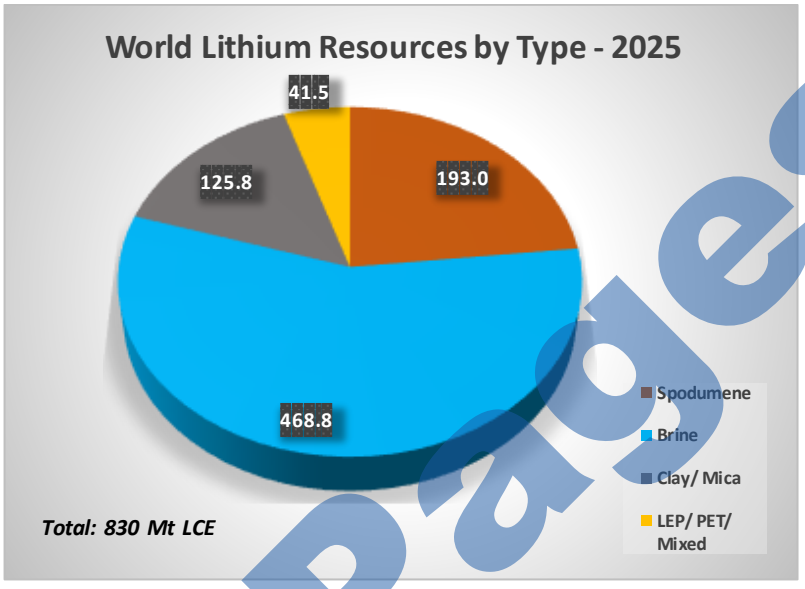
Africa's resource base is dominated by the Manono spodumene deposit in the DRC which is more than twice as large as Greenbushes, Australia. Half of Manono is now controlled by China.

Europe is not well endowed with resources. It only has three large resources: Jadar, Zinnwald/Cinovec and the Upper Rhine Valley geothermal brines. Jadar is a world-class spodumene deposit but subject to intense public opposition, as are most of the lithium projects in Europe. Cinovec is of low grade and the URVLP is a very complex and expensive undertaking.

Canada's spodumene deposits are quite small, the largest being 3.8 Mt LCE. During the 2030s, Canada may be better served by developing its larger brine resources in the west of the country, despite the challenges. Russia's hard rock deposits are also small but their brine potential is of a different order of magnitude altogether (see below).

Resource Breakdown by Type of Deposit

The following chart shows the breakdown of the total global lithium resource base of 830 Mt (excluding the CSP) by type of deposit: brine, spodumene, clay /mica /tuff (soft materials) and other hard rock minerals, such as lepidolite, petalite or mixtures.

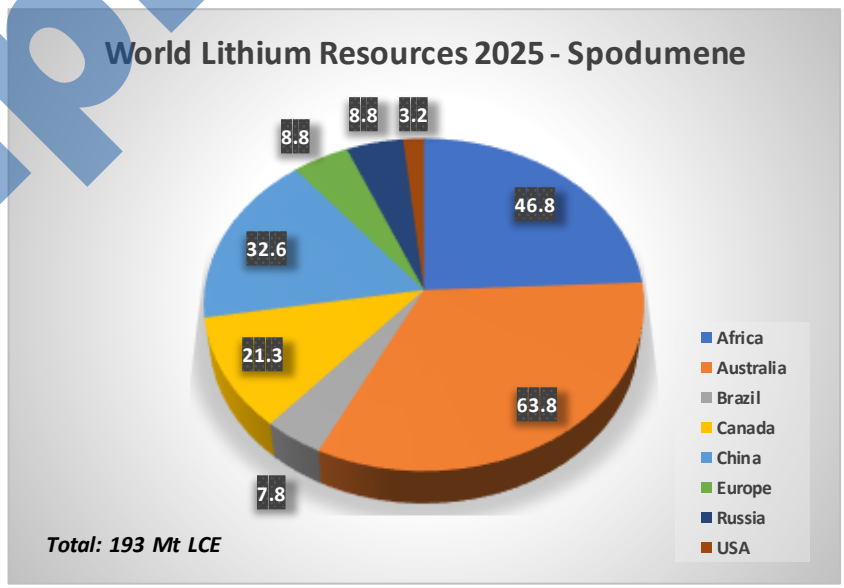


- **Brine resources make up over 56% of the total world lithium resource base.**
- Spodumene deposits account for 23% of the world's lithium resources.

Although brine makes up more than half of the lithium resource, **in 2024 only 449 kt out of total lithium production of 1.27 Mt LCE came from brine (35%).**

Spodumene – Breakdown by Country

The following chart shows the geographical distribution of the global spodumene resource.



Although Australia still holds the largest spodumene resource, Africa holds nearly 75% as much. This resource growth is overwhelmingly due to the discovery of the Manono pegmatite in the DRC which is twice as large as Greenbushes with potential for further expansion to the north east. It is highly possible that the resource will increase to put Africa on an equal footing with Australia in terms of spodumene alone.

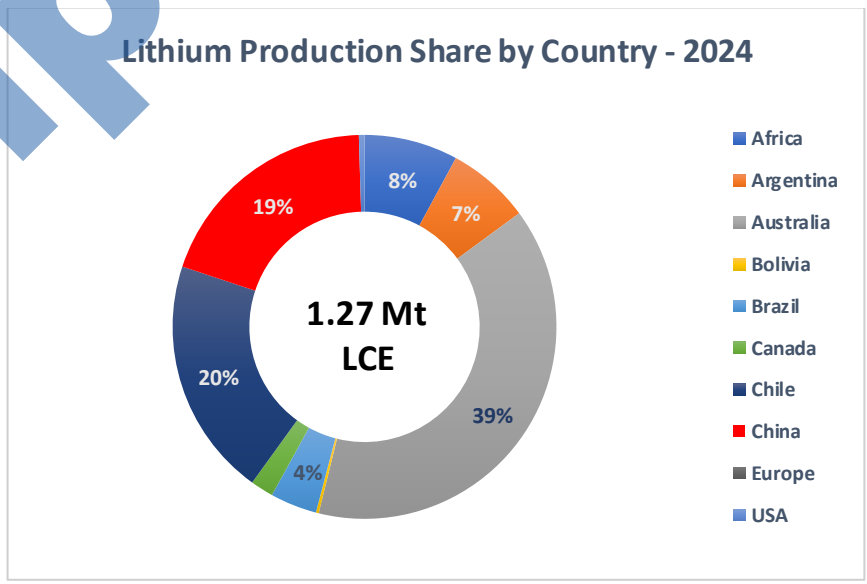
Production 2024

2024 mine production by country/ geographical region is illustrated below.

Australia is still the most important lithium producer, accounting for nearly 40% of global production in 2024. Production will fall somewhat in 2025 as mines retrench to reduce costs.

The low market price environment of 2024 and 2025 is having a very negative effect on the Australian lithium mining industry. All of the mines became loss making in late 2024 except for Greenbushes, which has the best economies of scale, but even Greenbushes suspended payment of dividends.

The share of production of each country is quantified below.



Africa Overview

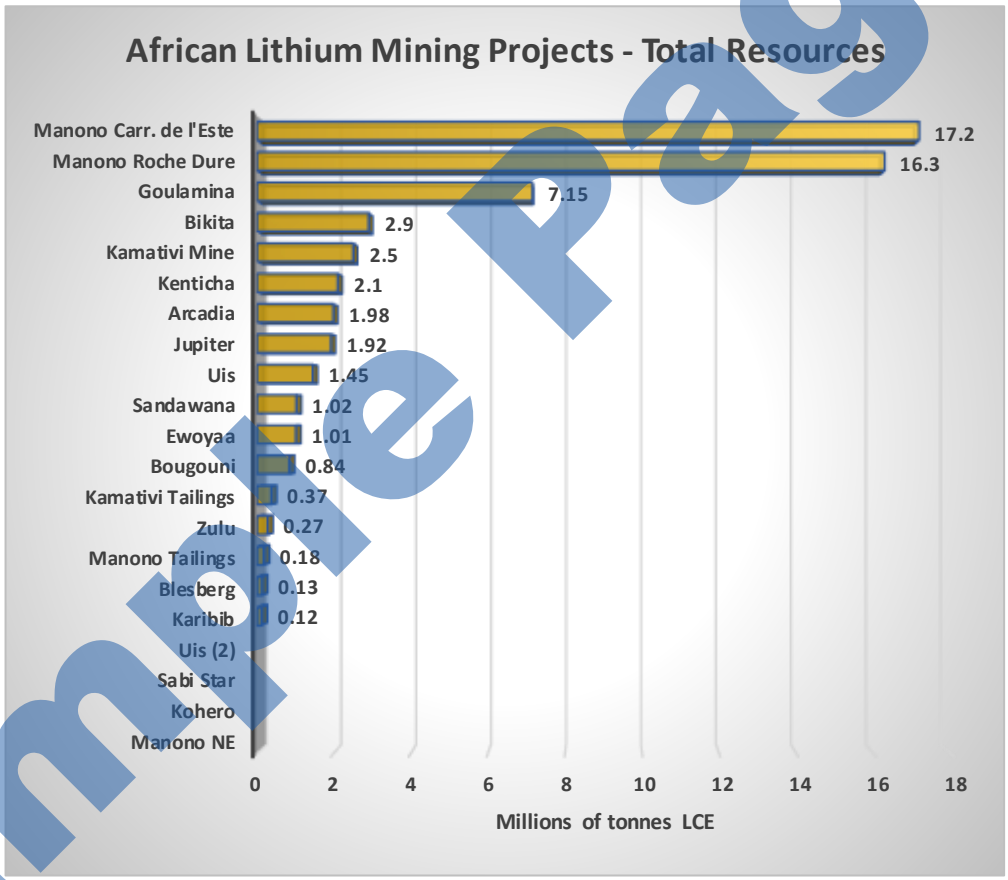
Overview

The number of lithium mines in Africa is growing very rapidly as African countries seek to take advantage of growing lithium demand. All of the mines are hard rock resources, intended to be mined using open pit methods. Many of the mines are either majority owned by Chinese entities or have offtake agreements to supply China. Little of the output will reach Europe or North America.

Lithium Resources of Africa

Resources by Lithium Deposit

The following chart shows the main lithium mining projects and deposits on the African Continent.



The total African lithium resource is therefore some 57.44 million tonnes LCE.

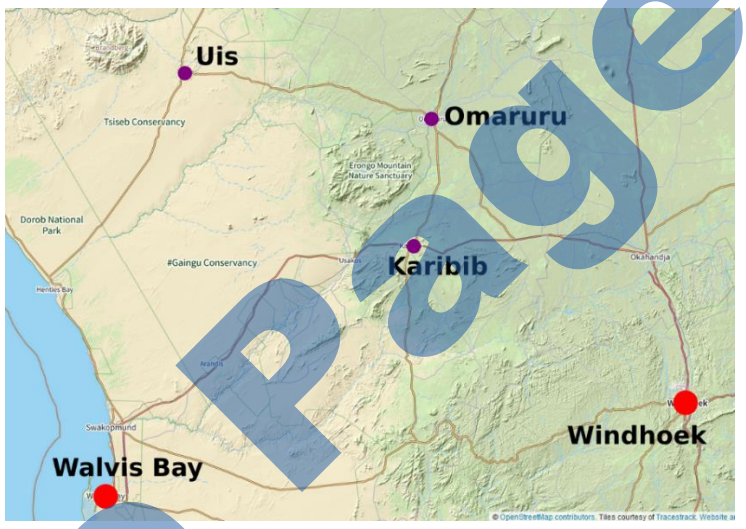
By far the largest resource is the Manono pegmatite field in the Democratic Republic of the Congo. The Roche Dure pegmatite body has been estimated to contain 16.2 Mt LCE, which is the same size as the Greenbushes mine in Australia. The Carriere de l'Este pegmatite may in fact be almost twice as large as Roche Dure but is currently shown as the balance of the total estimated resource so far for the entire Manono field, i.e. 17.2 Mt. This means that Manono is at least twice the size of Greenbushes and quite possibly more than three times as large.

Namibia

Overview

Namibia has been extensively mined for a variety of resources since the 19th century. Interest in developing its lithium potential only commenced about ten years ago, initially focusing on historical tin and tantalum operations.

The following map of central Namibia shows the main lithium mining projects and areas of interest.



There are now four main lithium mining projects in Namibia (Uis, Kohero, Uis-2, Karibib). If they all come to fruition, Namibia might become a minor lithium producer. However the lithium deposits in Namibia mostly consist of lepidolite and petalite which is much less suitable for production of downstream chemicals than spodumene. This along with other factors will constrain Namibia's lithium potential. So far, multiple efforts have been made by small mining companies to develop a lithium mining industry without major success.

	Owner	Status	Resource	Mineral
Uis	Andrada	In Production		Petalite
Lithium Ridge	Andrada	Exploration		Spodumene/ Petalite
Kohero	Xinfeng	In Production		Lepidolite?
Omaruru	Prospect	Exploration (Suspended)		Petalite
Uis-2	Askari	Exploration		Spodumene/ Petalite
Soris	Montero	Abandoned Spodumene?		
Karibib	Lepidico	Development (Suspended)		Lepidolite
Bitterwasser	Arcadia Minerals	Exploration		
Tantalite Valley	Kazera	In Production		Spodumene/ Lepidolite

Argentina

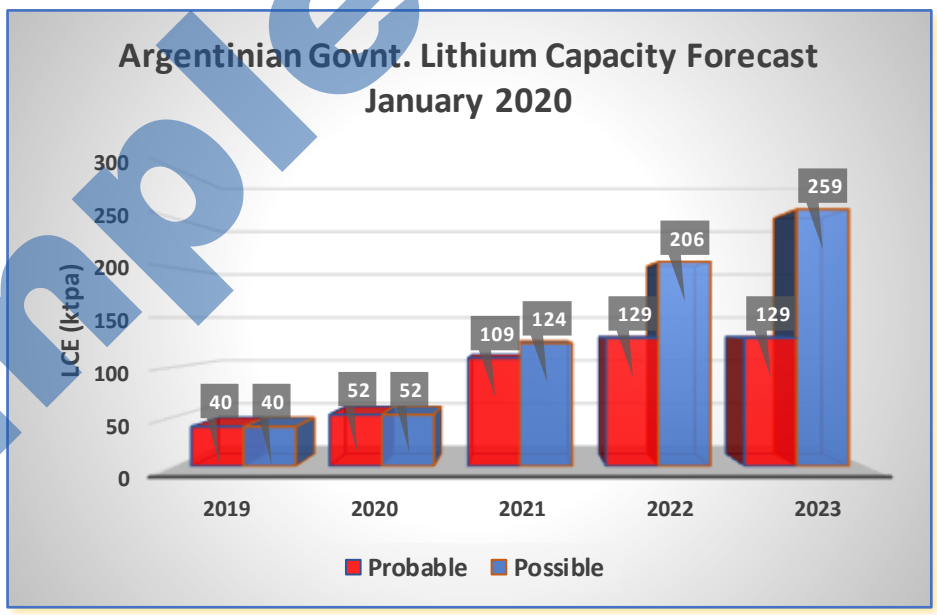
Overview

Currently over 28 lithium mining projects exist in Argentina. Five are in commercial production and eight are under development or under construction. The rest are at the feasibility or exploratory stage only.

Before 2010, there was only one lithium extraction operation in Argentina, at Salar de Hombre Muerto, operated by FMC (then Livent, now Arcadium). Until 2015, only one more mine had been able to start operating, the Salar de Olaroz mine operated by Orocobre (now Arcadium). Production started in 2015 and reached its full first year in 2017.

Despite its slow start in developing its lithium potential during the 2010s compared to Australia, growth has accelerated since 2010 and three more projects have commenced (Cauchari-Olaroz, Centenario Ratones and Tres Quebradas). Argentina appears to be on the verge of being able to bring significant new production on-stream as the EV market is forecast to experience exponential growth. Total identified brine resources amount to over 150 Mt LCE with reserves of 16 Mt. This figure for the reserves is clearly very conservative.

Before Covid-19, the Argentinian Government was projecting that Probable Installed Capacity would increase to about 130 ktpa LCE in 2022, from a bit less than 40 ktpa in 2019. Exports of $1 billion in 2022 were forecast (up from $190 M in 2019), increasing to $2 billion by 2030. The upper range optimistic forecast was for 206 ktpa in 2022, further increasing to 260 ktpa by 2025.



The probable scenario has not been achieved, with capacity only reaching 82.3 kt LCE in 2023 and another 44 kt coming on stream in 2024, although full production from Centenario and Tres Quebradas will not be reached until 2026.

Argentina has a certain cost advantage over Australia in that the vast majority of its resources are brine, not hard rock. Even so, the current low market price for lithium carbonate is affecting developments. Capital cost inflation since 2020 is also having a negative effect on some projects, particularly Lake Resources' Kachi project.

Salar de Olaroz – Argentina

Overview

High lithium concentrations at Olaroz were first identified in 1970 and its mineral potential was first evaluated in 1984. In 2008 Orocobre Ltd started a core sampling exploration programme to quantify the resource. Lithium concentrations averaging 640 ppm were identified, leading to successful exploration and mine development. Commercial production of lithium carbonate from the Salar de Olaroz was started in 2015 after seven years development. Olaroz was the first lithium brine facility outside China to enter production since Hombre Muerto started operations in 1998. The resource was developed by the Australian company Orocobre. The Olaroz Lithium Facility is a joint venture between Orocobre (66.5%), Toyota Tsusho Corporation, (25%) and a mining investment company owned by the provincial Government of Jujuy, Jujuy Energia y Minería Sociedad del Estado (JEMSE) (8.5%).

Current production capacity is 17,500 tpa of lithium carbonate. Additional Stage 2 capacity of 25,000 tpa has been under construction since 2020 and was scheduled to enter service in 2022. This was then delayed by Covid 19 and production start deferred to Q3 2023, with full output scheduled for FY2026. This may now come forward again to 2025 depending on market conditions. Production for 2024 is projected at between 22,000 and 26,000 tonnes.

The production capacity once Stage 2 comes on stream is 42,500 t of lithium carbonate equivalent per year.

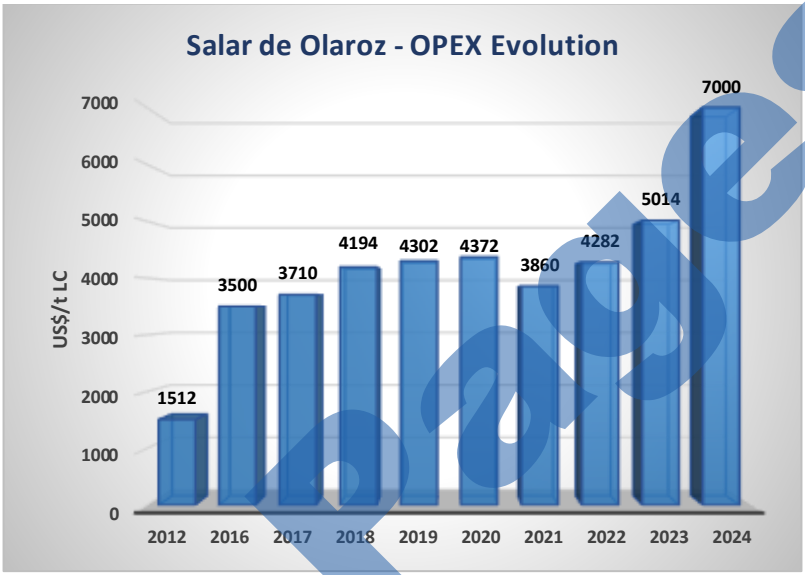
Olaroz evaporation ponds – Arcadium Lithium

The Stage 1 production consists of battery and technical grade material whereas Stage 2 will be technical grade lithium carbonate to be used to produce BG LHM.

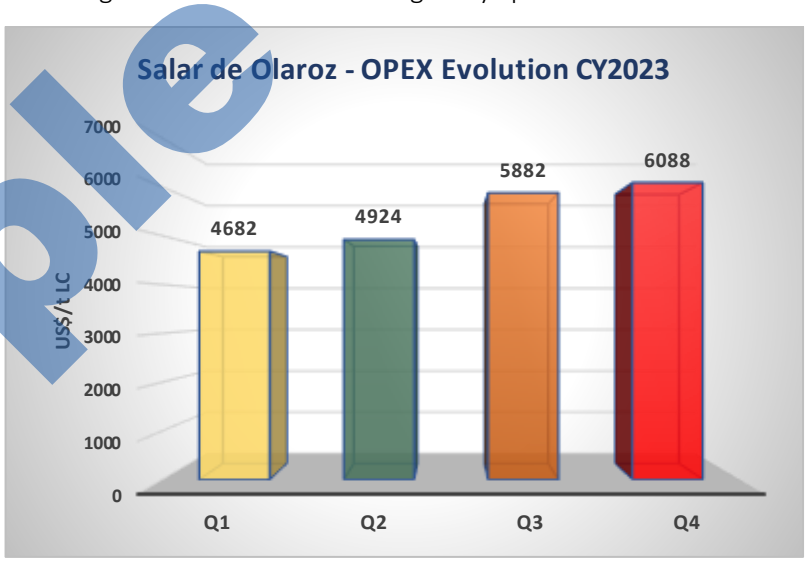
The company's partners Toyota Tsuho have constructed a lithium hydroxide facility in Japan (Naraha), the first such plant in the country. The plant was scheduled to be commissioned in 2022 but construction was not completed until November 2022. Product qualification took place during 2023. Capacity will be 10,000 tpa and the plant should be fully operational during 2024.

In 2015 and 2016, the director's remuneration package OPEX target was $2700/t and $2900/t. Such low costs have never been reached, with OPEX in the first real year of production, 2016, being $3500/t.

However OPEX stayed in the region of $4000/t from start of production until 2023, the year after the price bubble of 2022, since when costs have nearly doubled from that baseline. The following chart shows the OPEX figures from Orocobre and Allkem's annual reports. Therefore these are financial year figures (July to June). Arcadium have estimated 2024 costs as between $6,500 – $7,500/t.



During calendar year 2023 itself, Allkem's figures show costs increasing every quarter as follows.



The average OPEX for CY2023 was therefore US$5,394/t LC.

Allkem ascribed these cost increases to removal of export incentives, increased cost of sodium carbonate, lime and natural gas and increased labour costs.

This extreme increase over the last two years, at the same time as lithium prices have been on the reverse trend from their highs of 2022 is of significant concern for the long term viability of lithium extraction, not just in Argentina.

CAPEX

The 2023 CAPEX estimate for the Stage 2 expansion of 25,000 tpa was $425 M, up from $376 M in 2022. This equates to a development capital intensity of $17,000 per tonne of production capacity. Compared

Australia

Overview

Australia dominates global lithium mine production, producing nearly twice as much as the next largest producer Chile. **Mine production** has increased from 207,000 tonnes LCE in 2019 to **493,000 tonnes LCE in 2024**. Production will dip in 2025 but increase again to reach 880,000 tonnes in 2030.

There are currently at least 18 lithium mining projects at various stages of development in Australia not counting very early exploration projects. Production is dominated by the Greenbushes mine which started producing spodumene concentrate for the ceramics market in 1980.

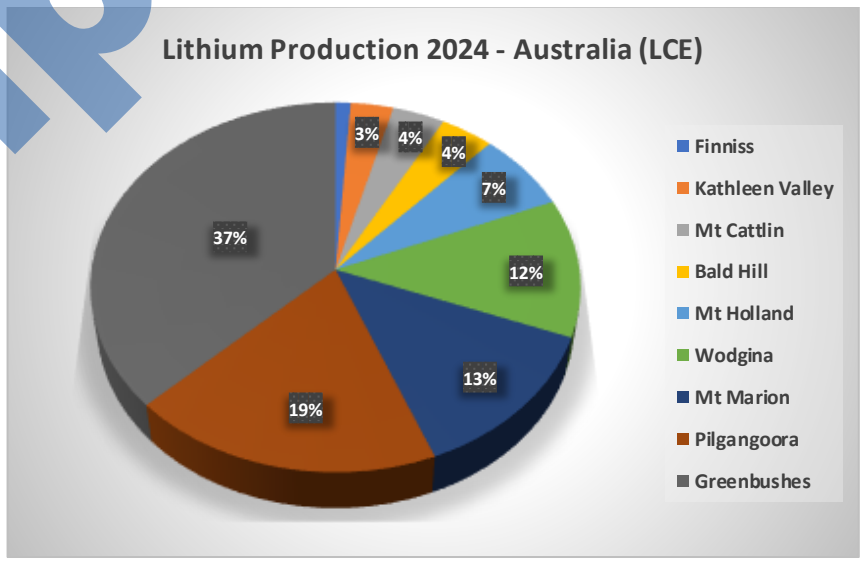
Since the resurgence of electric vehicles started in 2006, eight more hard rock lithium mines have started up in Australia, more than in any other country.

However, Australia faces a major challenge in that it is a high cost location and only the two largest mines – Greenbushes and Pilgangoora – have the economies of scale to generate low operating costs. Most of the other mines have found the extended low price environment of 2024 to be very challenging. Two mines (Finniss and Bald Hill) suspended operations in 2024 and Mount Cattlin also ceased mining, only staying in operation to process its stockpile. It is unlikely to restart after 2025.

This is a very concerning situation for the whole EV transition, given that Australia is such an important mainstay of global lithium production.

Another issue of major importance to the Australian lithium industry in 2024 was the **failure of the downstream industrial strategy** at Greenbushes pursued by Albemarle and IGO. Both lithium hydroxide plants under construction at Kemerton and Kwinana have been a catastrophe. The situation is reminiscent of the failures at the Whabouchi (Nemaska) lithium mine in Ontario. This is discussed below.

Australian lithium mine production by mine in percentage terms is illustrated below. All production is in the form of concentrate.



- Total mine production in 2024 was 493,000 t LCE.
- Greenbushes and Pilgangoora accounted for 56% of production.

Analysis

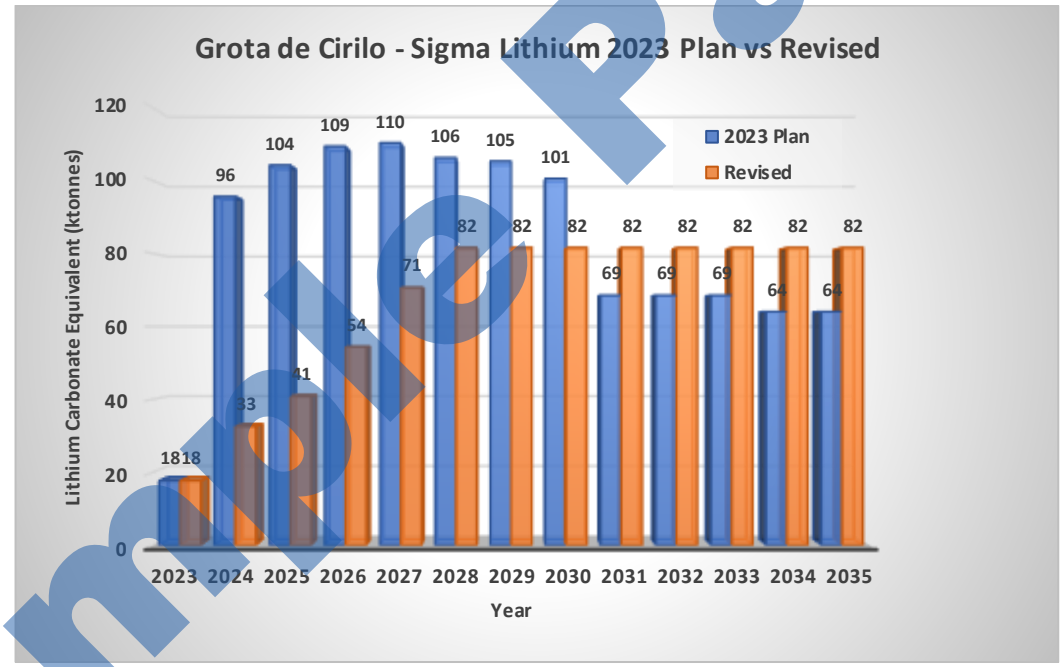
First year production (2023) was expected to be 130,000 t of concentrate or 17,800 t LCE. Sigma indicates that the full Phase 1 production rate will be reached in 2023 followed by full Phase 2 and 3 production in the second half of 2024. The steep drop in lithium prices towards the end of 2023 might delay this.

Like most of these projects, the original timescale slipped. In 2020 production of 220 kt was forecast for 2021 and 440 kt in 2022 but that was planned before COVID 19.

In their June 2023 technical report, Sigma indicate a lithium recovery rate of 65% from ore to SC5.5 for Phase 1, dropping to 58% and 51% for Phase 2 and 3. So overall, only about 60% of the mined ore will be recovered to concentrate, before downstream processing adds further losses (20%). In addition, only about half of the ore in place is generally considered as minable.

Production

Sigma's production plan as of end 2023 is shown below by the blue columns. The graph shows SC5.5 production in terms of LCE. As mentioned above, Sigma indicated that they would not ramp up production so much in 2024 if prices did not recover.



In fact, production did not ramp up in 2024 as planned and will remain at a lower level. Commissioning of the second concentrator will not occur until 2026. The orange columns show actual production in 2023 and 2024 and highly probable production up to 2027. This is then followed by a base scenario from 2028 onwards of 600 ktpa SC5.5.

Construction of Phase 2 (to take capacity to 520 ktpa SC5.5) is underway during 2025 and will not come on stream until 2026. The following table shows the data for the orange columns above.

Grota de Cirilo Brazil – Mine Production												
Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2033
Production (kt SC5.5)	130	240	300	400	520	600	600	600	600	600	600	600
LCE (kt)	17.7	32.6	40.8	54.4	70.7	81.6	81.6	81.6	81.6	81.6	81.6	81.6

Therefore in 2022 the Chinese Ministry of Natural Resources increased China's lithium reserves by 57% by adding 5.4 Mt of lepidolite deposits in Jiangxi Province.

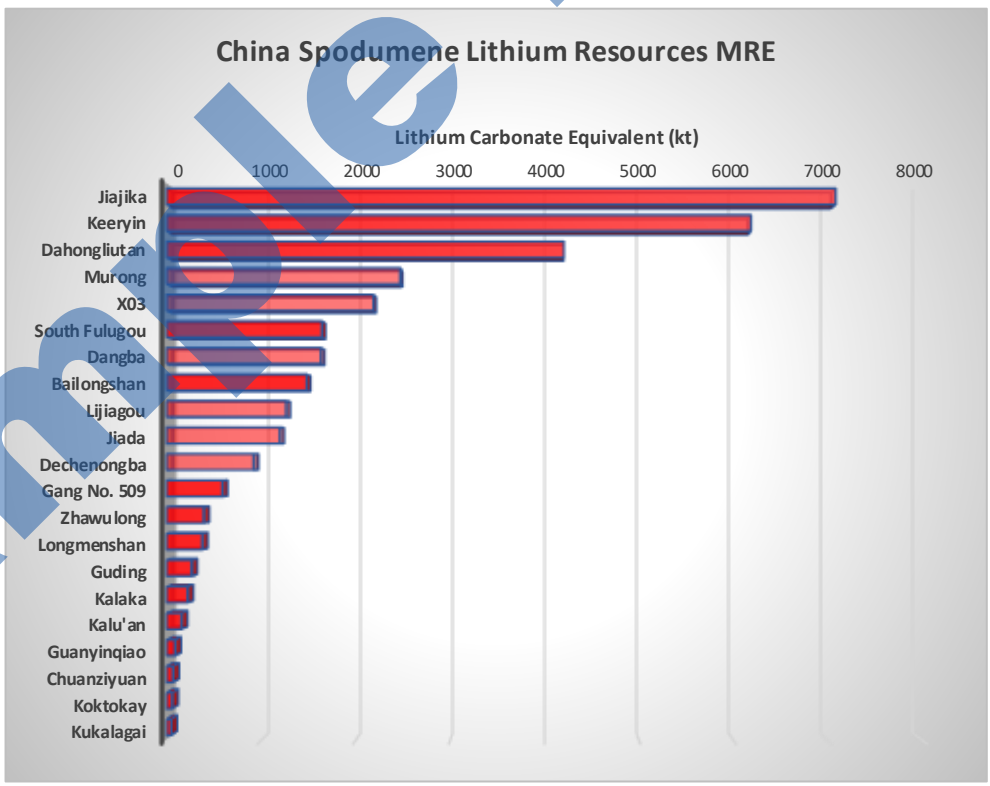
The problem with this revised picture, where lepidolite now accounts for two thirds of China's hard rock reserves and 40% of China's entire lithium reserves, is that those "reserves" were added in 2022 when lithium prices had reached all-time record highs. At those prices (over $80,000 per tonne at one point) the lepidolite was economic to recover and therefore could be considered as reserves but not at current prices. At a long-term lithium carbonate price of $25,000 per tonne, which is the standard figure used by most western mining companies in their lithium mine feasibility studies, a large part of the lepidolite mines would remain marginal. For lithium-ion EV batteries to be affordable for the mass market, particularly outside China, an even lower price than $25,000 is required.

We would therefore take a more conservative view and retain the 2021 Reserves figures as more closely reflecting reality.

Resources

The above referenced paper lists some 53 lithium deposits in China in 2021. 22 are saline brines, 4 are "sedimentary type" and the rest (27) are hard rock deposits (spodumene, lepidolite, zinnwaldite, muscovite, montebrasite). 9 of the hard rock resources contain less than 100 kt of Li_2O leaving 18 with more than 100 kt Li_2O.

We have shown the lithium resources estimated to be contained in these deposits in the three charts below. The data is a combination of that given in the above referenced paper and data from other published information. The first chart shows the Chinese spodumene resources.



The deposits shown in lighter red are part of the Jiajika and Keeryin orefields and therefore could be included within them. However, the resource estimates for Jiajika and Keeryin are expanding all the time and all estimates as to the ultimate size and exploitability of the deposit are uncertain. We have coloured them in a lighter shade to indicate this uncertainty.

Production Analysis

Raw Lithium Content

If we consider the indicated brine flow of 950 l/s, at 181 mg/l, that equates to a lithium metal content in the brine of 5,423 tonnes LME per year (32,538 t LHM) at 100% capacity factor, i.e. 24 hours a day for 365 days of the year.

Capacity Factor

We then have to consider capacity factor. No powerplant operates at 100% capacity all year every year. The Riehen district heating system for instance near Basel operates[10] 4500 – 5500 hours per year, or a maximum capacity factor of 63%.

According to the European Geothermal Energy Council, the average capacity factor of European geothermal plants[11] is between 73% and 89% (lower and upper limits). Taking an average of 81% reduces the raw lithium content to 4393 tonnes LME.

We then have to consider the efficiency of the two stage process to produce the end product: a) the DLE extraction process to produce LiCl from raw brine and then b) conversion of low purity LiCl to high purity battery grade LHM.

If we consider each of those processes to be 90% efficient, the final production capability of battery grade LHM would be 3558 tonnes of lithium metal, or 18,860 t LCE or 21,350 t LHM.

A process recovery rate of 70% may be more realistic. This is the rate that EnBW are using in their Project UnLimited and similar to that obtained in laboratory tests by Controlled Thermal Resources at the Salton Sea (64%). If we apply an 81% capacity factor and 70% process recovery rate, production would be 3075 t LME or 18,450 t LHM.

End Production

Vulcan's planned production is therefore at the upper end of what is feasible and implies a higher capacity factor of their geothermal plant than may be achievable in the long term. A more conservative production scenario would be in the range of 3,000 to 3,600 t LME (18,000 – 21,600 t LHM) per year.

Insheim Plant

Vulcan already own the operational Insheim geothermal plant.

The flowrate at Insheim is 70 l/s and the brine grade is 168 mg/l[12]. Annual production of some 250 tonnes LME or 1500 tonnes LHM could therefore be achieved from this site.

Drilling Plan

The original drilling plan called for drilling to start in mid-2023 and to be completed by the end of 2025, for 23 wells in total, 11 for production and 12 for re-injection. The BES plan extended this from mid-2023 to end-2027 for 24 wells, which is much more realistic, with first production at the end of 2026.

This means that Vulcan intend to drill nearly as many wells (11) in one small region as the total number of production wells (13) that are already in operation in the entire Upper Rhine Graben. Each well will have a brine flow of 86 l/s. There are only two wells in the URG that match that flowrate, Insheim and Rittershoffen. Until each well is actually drilled, the flowrate that it is capable of will not be known (rock permeability, temperature, pressure etc.).

Original Plan

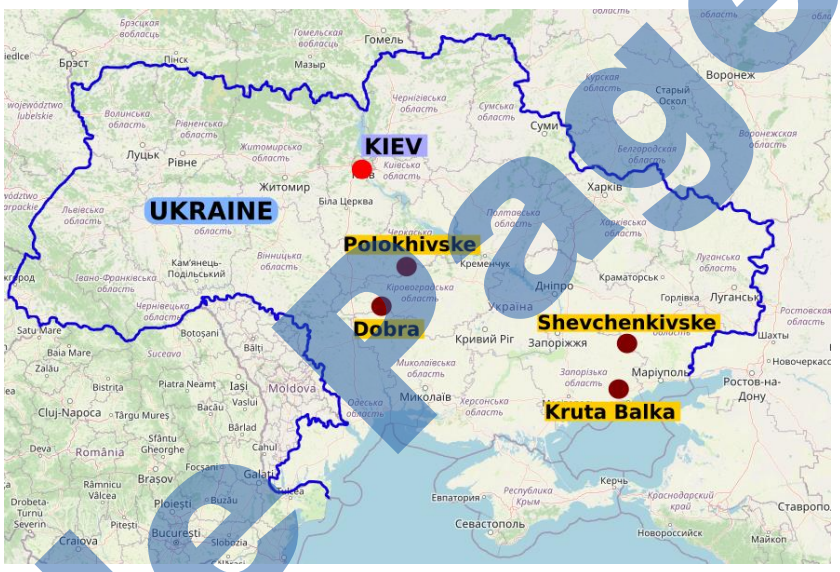
Inspection of the original drilling plan showed that the first three Production wells would take 7 months each to drill, but later wells would take only 2, 3 or 4 months to drill.

Ukraine

Overview

Ukraine has three significant hard rock lithium deposits at Shevchenkivske (Shevchenko) in the Donetsk region (eastern Ukraine), Polokhivske in the Kirovohrad region (central Ukraine) and Dobra, also in central Ukraine. There is also a small deposit named Kruta Balka near Shevchenko.

The Ukraine also has a number of oil field brines that contain lithium. The lithium concentration is very low, with a maximum of 23 mg/l.



Lithium Deposits of the Ukraine

Polokhivske

In 2016 the company Ukrlitiummining (ULM) was set up to develop the Polokhivske deposit. Their sample drilling showed good intersection lengths of high grade material, ranging from 1.2% to 1.6% Li_2O. 96% of the lithium was stated to be concentrated in petalite. They published an initial resource estimate (non-JORC) of 37 Mt of ore at 1.23% Li_2O or 1.1 Mt LCE. Intended throughput was 1.5 Mtpa of ore.

In March 2021 they published a JORC compliant resource estimate.

ULM now indicate that they hope to mine 1.5 Mtpa of ore and produce 300 ktpa of petalite concentrate. In July 2023 it was reported that they intend to exploit the deposit using an underground mine to reduce the environmental impact. In April 2024 they announced completion of a PFS and in October 2024 they announced completion of an EIA. In December 2024 Ukrainian authorities issued a statement that the reserves had increased to 760,000 tonnes LCE.

Work on the project appears to have continued to progress despite the challenging circumstances.

The major drawback is that Polokhivske is entirely a petalite deposit.

Petalite Recovery Tests

ULM have published the results of laboratory-scale petalite concentrate production tests. From 8 batches of 1.8 kg each, all containing 1.31% Li_2O, the Finnish mining engineers Metso:Outotec achieved an average recovery of 48.9% of the lithium oxide to concentrate (3.45% Li_2O).

Key Events

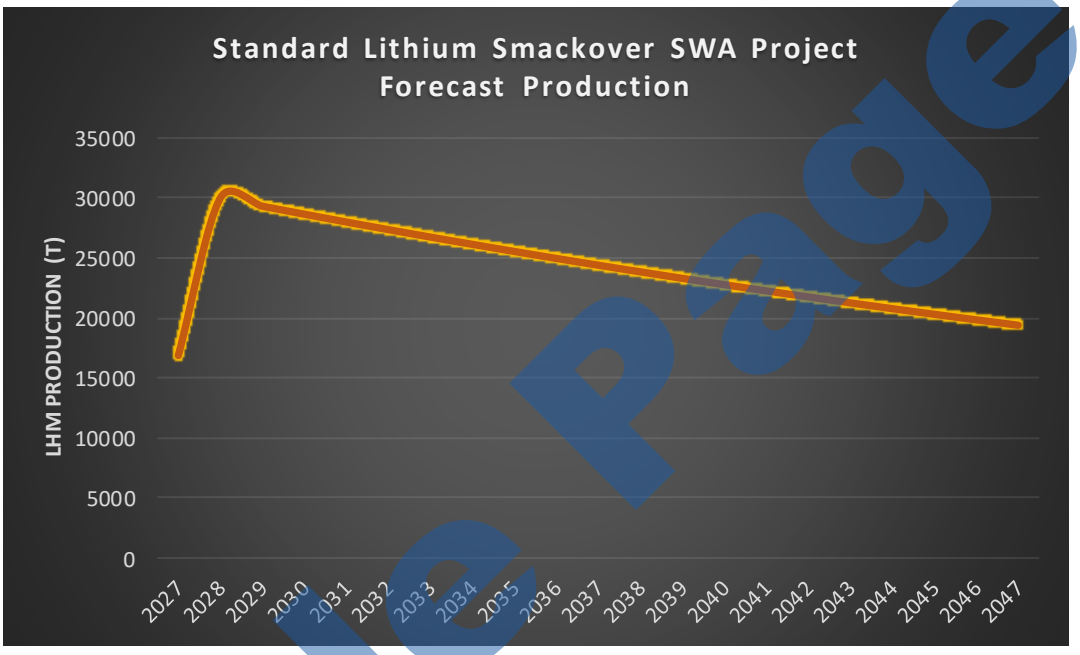
Milestones	
2017	Ioneer (previously Global Geoscience) purchase Rhyolite Ridge Lithium-Boron Project.
October 2018	PFS report issued.
January 2020	Total resource of 1.2 Mt LCE and reserve of 0.57 Mt LCE announced. April
2020	DFS completed. CAPEX increased from $600 M to $785 M.
June 2021	Ecopro Innovation sign 7,000 tpa offtake agreement for their battery plant in South Korea.
September 2021	South African mining company Sibanye-Stillwater take conditional 50% stake in project for $490 M.
July 2022	Binding offtake agreement signed with Ford Motor Company for 7,000 tpa lithium carbonate.
August 2022	Binding offtake agreement signed with Prime Planet Energy & Solutions, joint venture between Toyota and Panasonic, for 4,000 tpa of lithium carbonate.
January 2023	$700 M conditional loan awarded by DoE for on-site lithium carbonate plant.
March 2023	MRE update issued. South Basin resource increased to 3.3 Mt LCE.
October 2024	Environmental approval issued for Mine Plan of Operations. Legal challenge issued by Center for Biological Diversity.
January 2025	US DoE award US$996 M loan guarantee.
January 2025	Presidential Executive Order "Unleashing American Energy" orders halt on disbursements under the IRA.
February 2025	Ioneer announce intention to make FID presently with JV partner Sibanye-Stillwater. Sibanye Stillwater withdraw from Rhyolite Ridge project a few days later.
June 2025	Reserves increased to 1.92 Mt LCE plus 7.7 Mt boric acid. LoM: 95 years.

Key Metrics

Rhyolite Ridge Lithium Project USA – Key Metrics		
	Current	Previous
Status	Pre-Development	
Resource South Basin Total	3.97 Mt LCE (2025)	3.35 Mt LCE
Resource Estimate Stream 1	1.34 Mt LCE	1.3 Mt LCE
Resource Estimate Stream 2	1.2 Mt LCE	2.0 Mt LCE
Resource Estimate Stream 3	0.72 Mt LCE -	
Reserve Proven & Probable	572 kt LCE	
Planned Production	22,340 t Li_2CO_3	
Grade	1500 – 2000 ppm 1461 ppm (avg.)	
Recovery	85%	
Production Start	2028	2021
OPEX	$6,200 / t Li_2CO_3	
CAPEX Phase 1	US$785 M (DFS)	US$600 M (PFS)
LoM	26 years	

The brine feed rate to the central processing facility (CPF) is 1800 m^3/hour for 8,000 hours per year, i.e. 14.4 Mm^3 per annum. At 437 mg/l, this represents a lithium feedstock of 6,293 t LME or 33,351 t LCE. Production of 30,000 tpa LHM infers a recovery factor of 79% which is much more realistic than the figure implicitly used at the Lanxess South Plant.

As with the Lanxess Phase 1A project, SLI's resource figures are again difficult to interpret. The PFS[7] gives an Indicated Resource of 269,000 t LME in a net brine volume of 5.11 km^3 at a concentration of 446 mg/l. The brine volume must have been overstated by a factor of ten. At 446 mg/l and an Indicated Resource of 269,000 t LME, a "reference" brine volume of 603 Mm^3 is calculated. Forecast production is shown below taking dilution into account using these figures as the baseline.



Cumulative production will reach 504,000 t LHM in 2047.

Fresh Water Use

The CPF will be supplied with 477 m^3/hr of fresh water and each supply well with 10 m^3/hr, indicating a total fresh water consumption of 687 m^3/hr (5.5 Mm^3/yr) or 190 litres per second. This is 38% of the raw brine feed rate. For comparison, Lithium Power International envisaged a brine extraction rate of 180 l/s at the Salar de Maricunga, Chile, for production of 15,200 tpa LCE using evaporation. Critics would say that the DLE process being envisaged in South West Arkansas is not necessarily low on water use.

Economics

The September 2023 PFS economic model uses a long term LHM price of $30,000 per tonne. If the price of lithium remains at that level, production of mass market BEVs (outside China) will prove challenging.

OPEX is given as $4,073/t LHM, rising to $5,229/t LHM when Royalties and Sustaining Capital are included. This is again financially challenging in the 2024 lithium price environment. In addition, this only considers the 2.5% royalty that SLI have agreed to pay Tetra. The AOGC (Arkansas Oil and Gas Commission) have yet to define overall state royalties for lithium or potential royalties to the landholders where wells are situated.

DoE Grant and Updated Production Plan

The September 2024 announcement of a potential DoE grant (under the IRA Act) to support the SWA Project further underlines the priority of SWA over Lanxess South. SLI have also changed the production plan from the PFS to a total of 45,000 tpa LCE to be built in two phases of 22,500 t each.