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Minerals of the future: Lithium in Argentina

By

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The views expressed are those of the author and do not necessarily reflect
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Secretaría de Coordinación de Política Minera
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Minerals of the future: Lithium in Argentina: trends, challenges...



- Lithium is a soft, silver-white metal, with a symbol Li and atomic number 3
- Highly reactive, not found in Earth in elemental form
- Lightest of all metals
- Least dense solid element
- Highest specific heat capacity
- High electrochemical potential



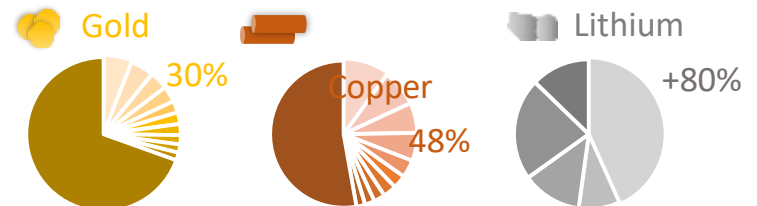
The total Lithium market is a little part vs. Copper and Gold



Lithium is not a standard commodity. The prices of lithium carbonate and hydroxide are negotiated individually through contracts between buyers and sellers – there is little transparency in pricing, but some price recognition is available through analysis of trade statistics

While for Gold and Copper 10 producers have only 30% and 50% market share.

4 Lithium producers have more than 80% market share



Source: Subsecretaría de Desarrollo Minero

➤ Source:

- Brines (continental, geothermal, and oil field)
- Hard rocks

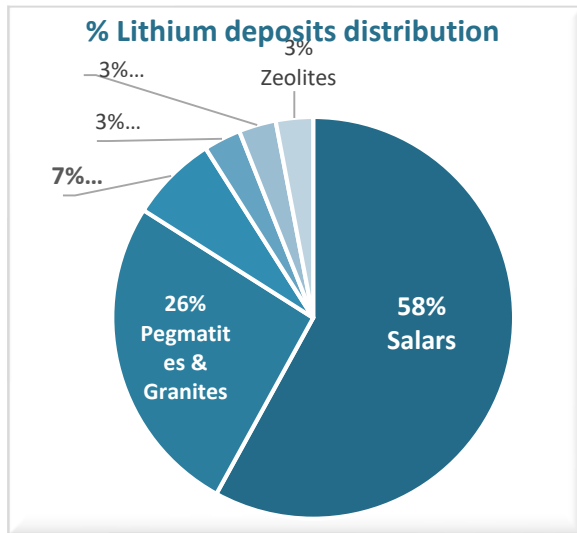


➤ Type:

- Lithium carbonate (Li_2CO_3)
- Lithium hydroxide (LiOH)
- Lithium Chloride (LiCl)

➤ Application:

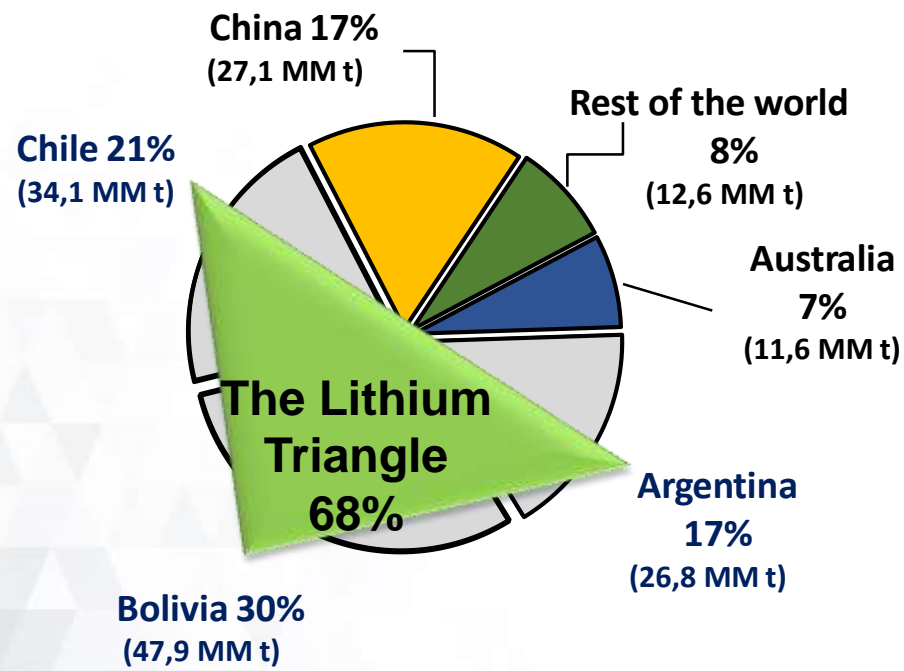
- Batteries
- Glass
- Ceramics
- Air conditioning equipment
- Greases
- Pharmaceuticals



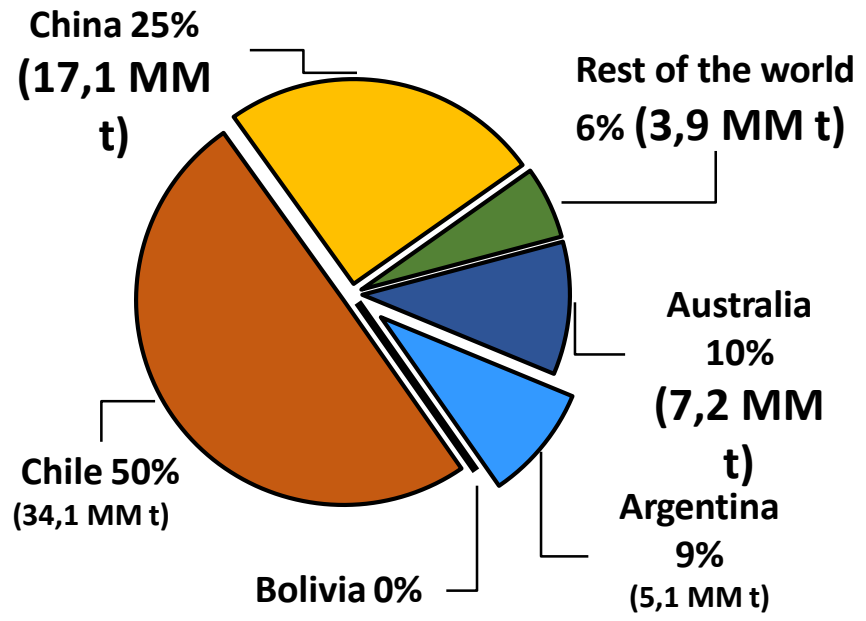
	Salars
	Pegmatites and Granites
	Clays
	Petroleum brines
	Geothermal brines
	Zeolites

Source: Subsecretaría de Desarrollo Minero

Resources 2016
 (160,2 MM t LCE)

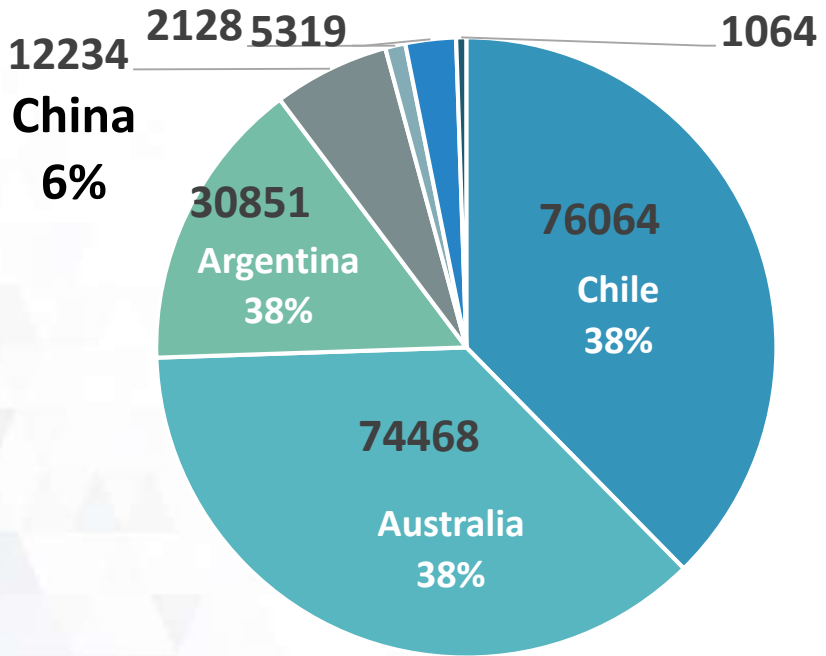


Reserves 2016
 (67,4 MM t LCE)

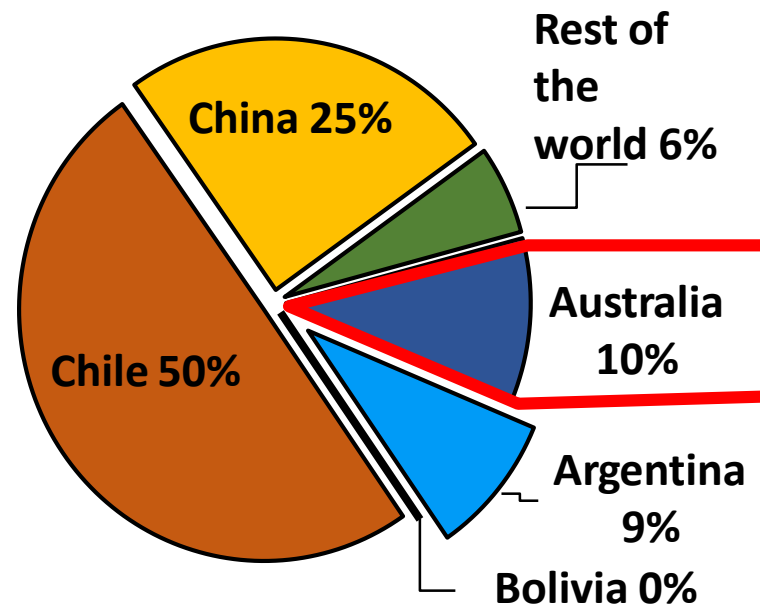


Source: Subsecretaría de Desarrollo Minero

Production 2016
(202 Mt LCE)

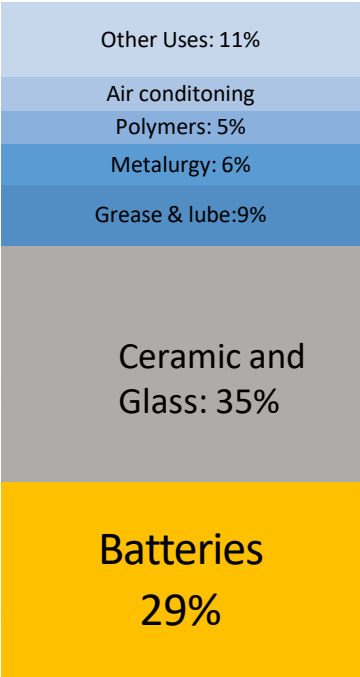


Reserves
(68,5 MM t LCE)

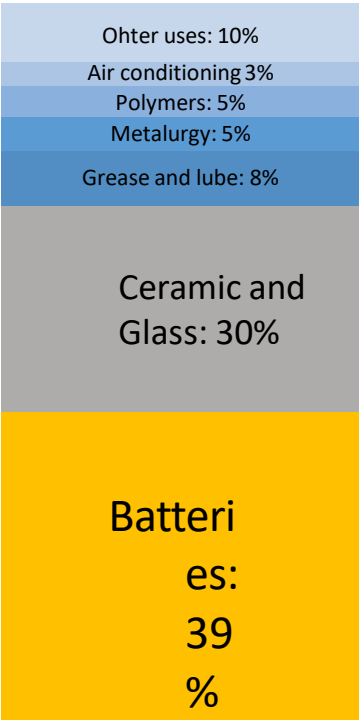


Source: Subsecretaría de Desarrollo Minero

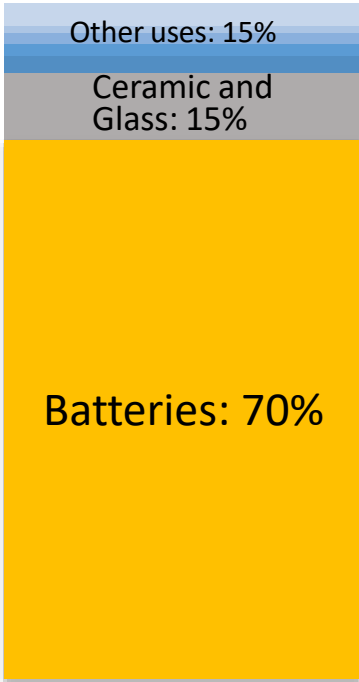
2012

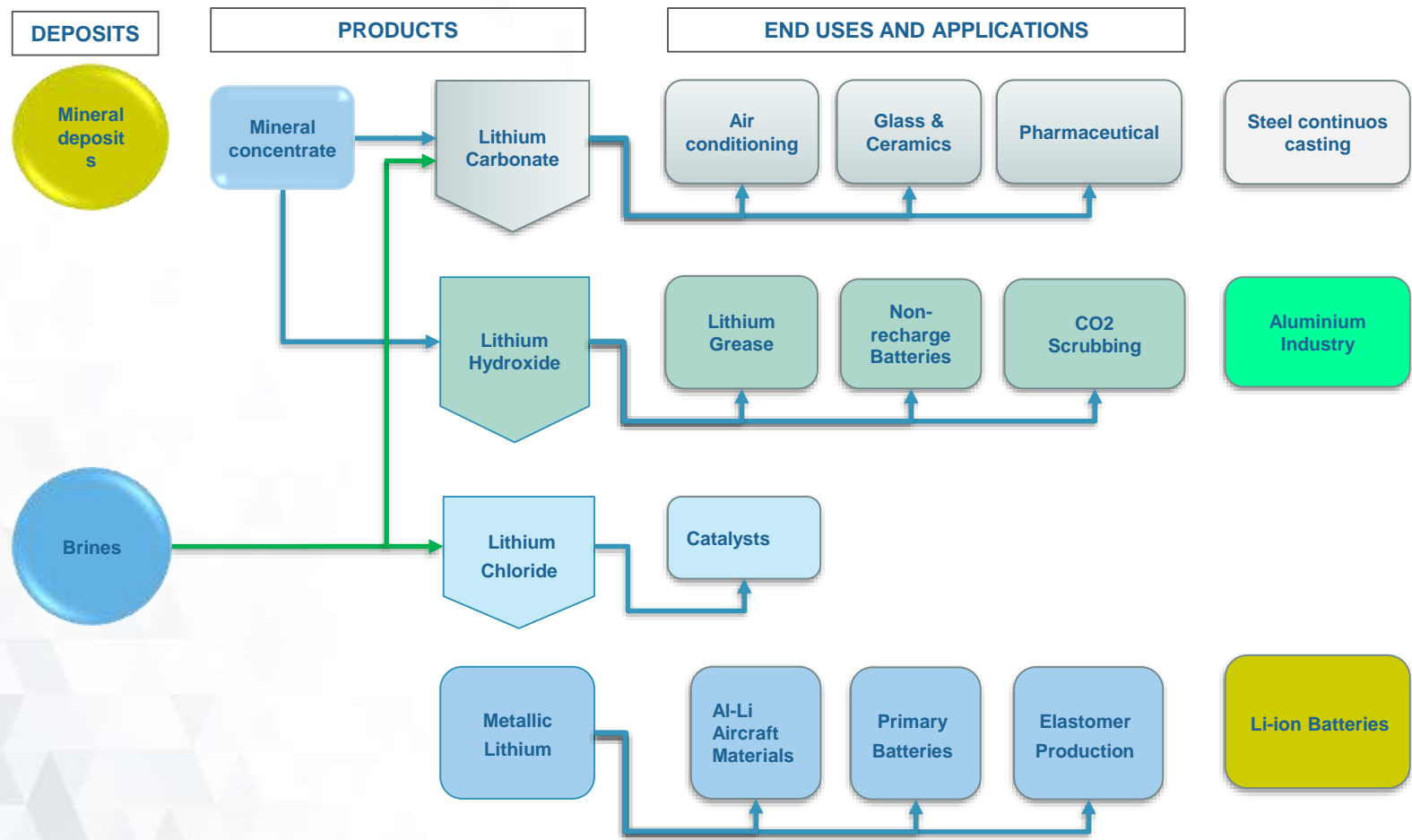


2016

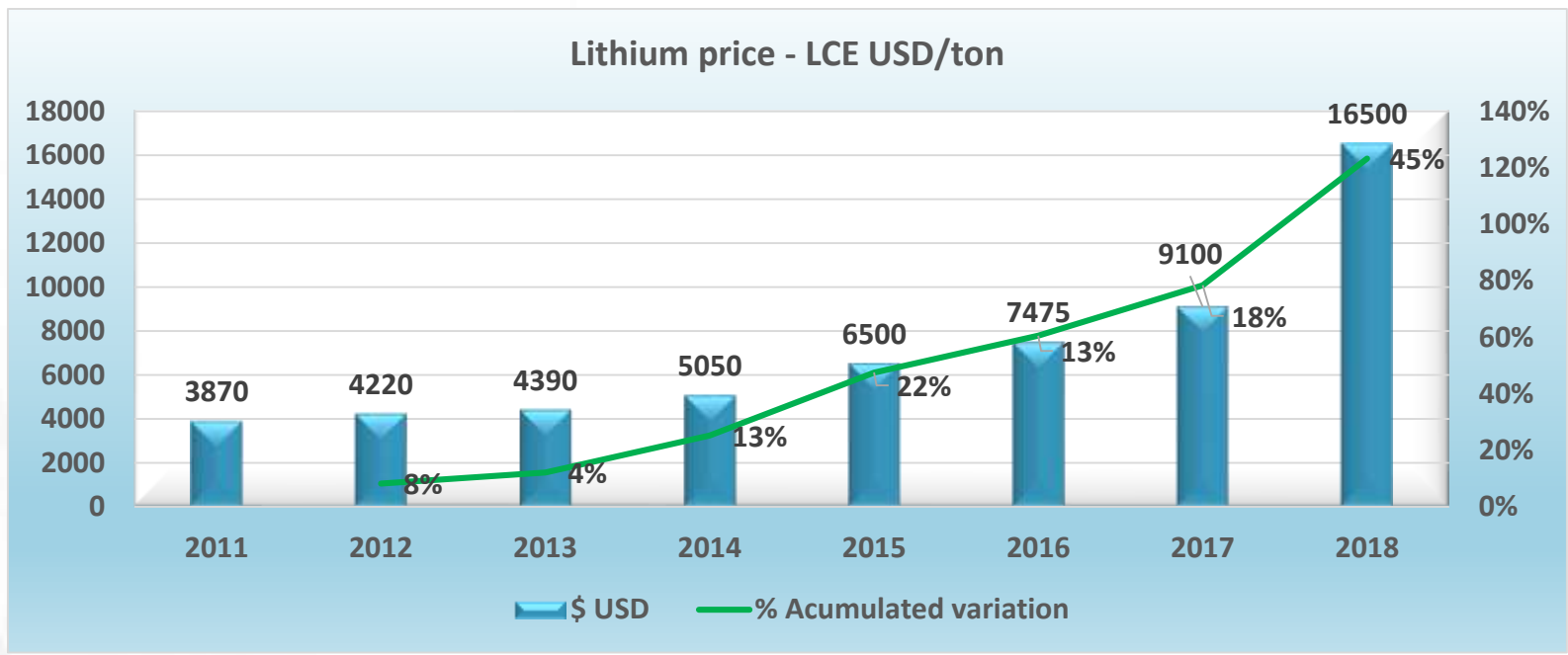


2026





- **Battery grade lithium products have significantly higher costs to produce from mineral sources than from salt lake brines**
- **But brine operations have significant lead times to develop and ramp-up production**
- **Mineral operations' higher cost of production is driven by a technically more complex and energy intensive process to reach battery grade lithium carbonate and hydroxide products**
- **Brine operations also exploit economies of scale and don't have the associated expenses of hard rock deposits**



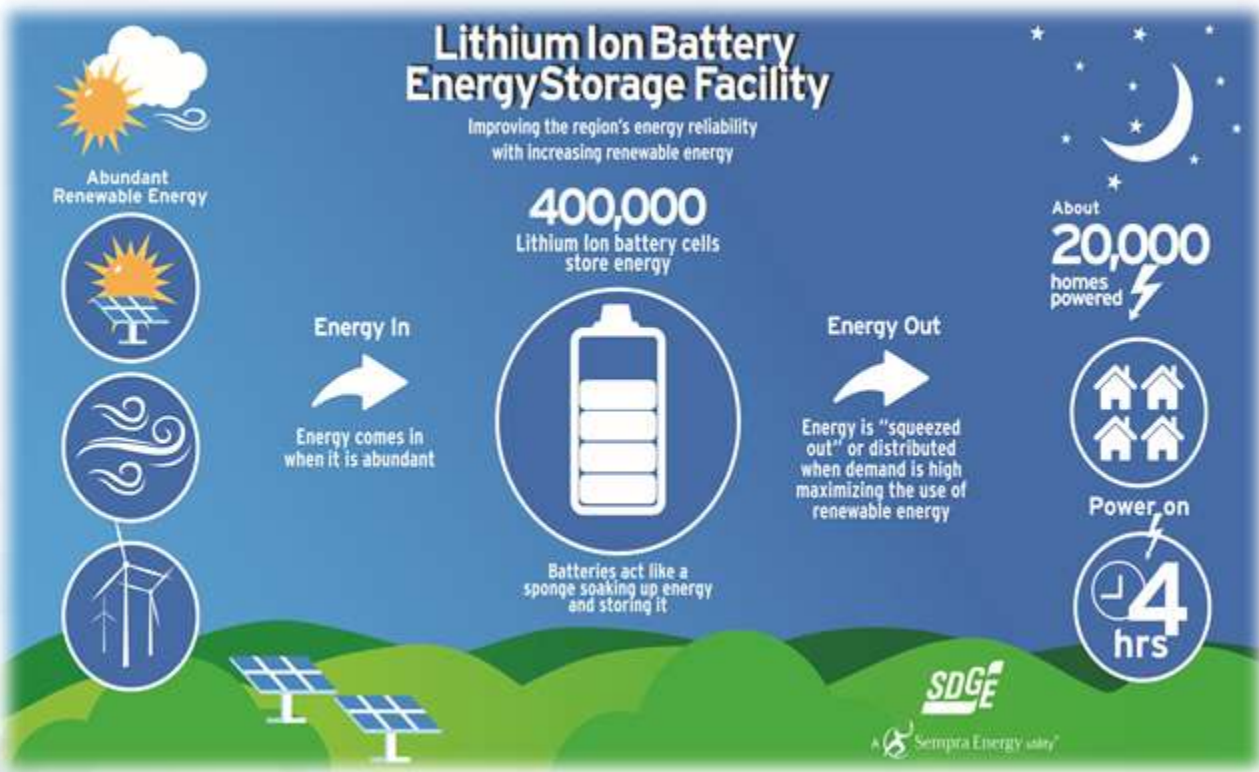
Source: Metalary.com



- Since 2010, battery costs have fallen by more than 70%
- The viability of electric vehicles will ultimately depend on how well each car can compete across segments and geographies
- EV stock around the world to increase from 2 million in 2016 to 125 million in 2035
- By 2035, 1.8 million b/d of global oil demand will be displaced by Evs
- Buses LIB can be push the demand

Source: woodmac.com/Metals & Mining

Y	Country	Proposal	Status
2025	Norway	Change to taxes and incentives to achieve only zero or low emission sales	Agreement amongst all relevant parties
	Netherlands	Change to taxes and incentives to achieve only zero or low emission sales	Passed by parliament's lower house – needs approval by upper house
	EEUU	No country-wide proposal although California aims to have a 1.5 million ZEV fleet	State approved mandate
	China	"New energy" vehicles to make up at least 20% of vehicle sales	Approved in latest five year plan
2030	Japan	50 to 70% of vehicle sales to be of "next-generation" vehicle	Government set target
	India	End the sale of petrol and diesel cars	Policy proposal
	Germany	Change to taxes and incentives to achieve only zero-emission vehicle sales EU-wide	Non-binding resolution by parliament's upper house
2040	France	End the sale of cars emitting greenhouse gases	Policy proposal
	England	End the sale of all new conventional petrol and diesel cars and vans	Policy proposal

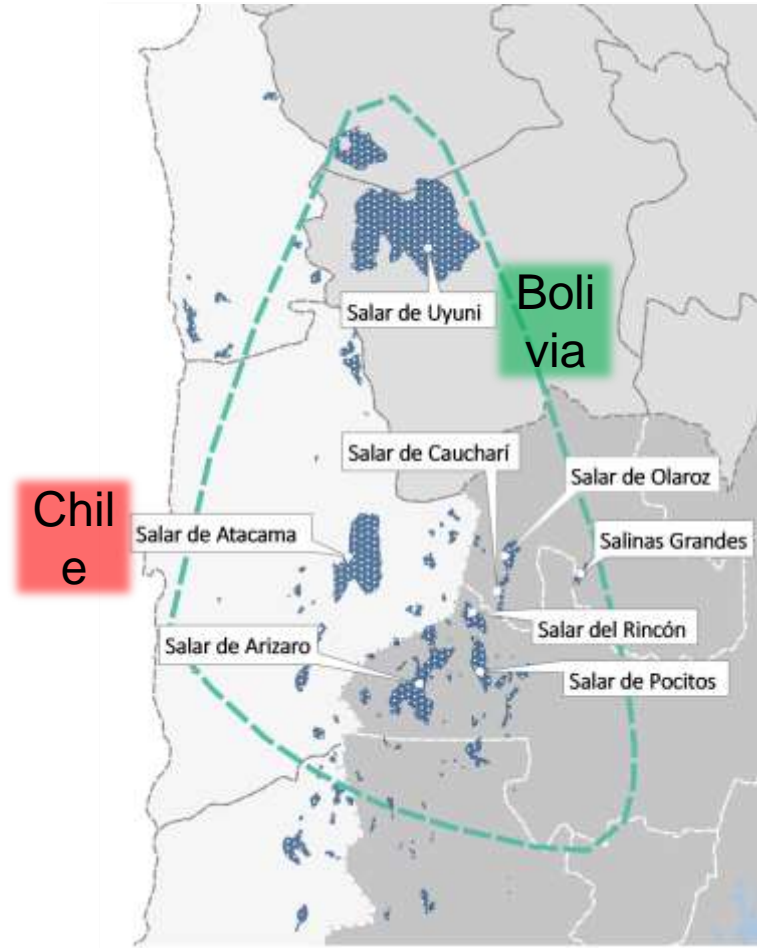


Tesla world's largest Li-On battery South Australia
100 MW/ 129 MWh.
Capacity: 30.000 homes for an hour

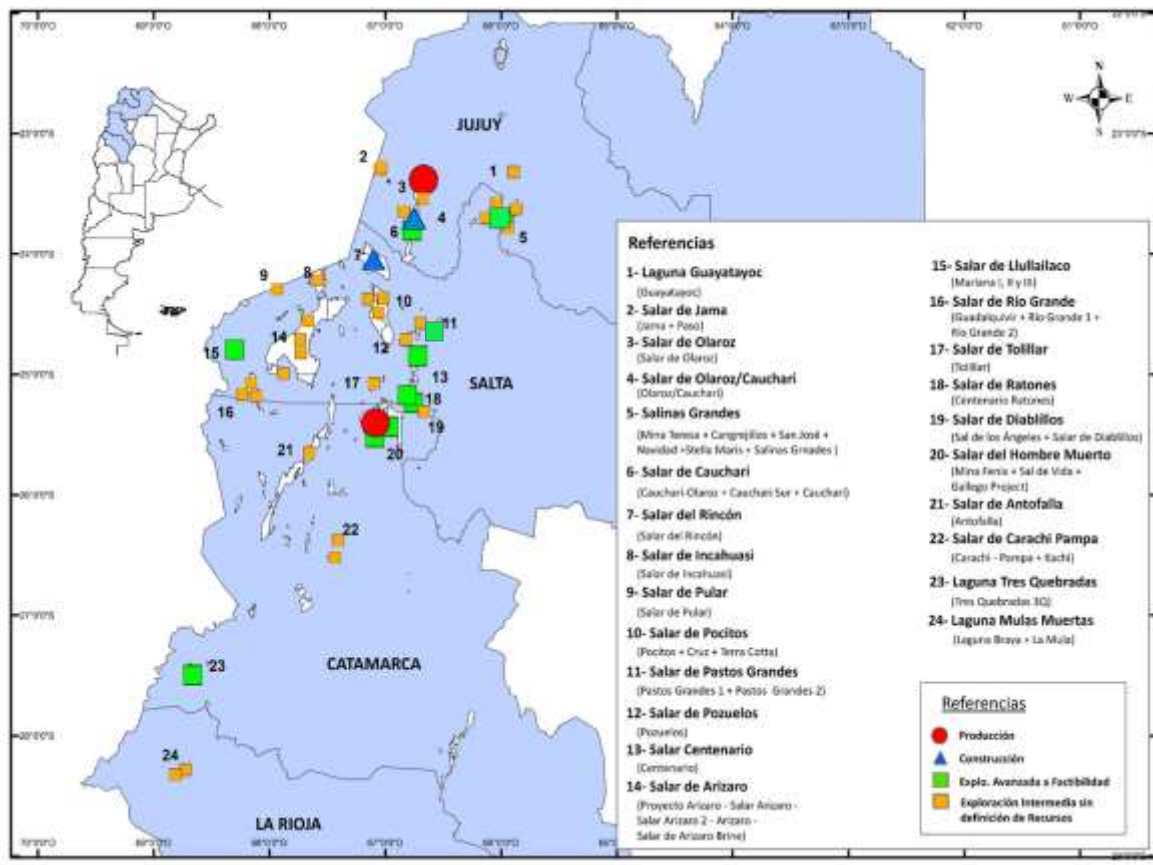


AES & SIEMENS – Escondido, California, EEUU
30 MW/ 120 MW/h
Capacity: 20.000 homes for about 4 hours



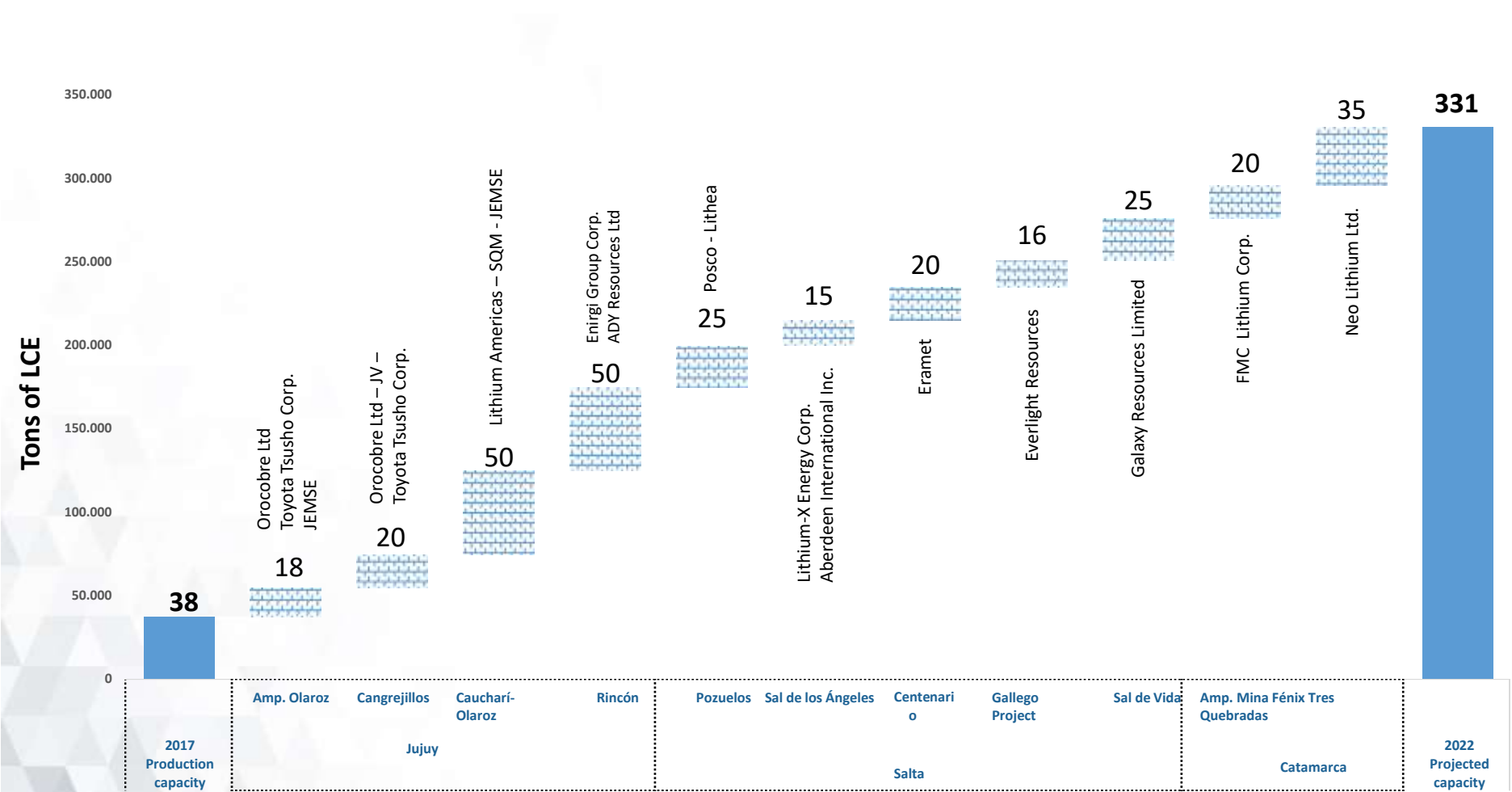


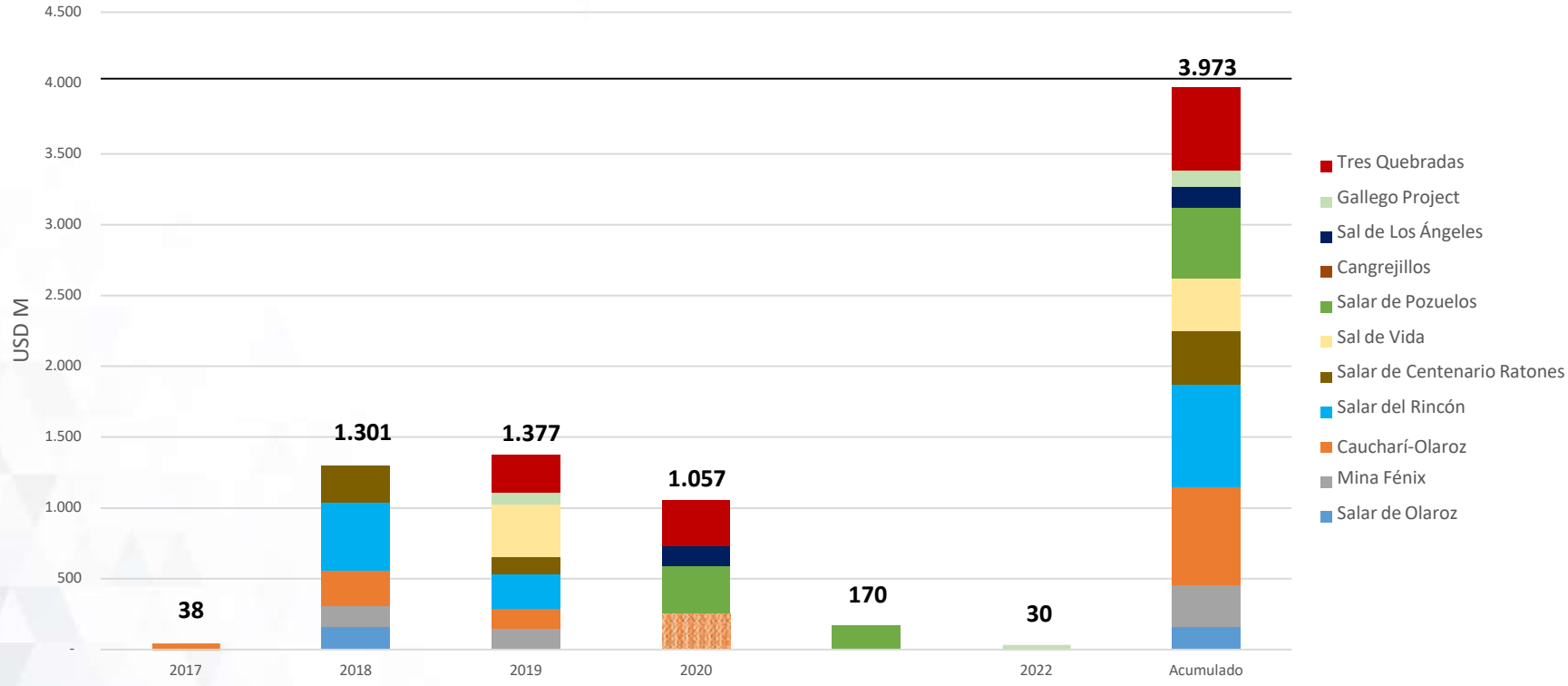
Source: Dirección de Infraestructura Minera/ Subsecretaría de Sustentabilidad minera

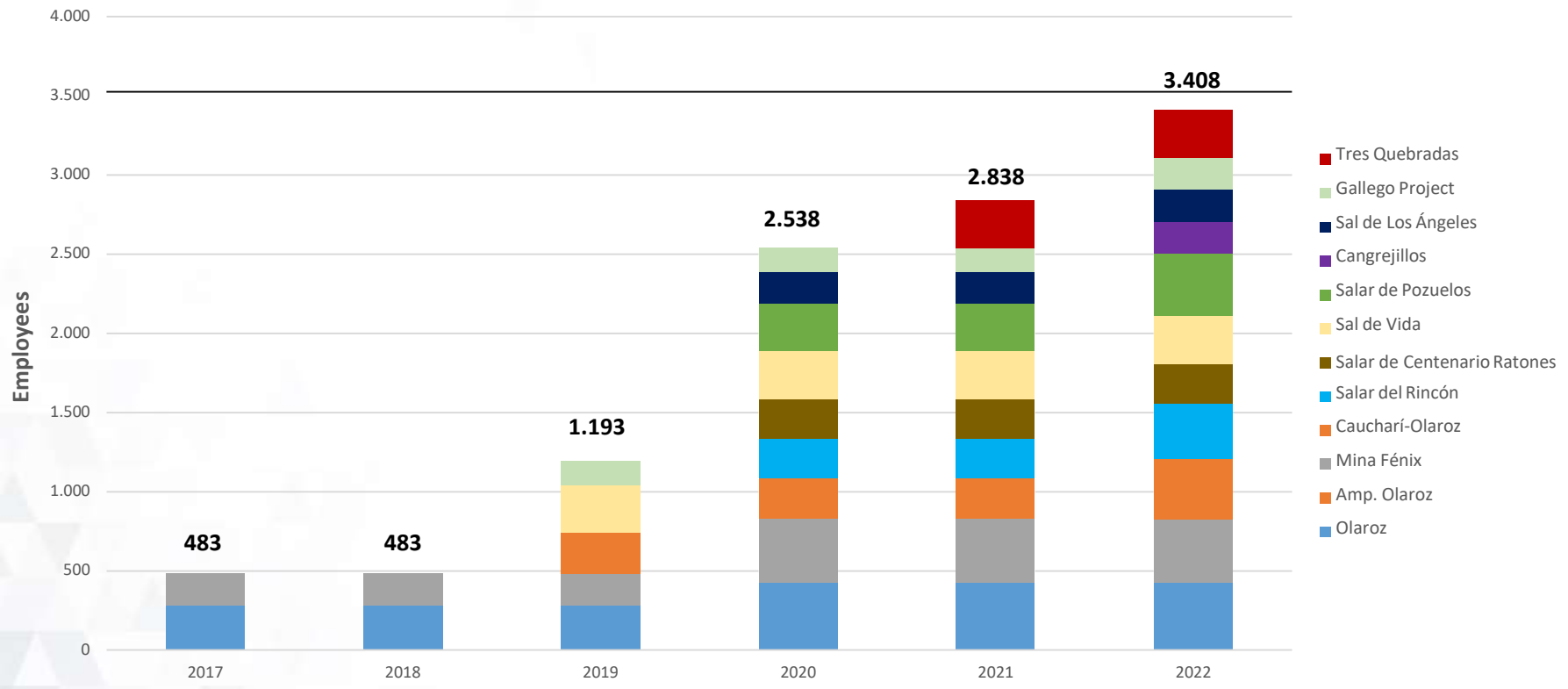


	2 mines in Production. Both expanding production capacity
	2 mines under Construction
	10 projects from Feasibility to Advanced Exploration
	> 40 projects in Early-Stage Exploration phase, 6 of them from pegmatites deposits

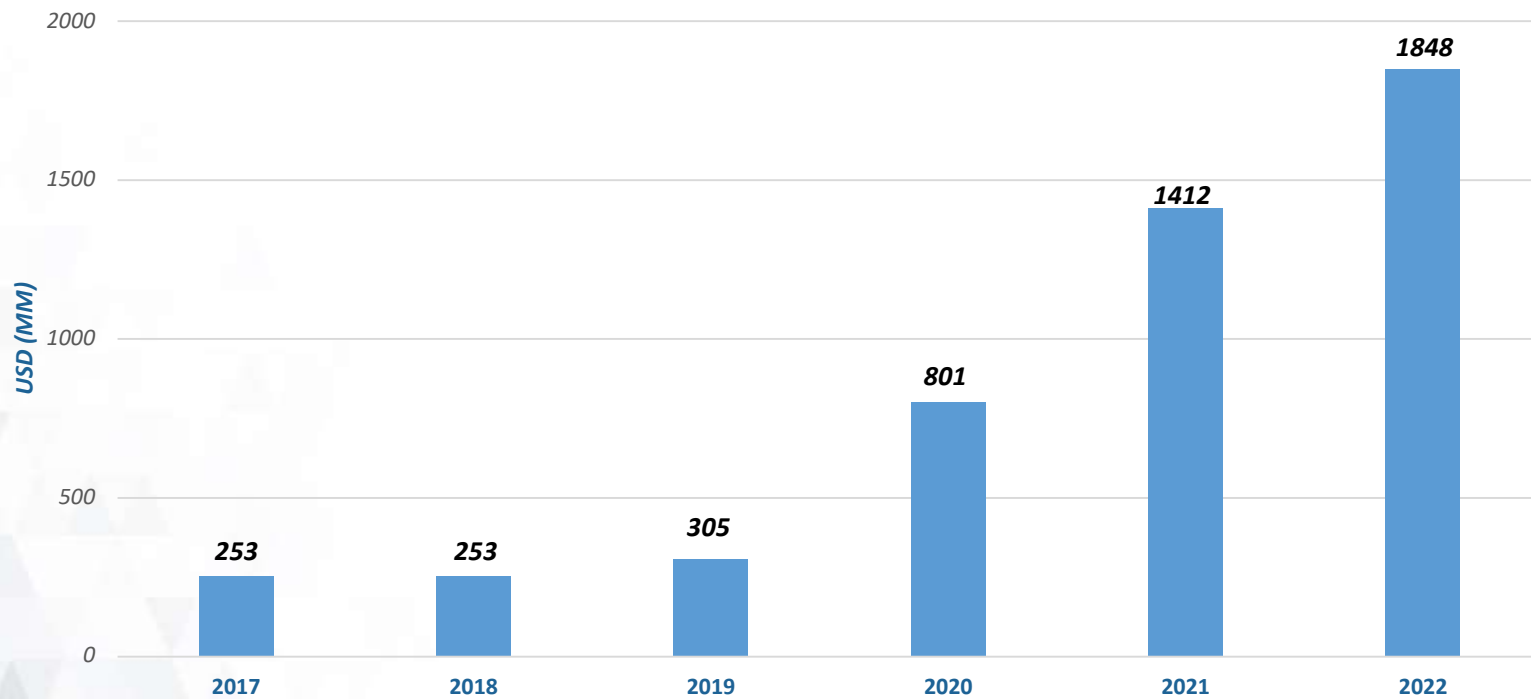


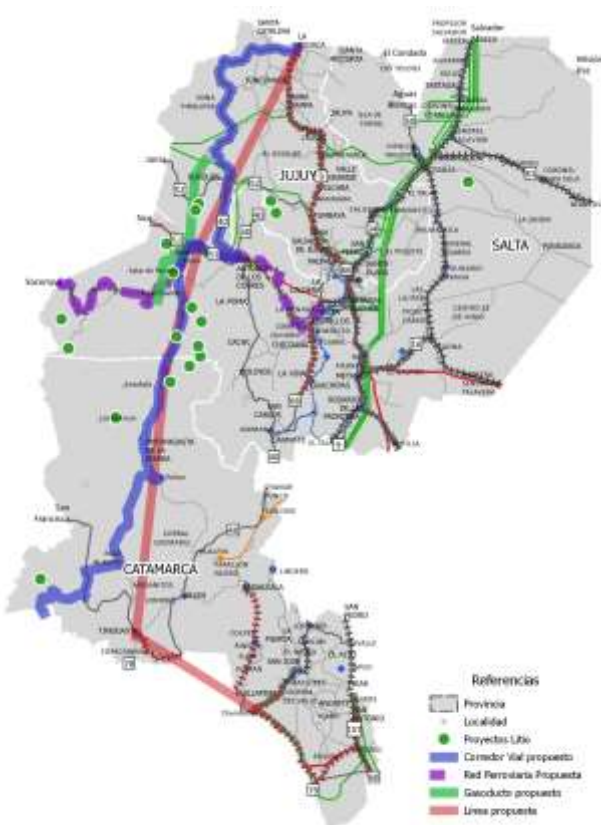






At 75% of projected production capacity and 9.000 USD/t LCE price

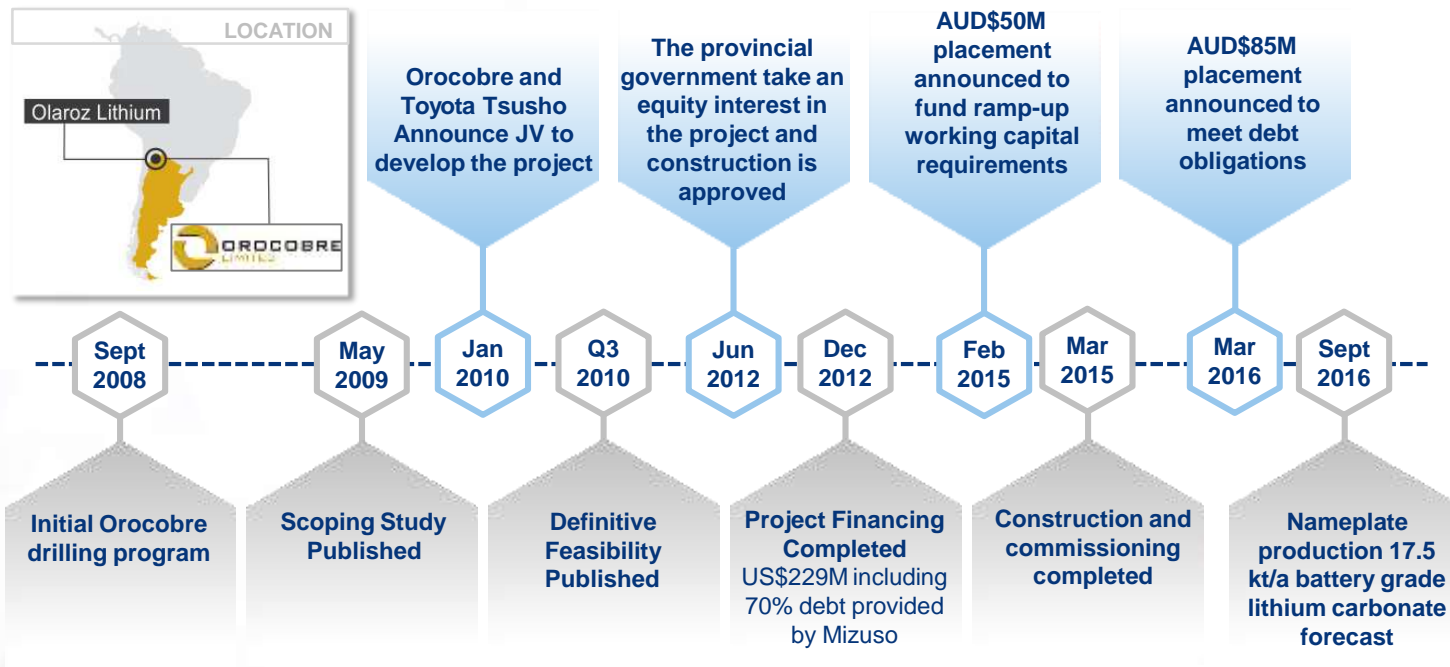




Prices are still rising...

- Infrastructure (Roads, railways, gas, electricity, telecomunicaciones)
- Skills development for the specific salar production system
- Accelerate the process between projects and production
- Local development plans
- Consider seriously the impact in local and aboriginal communities.
- Hydrogen cells and graphene can be competitors.
- Recycling by 2040 would cover 50% of the demand for lithium.
- Australia alone could supply the demand for world lithium for the next 60 years.
- Technological advances can create new sources.

Source: Dirección de Infraestructura Minera/ Subsecretaría de Sustentabilidad minera



Commissioning and process residence times are a specific risk to brine production and will hamper the progress of expansion. These obstacles for new brine developments may sustain the current market deficit in the short term.



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