

# Mercado Internacional de Lítio – Visão da CRU International

## - demanda, oferta, cenários de preços e riscos -

II Seminário sobre Lítio - Brasil – CETEM – Rio de Janeiro, jul.2016  
Julia Ralph, Alice Yu, Márcio Goto



### CRU International Ltd.

#### Escritório Central

Chancery House,  
53-64 Chancery Lane,  
Londres, WC2A 1QS, UK – Reino Unido

[www.crugroup.com](http://www.crugroup.com)

**Tel** +44 20 7903 2000  
**Fax** +44 20 7837 0976  
**Email** [sales@crugroup.com](mailto:sales@crugroup.com)

### Contato na América Latina

Márcio Goto – São Paulo, Brasil  
**Tel** +11 5051 8124  
**Cel** +11 99 726 4466  
**Email** [marcio.goto@crugroup.com](mailto:marcio.goto@crugroup.com)

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# CRU – Quem somos?

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# “Setores” cobertos pela CRU:

Continuously monitored / analysed / published  
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1 H																	2 He	
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
55 Cs	56 Ba	57-70 *	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-102 **	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

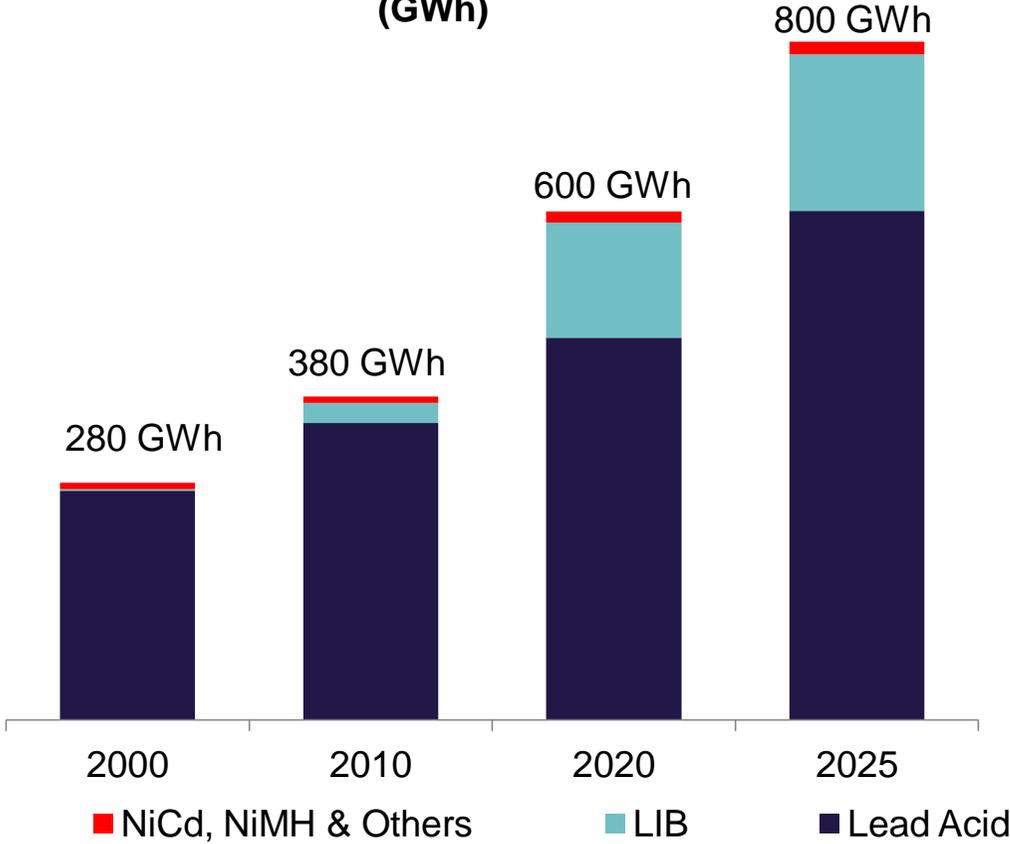
  

57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

\*Lanthanide series  
 \*\*Actinide series

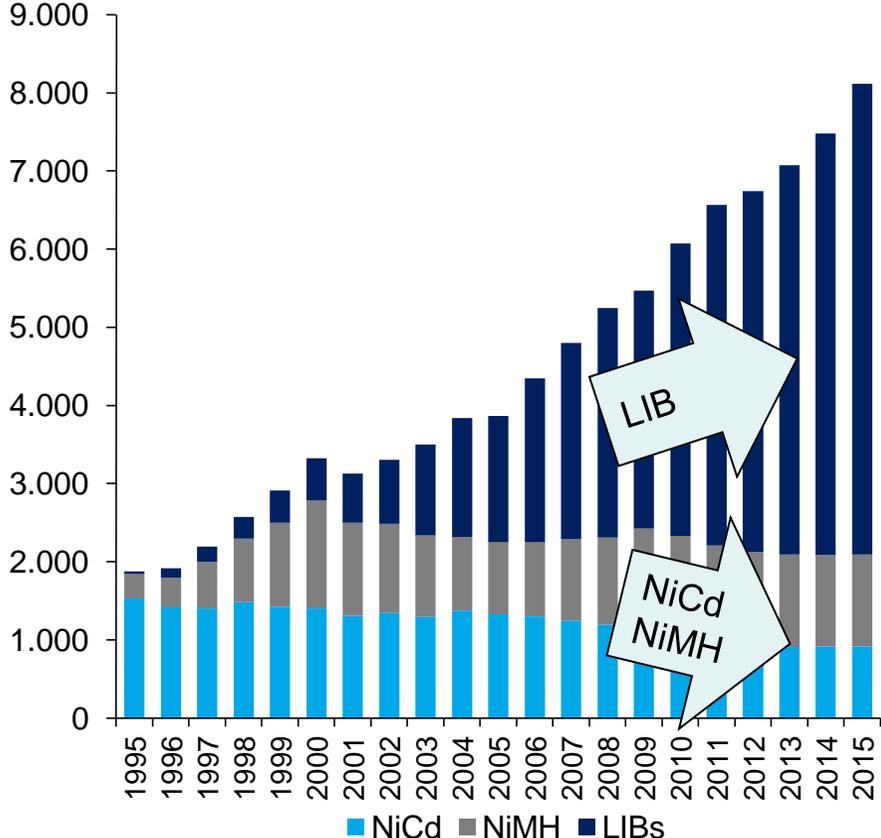
# Lithium Ion Batteries (LIB) are now the battery of choice for Electric Vehicles (EV) and consumer electronics

Global rechargeable battery market (GWh)



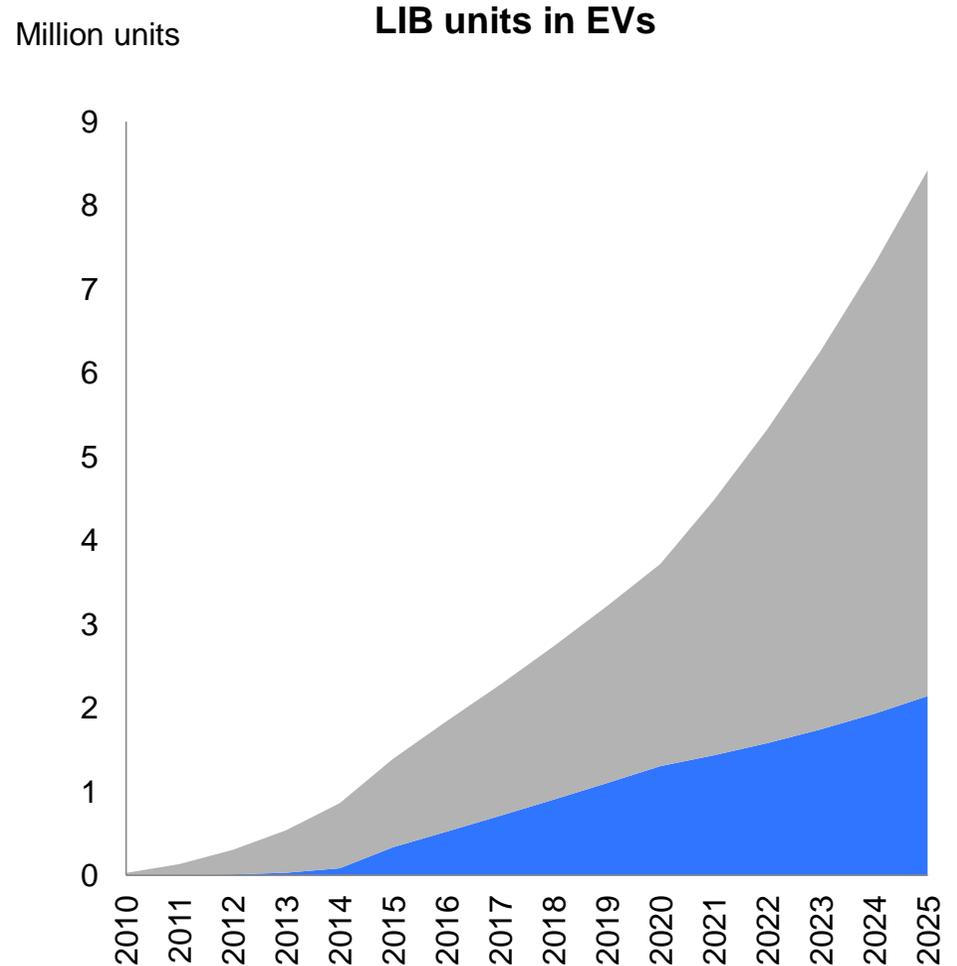
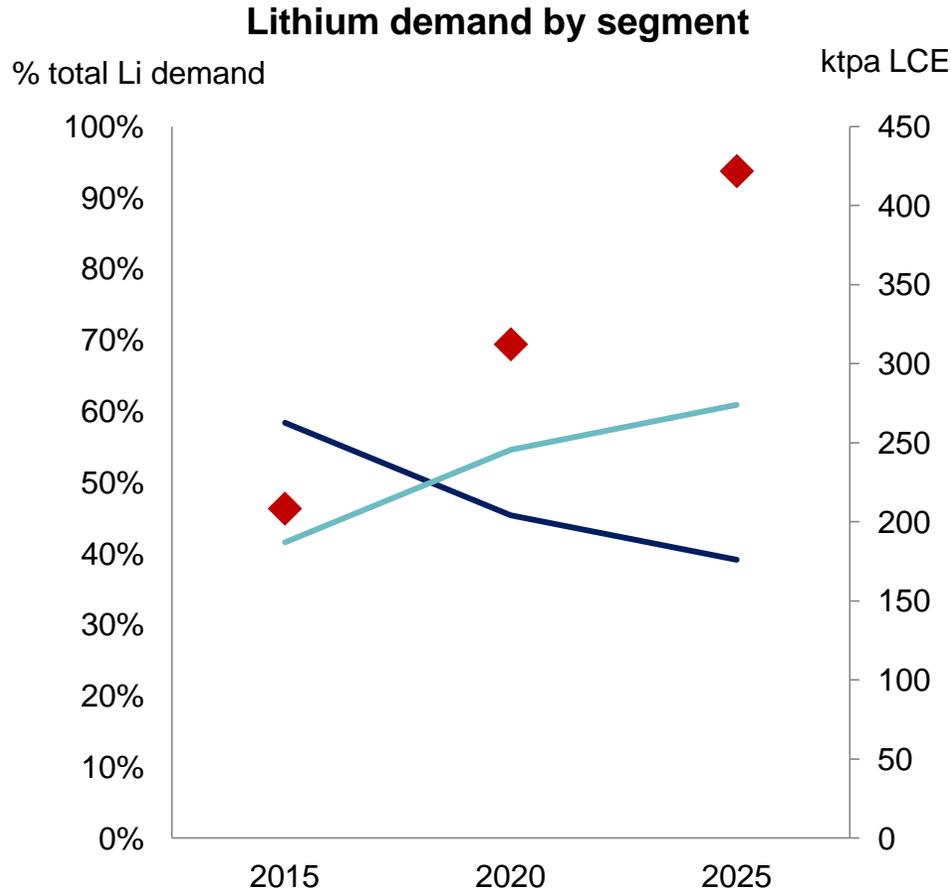
Data: Avicenne, CRU

Battery market (million cells)



Data: CRU

# Lithium demand to reach 421kt LCE by 2025, dominated by battery demand for EVs, particularly in China...



— Industrial Application    — Battery Application

◆ Lithium demand

LCE = Lithium Carbonate Equivalent

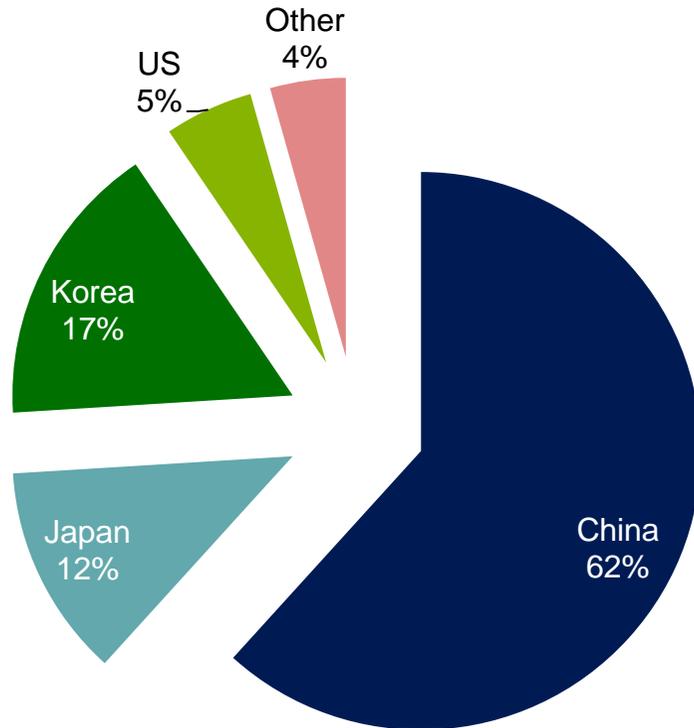
Data: CRU

■ China    ■ Ex-China

Data: CRU

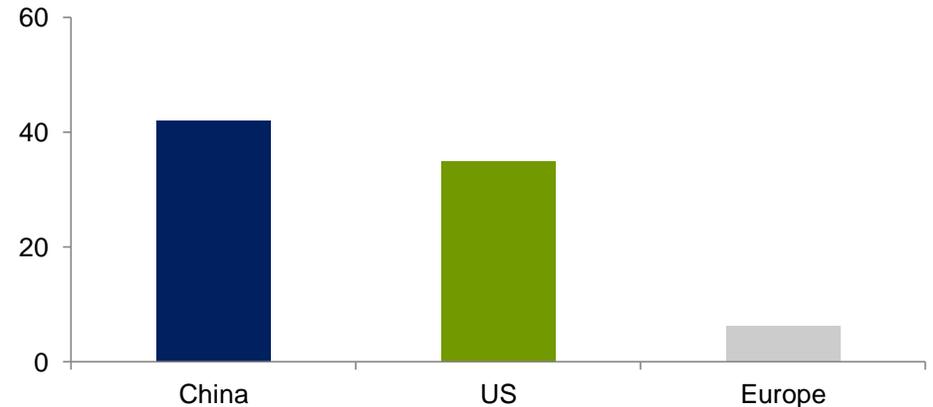
# LIB manufacturing plants - mostly in Asia (South Korea, Japan and China) - ~50% of new plants are in China

2015 LIB manufacturing Capacity  
Total: 97 GWh/y



Data: CEMAC, CRU

LIB capacity in project pipeline, GWh/y



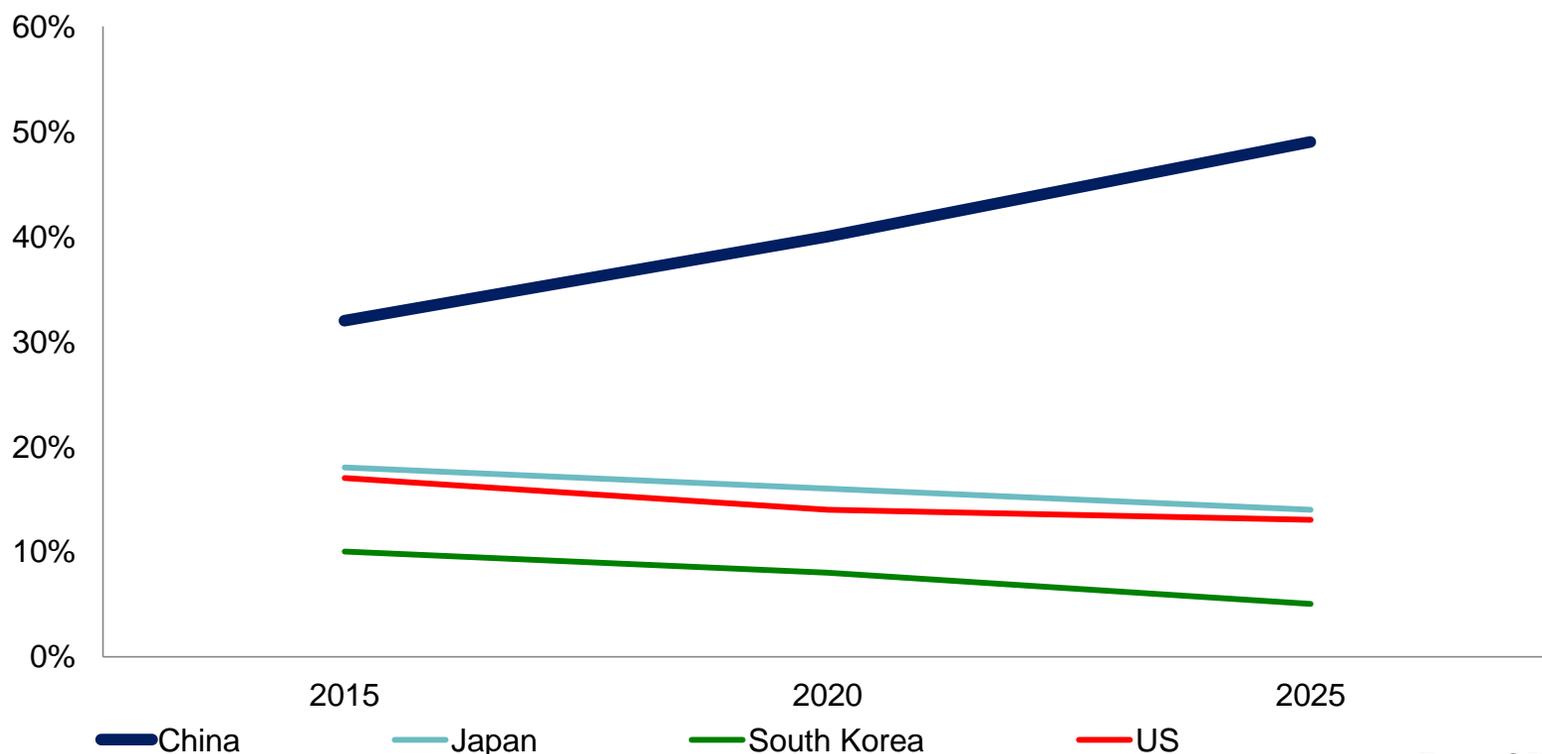
Data: CEMAC, CRU

Country	Japanese/Korean involvement
China	Yes (LG, Panasonic and SDI)
US	Yes (Panasonic)
Europe	No

Data: CRU

# China to account for nearly 50% of total lithium demand by 2025 – driven by EVs - market share of other countries to fall...

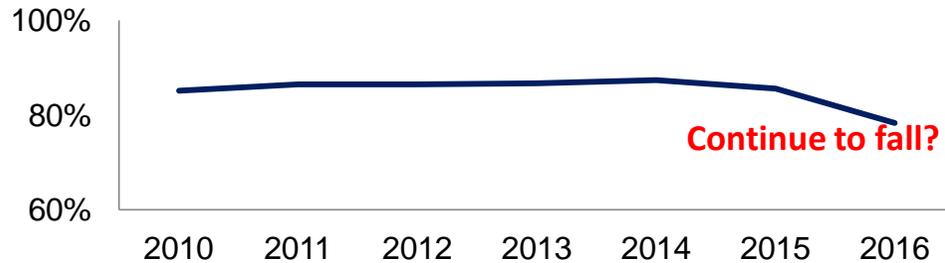
Lithium demand by country



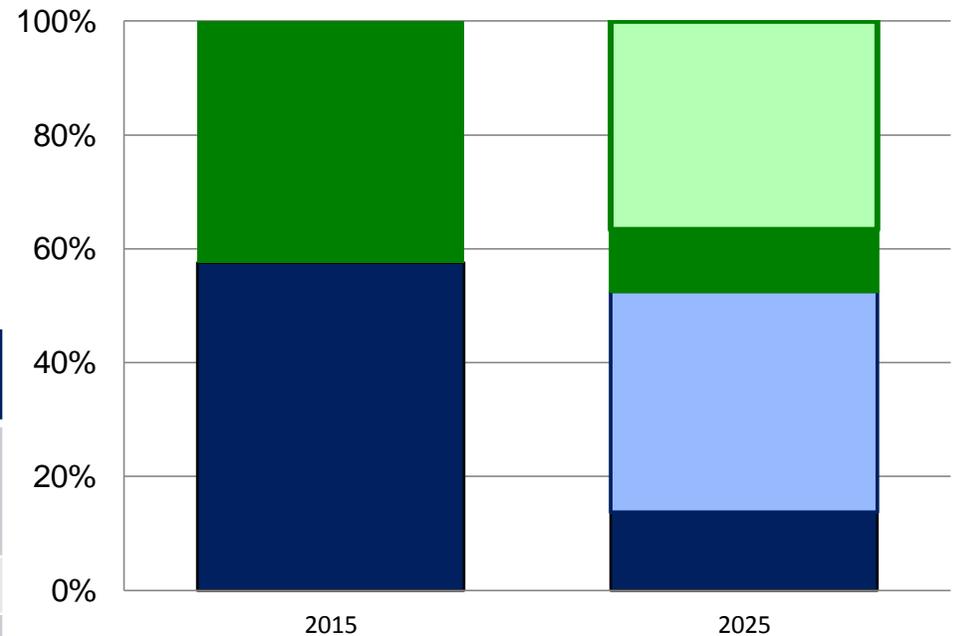
Data: CRU

# New entrants to alter the current oligopoly in supply - brine x hard rock share remains at similar levels to 2025

The Big 4's (Tianqi, SQM, Albemarle e Orocobre) share of global supply



Capacity of brine and hard rock operations and projects

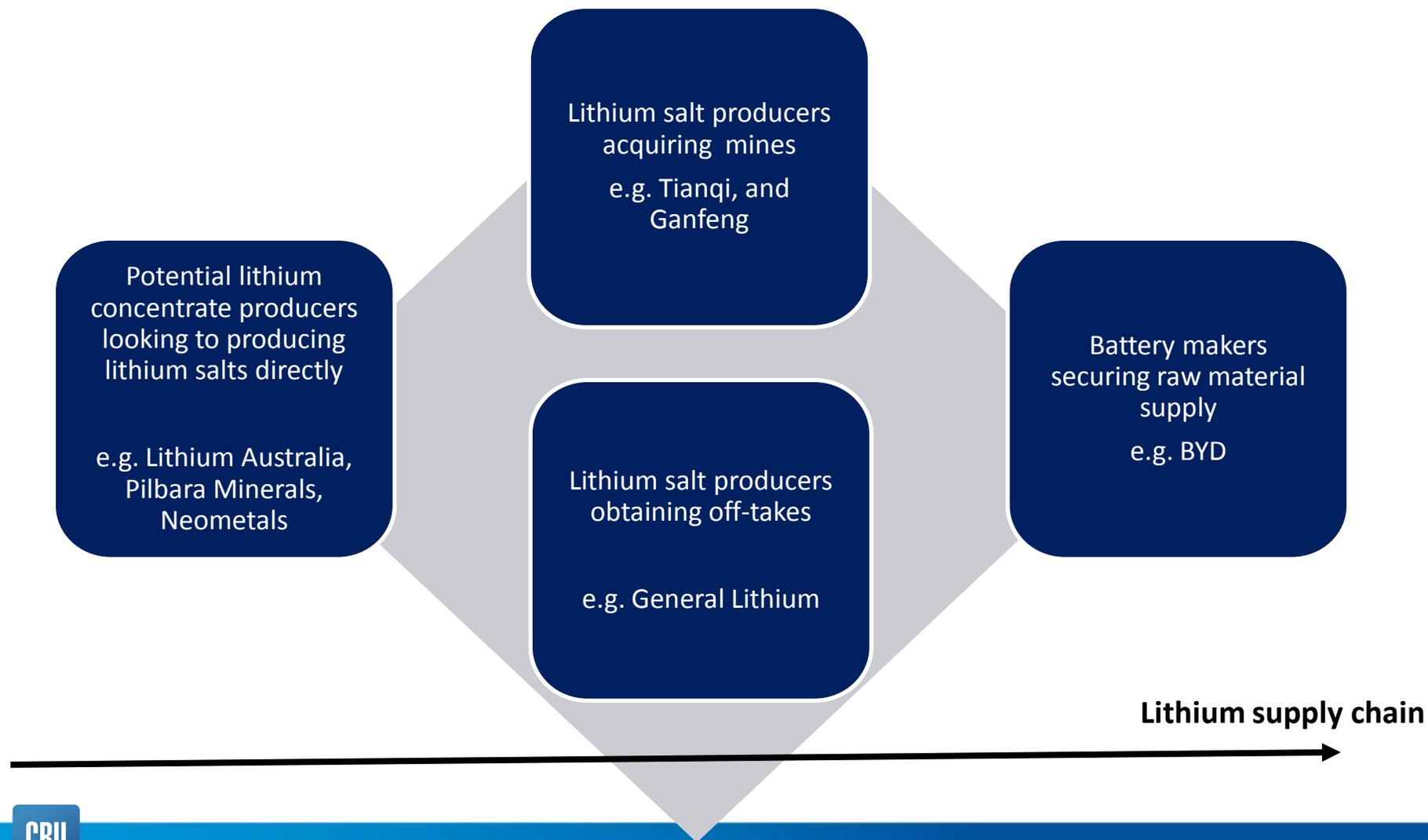


Planned start date	Project	Owner
2016	Mt. Marion	Neometals, Mineral Resources and Ganfeng
	Heyuan Lihui	Ganfeng
	Yichun Deposit	Jiangxi Motor
2017	Pilgangoora Lithium (ALT)	Altura Mining Limited
	Pilgangoora Lithium (PLS)	Pilbara Minerals
	Lithium Quebec	Jilin Jien

- Existing operation - brine
- Projects under development - brine
- Existing operations - hard rock
- Projects under development - hard rock

Data: CRU

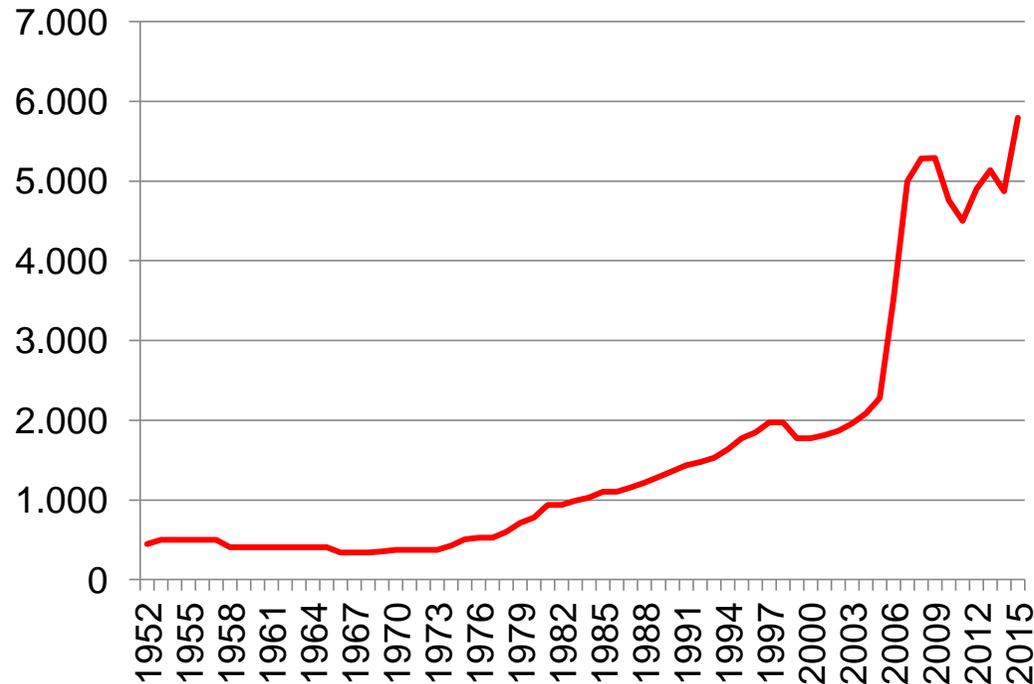
# Price hikes and supply shortages have created many opportunities for downstream integration...



# Where to next for lithium prices?

## Lithium Carbonate Price\*

Nominal, US\$/t

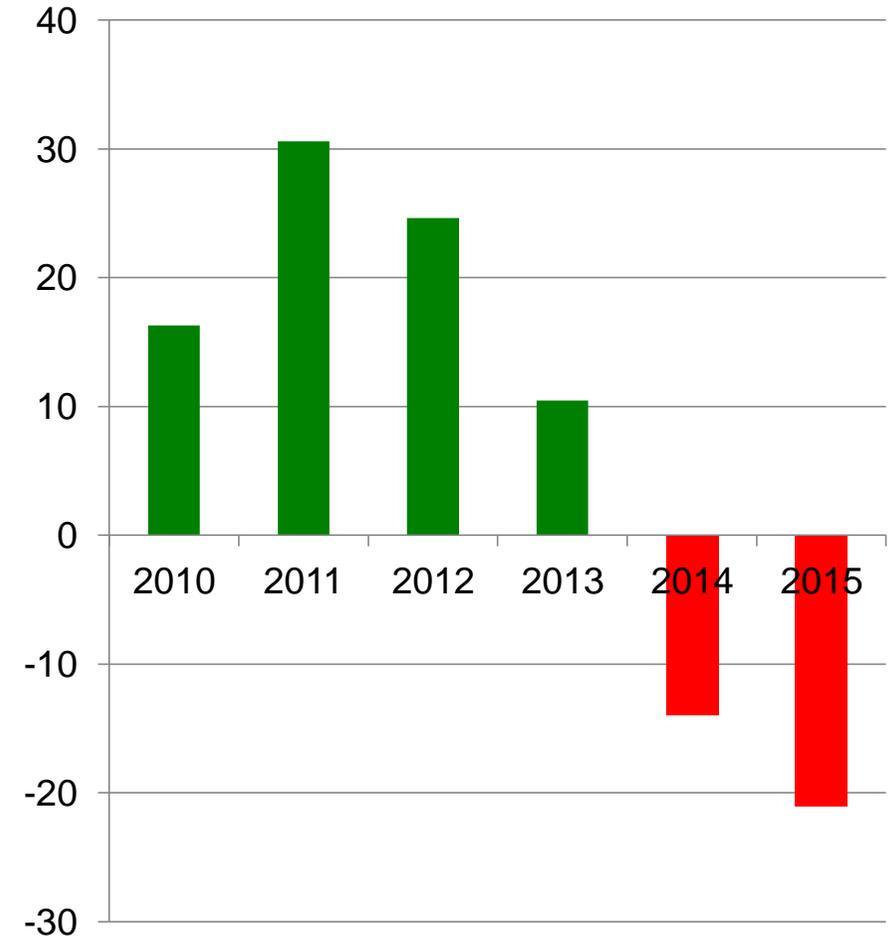


*\*Lithium Carbonate Price is based on average unit values at the major import and export destinations, as an average for the year. These values are conceptually different and so will be below contract prices. Prices before 2000 were estimated using historical rates of change in the United States Geological Survey unit value series for lithium*

Source: GTIS, CRU

## Market balance

kt LCE

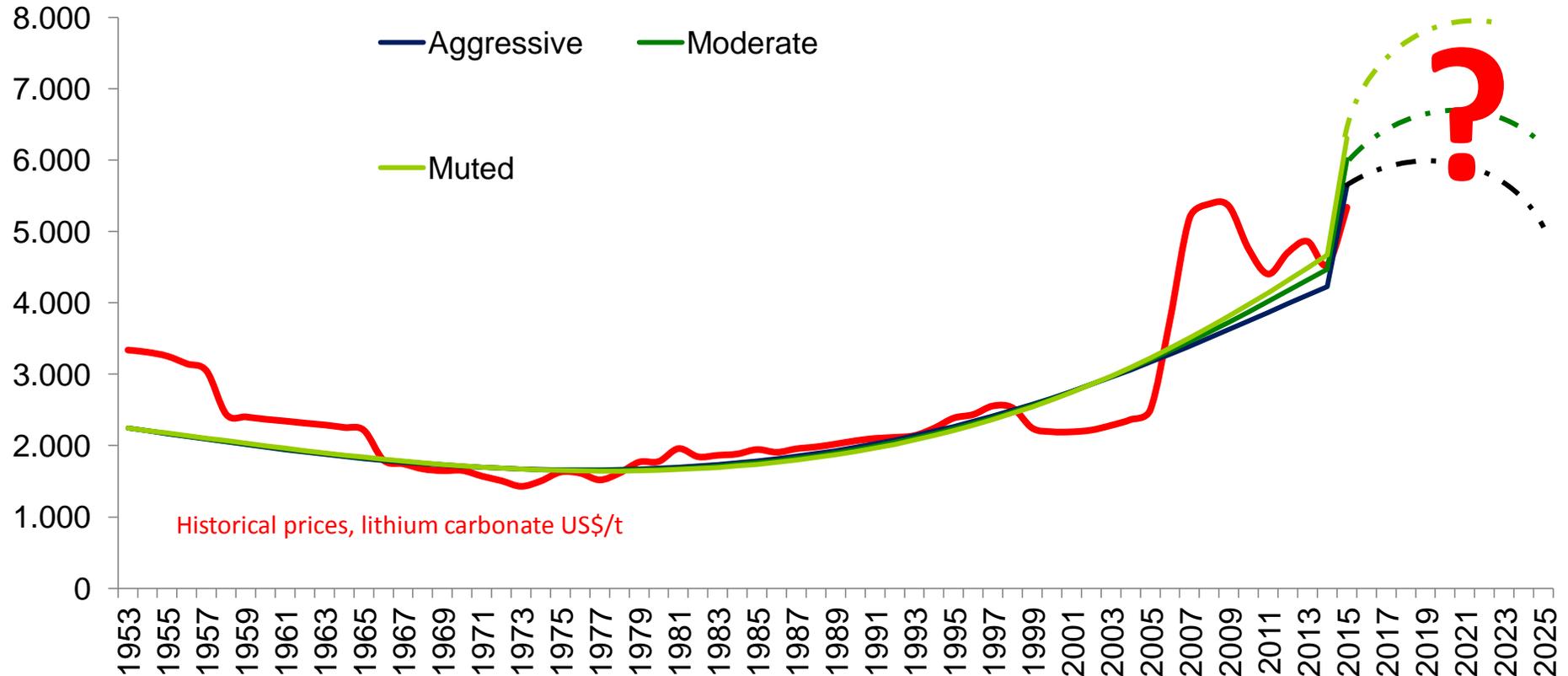


Source: CRU

# Three possible underlying cost trend scenarios

421kt LCE demand in 2025  
Market value at stake

US\$ / tonne



\*Lithium Carbonate Price is based on average unit values at the major import and export destinations, as an average for the year. These values are conceptually different and so will be below contract prices. Prices before 2000 were estimated using historical rates of change in the United States Geological Survey unit value series for lithium

Source: GTIS, CRU

## Demand:

- EV uptake lower than expected in China
- Low oil prices and changing consumer preferences for EVs
- Withdrawal / reduction in governments support
- Low risk of substitution (CRU view)

## Supply:

- Too many new projects come online, potential to flood the market
- Countries with significant under-developed lithium deposits: Bolivia and Serbia
- Novel technology to disrupt the current supply chain

## ...and the risks

### Balance:

- Potential of sustained and large market surplus
- Secondary production of various lithium compounds e.g. lithium carbonate vs. lithium hydroxide to disrupt the supply chain

### Prices:

- Potential for prices to crash due to aggressive supply response (as above)
- Price volatility due to time delay / technical issues with new projects
- Lack of benchmark pricing to result in highly competitive supply contracts / lack of visibility

# Conclusions

## LIB demand to be driven by EVs

- LIBs will demonstrate the highest growth rates and investment activity among all rechargeable battery types mainly driven x EV
- China's share of global lithium demand to increase at the expense of other countries

## Structural shift in supply dynamics

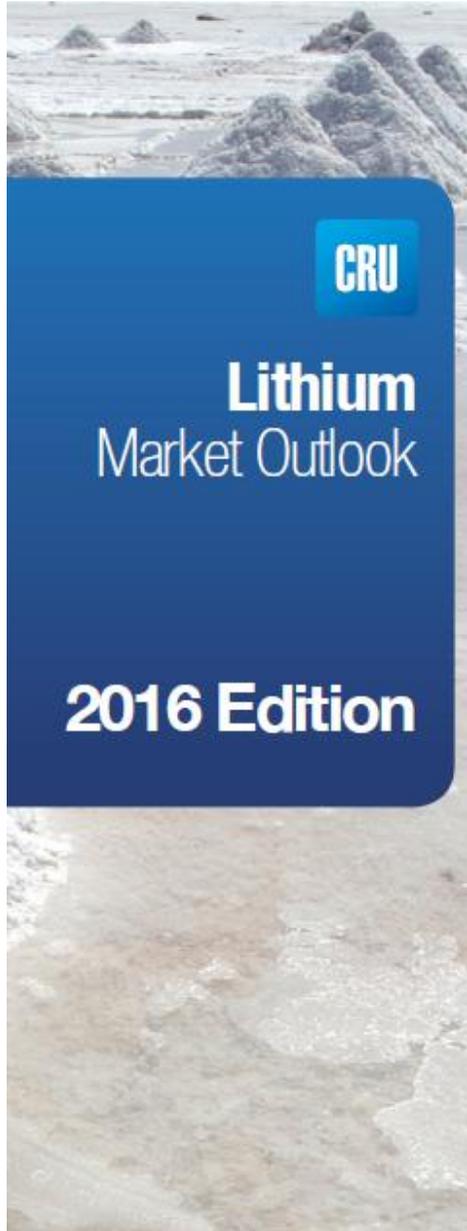
- Lots of new entrants (hard rock and brines), altering the current oligopolistic structure of lithium materials
- Integration of the supply chain to secure raw materials / competitive prices

## Market currently in deficit

- Supply shortages have caused price spikes, particularly in China
- Prices will continue to rise if new projects are not developed

## Significant price risks

- Price could crash if supply response is aggressive, and/or EV uptake is lower than expected



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Key products and applications  
Industry structure

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Lithium supply forecast to 2025

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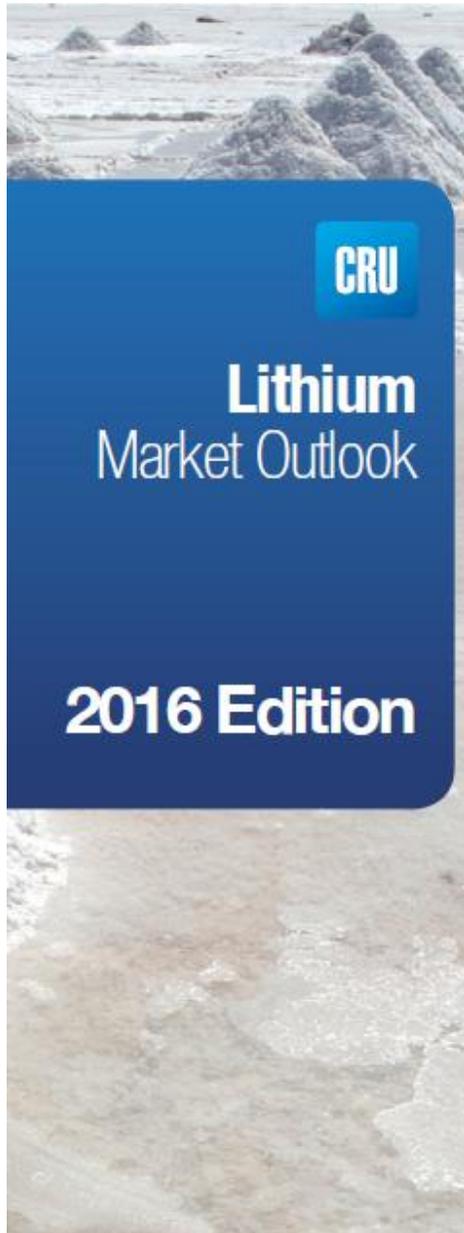
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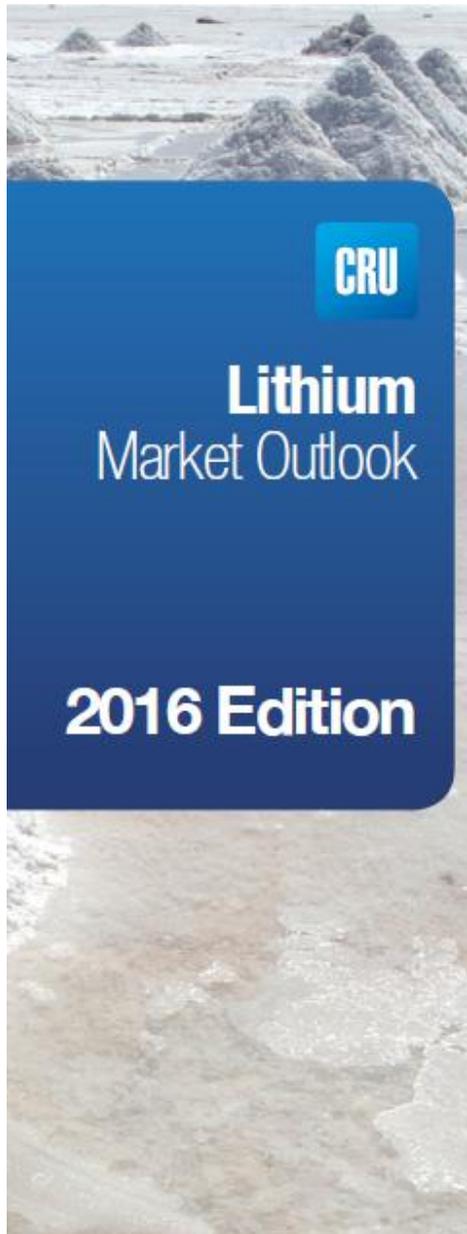
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**Table 2.8: Lithium demand forecast for eTransportation, 2010-2025**

	2010	2011	2012	2013	2014	2015	2016	2017
eMotorcycle	t LCE							
eScooter	t LCE							
eBus	t LCE							
eBikes	t LCE							
EVs	t LCE							
HEVs	t LCE							
PHEVs	t LCE							
<b>Data: CRU</b>								

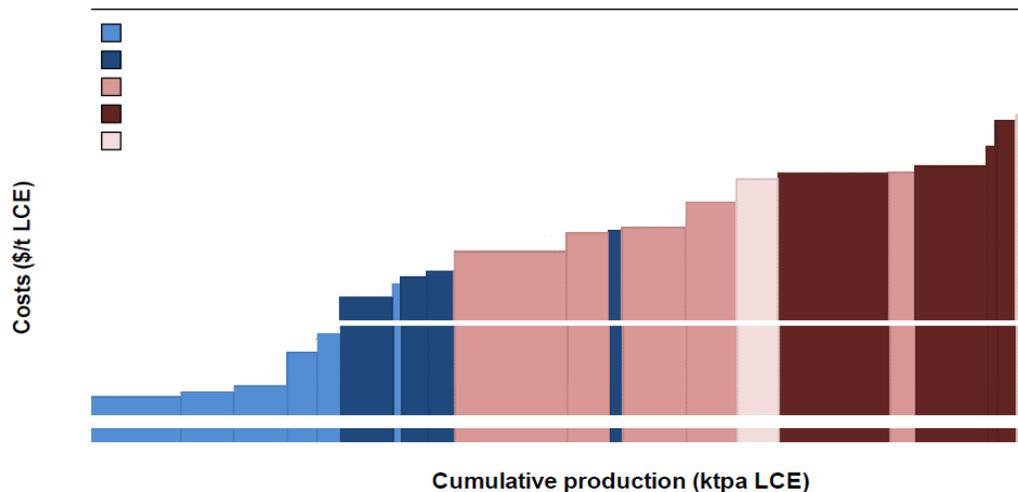
**Table 3.13: Lithium operations and projects in Argentina**

Project	Owner	Deposit	Announced start date	Capacity (ktpa LCE)
<b>Operating</b>				
Hor				
Sal				
<b>Committed</b>				
Poz				
<b>Probable</b>				
Ca				
<b>Possible</b>				
Ol				
Hc				
Sa				
Sa				
Sa				
<b>Speculative</b>				
Mc				
Sa				
Gt				
Sa				
<b>Data: CRU</b>				

**Table 6.2: CRU lithium price forecast, 2010-2025**

	2010	2011	2012	2013	2014	2015	2016	2017
Lithium carbonate	\$/t LCE							
Lithium hydroxide	\$/t LCE							
<b>Data: CRU</b>								

**2025 cost curve (real 2016 USD)**



# Artigos recentes publicados no website da CRU

**07.Jul.2016 - Cobalt and Lithium the winners in battery demand**

[http://www.crugroup.com/about-cru/cruinsight/Cobalt and Lithium the winners in battery demand](http://www.crugroup.com/about-cru/cruinsight/Cobalt_and_Lithium_the_winners_in_battery_demand)

**01.Jun.2016 - Lithium - The Problem With Prices...**

[http://www.crugroup.com/about-cru/cruinsight/Lithium-The Problem With Prices](http://www.crugroup.com/about-cru/cruinsight/Lithium-The_Problem_With_Prices)

**04.May.2016 – Hard Rock Miners Set to Plug Supply Gap**

[http://www.crugroup.com/about-cru/cruinsight/Hard Rock Miners Set to Plug Supply Gap](http://www.crugroup.com/about-cru/cruinsight/Hard_Rock_Miners_Set_to_Plug_Supply_Gap)

**14.Apr.2016 - The Rise Of Lithium - Demand Set To Surge**

[http://www.crugroup.com/about-cru/cruinsight/The Rise Of Lithium-Demand Set To Surge](http://www.crugroup.com/about-cru/cruinsight/The_Rise_Of_Lithium-Demand_Set_To_Surge)



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**Márcio Goto**

**Tel +11 5051 8124 - Cel +11 99 726 4466**

**Email [marcio.goto@crugroup.com](mailto:marcio.goto@crugroup.com)**



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