



2018080139198

13/08/2018 13:13 Operador: PFRANCO
DIVISION CONTROL FINANCIERO VALORES
Nro. Inscrip: 184v

Santiago, 13 de agosto de 2018

Señor
Joaquín Cortez Huerta
Presidente
Comisión para el Mercado Financiero
Avda. Libertador Bernardo O'Higgins 1449
Presente

De nuestra consideración:

En cumplimiento a lo indicado por esa Comisión para el Mercado Financiero, adjuntamos la copia de presentación que publicamos el día 8 de agosto de 2018 y que fue presentada en el Foro del Litio en Santiago el mismo día.

Saludamos muy atentamente a usted,

SOCIEDAD QUÍMICA Y MINERA DE CHILE S.A.

Patricio de Solminihac
Gerente General
SQM S.A.

cc: Bolsa de Comercio de Santiago (vía ebox)
Bolsa de Valores de Valparaíso
Bolsa Electrónica de Chile
Archivo

SQM
El Trovador 4285, Piso 10
Las Condes, Santiago, Chile
Tel: (56 2) 2425 2485
Fax: (56 2) 2425 2493
www.sqm.com



LITHIUM MARKET OUTLOOK

Foro del Litio
August 2018

Daniel Jimenez

SVP Iodine, Lithium and Industrial Chemicals



Agenda

1 Lithium Market

2 Demand

2.1 Global

2.2 Li-ion Batteries and Electric Vehicles

3 Supply

4 Lithium at SQM

Lithium Market

Background

- Lithium is widely spread in nature⁽¹⁾.
- Lithium is found in:
 - Continental brines (100-2,700 ppm)
 - Dried out “Salares” (e.g. Atacama in Chile, Hombre Muerto in Argentina, Uyuni in Bolivia and Silver Peak in the US).
 - Salt lakes (e.g. Zhabuye and Qinghai in China).
 - Minerals (2,300-18,000 ppm)
 - About 145 mineralogical species, however only a few are commercial sources of Lithium (e.g. spodumene, petalite and lepidolite).
 - Other resources
 - Oil field brines (e.g. Smackover, Texas, USA) (60-500 ppm)
 - Geothermal brines (e.g. Imperial Valley, California, USA) (50-400 ppm)
 - Sedimentary clays (e.g. hectorites in USA y jaderites in Serbia) (2,000-3,000 ppm)
 - Sea water (0.17 ppm)

Brines



Minerals



Lithium Market

World resources

USGS Lithium Reserves 2017	
Country	Reserves (MT)
Argentina	2.000.000
Australia	2.700.000
Brazil	48.000
Chile	7.500.000
China	3.200.000
Portugal	60.000
US	35.000
Zimbabwe	23.000
Total (Li)	15.566.000
Total (LCE)	82.811.000

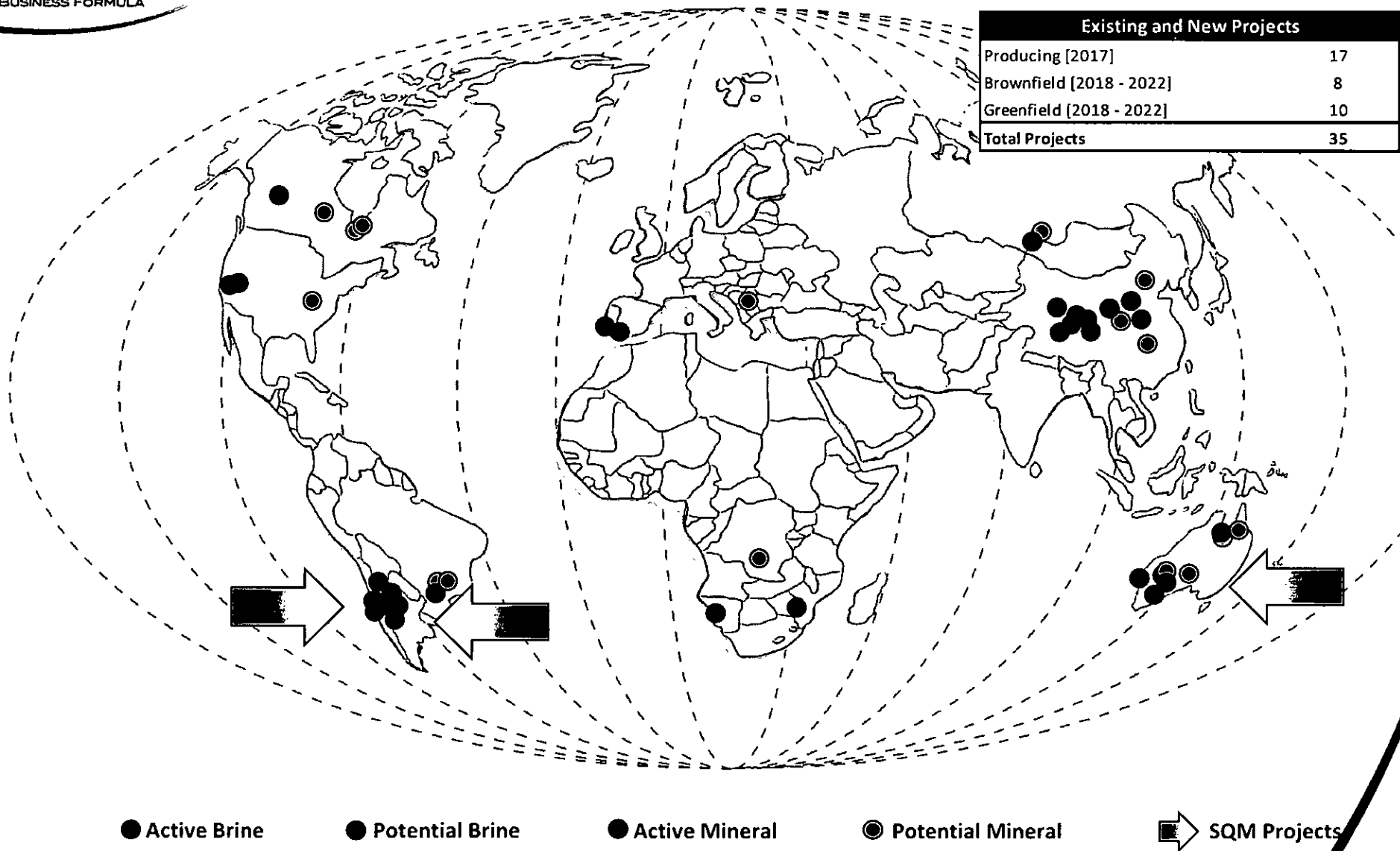
Source: USGS

- SQM Reserves (20F Report 18):
8.130.000 MT-Li
→ Enough to supply 200 years of world's 2017 lithium demand.

Source: SQM

Lithium Market

Global resources



Agenda

1 Lithium Market

2 Demand

2.1 Global

2.2 Li-ion Batteries and Electric Vehicles

3 Supply

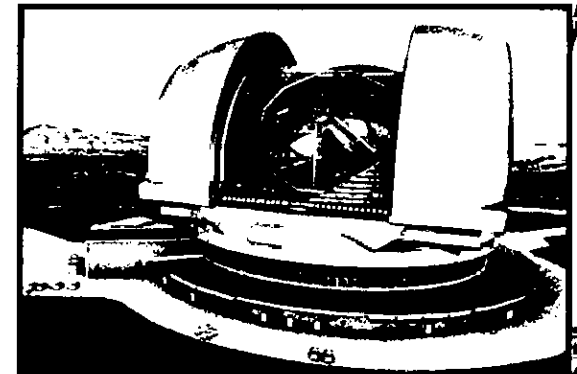
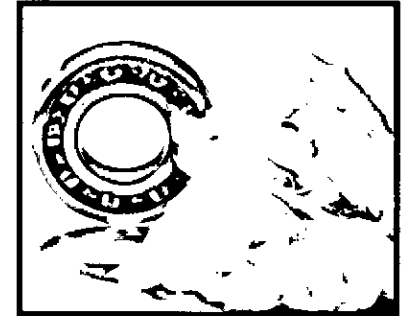
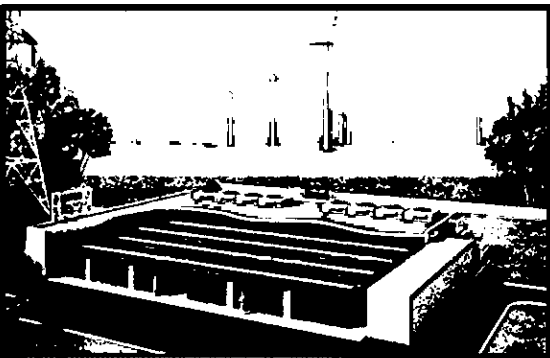
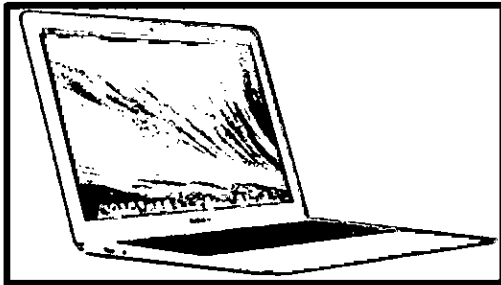
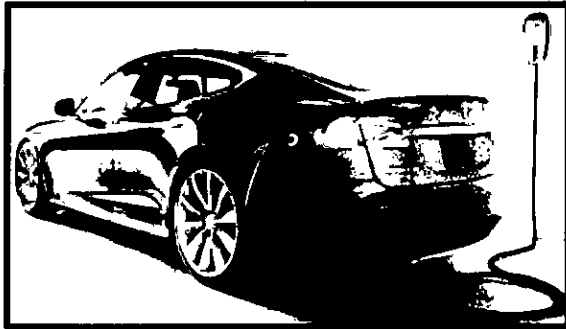
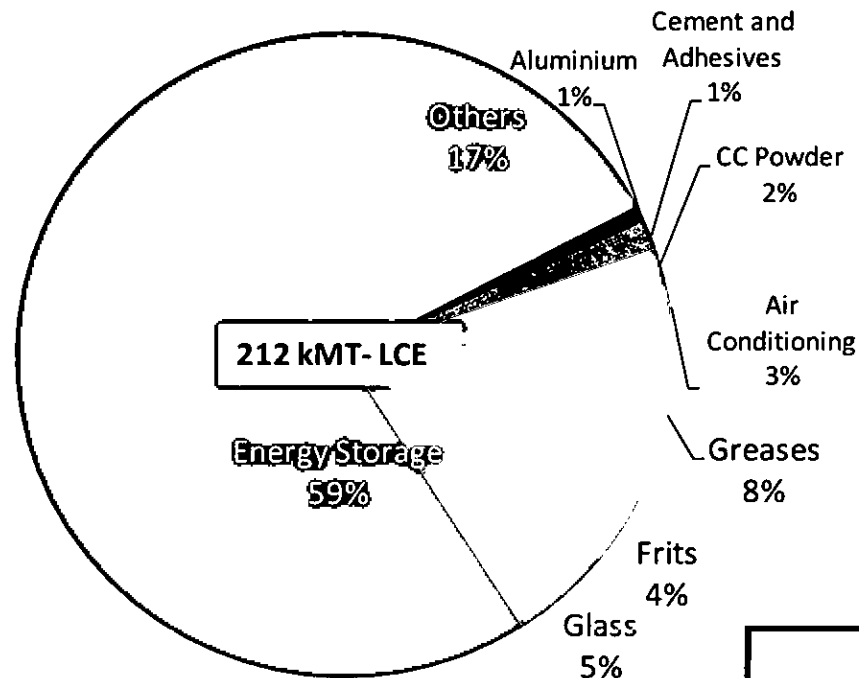
4 Lithium at SQM

Demand: global

End use

Energy storage market share In 2017: 59%

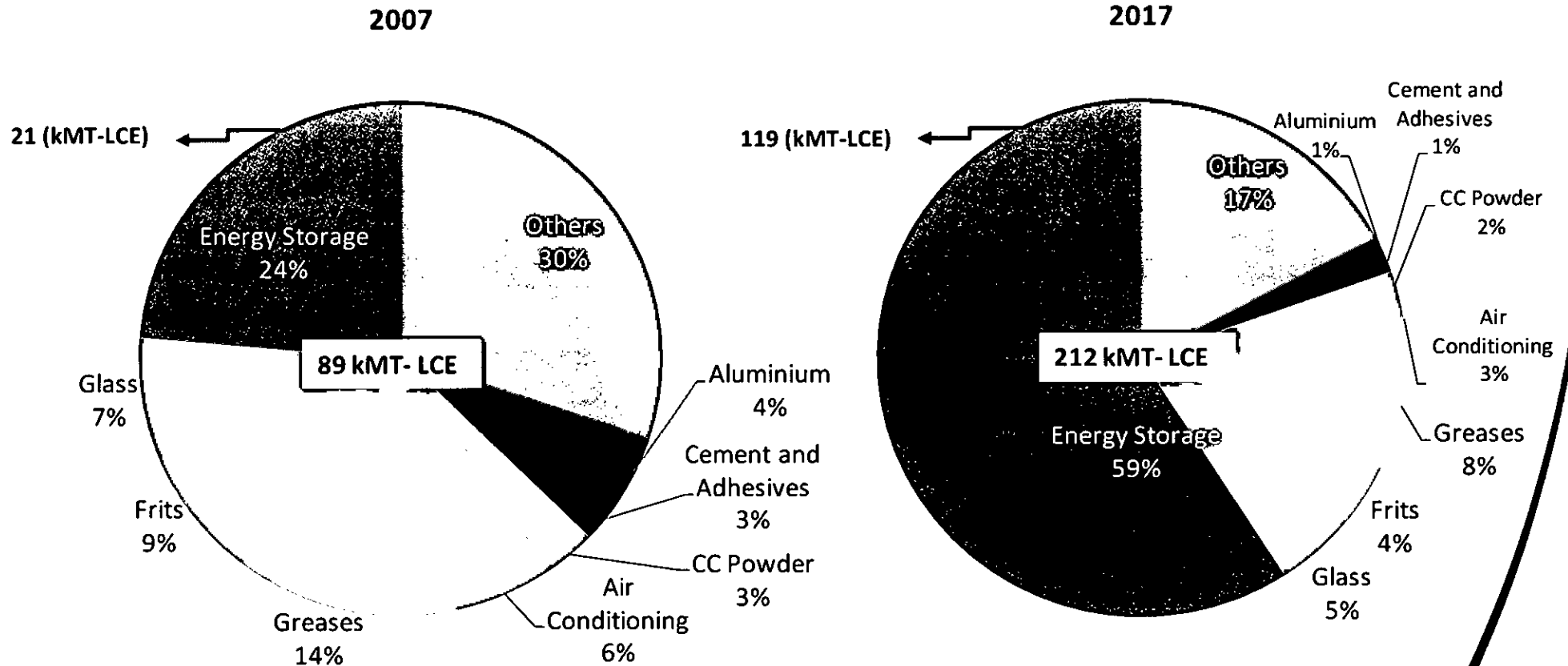
Lithium Chemicals Demand 2017



Demand: global

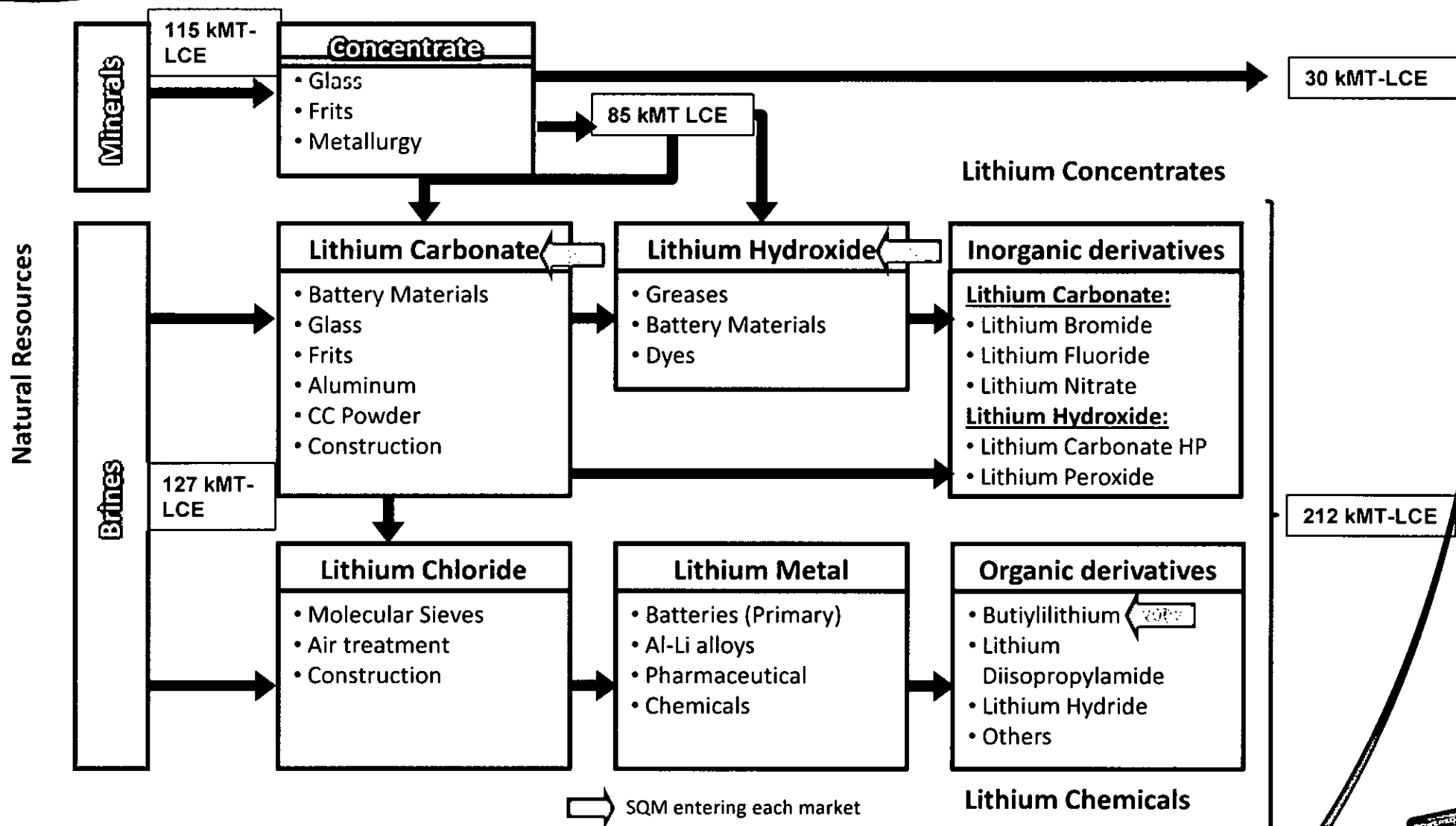
End use

Lithium Chemicals Demand 10-year comparison



Demand: global

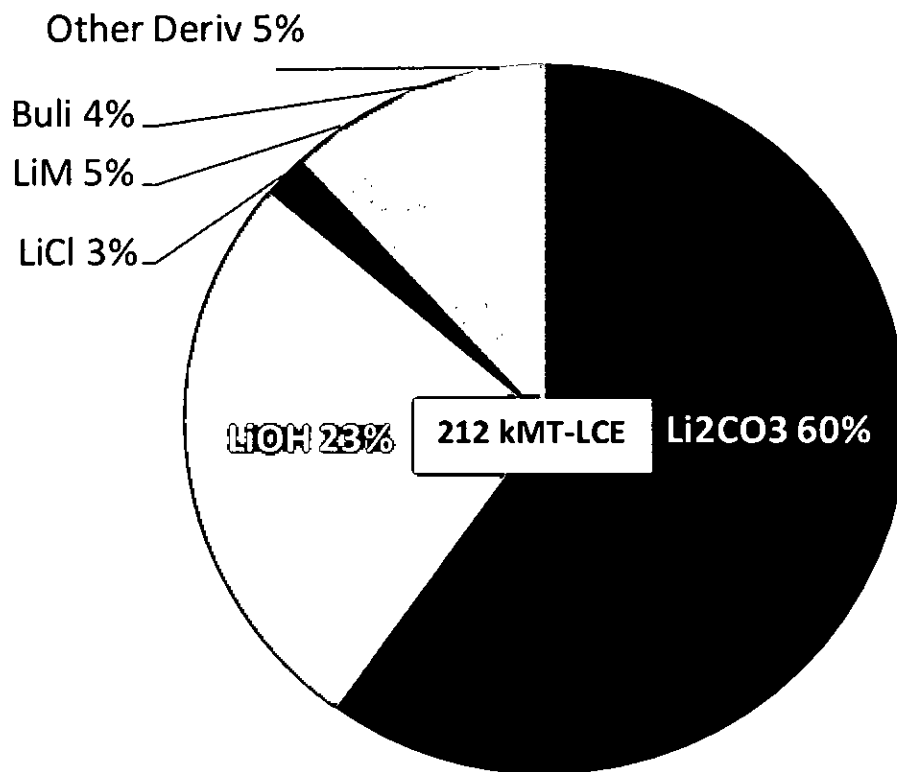
Overview of Lithium production (2017)



Demand: global Lithium products

2017 Lithium Hydroxide : Lithium Carbonate ratio =
2:5

Lithium Chemicals 2017 (%)



Li₂CO₃ = Lithium Carbonate

LiOH = Lithium Hydroxide

LiCl = Lithium Chloride

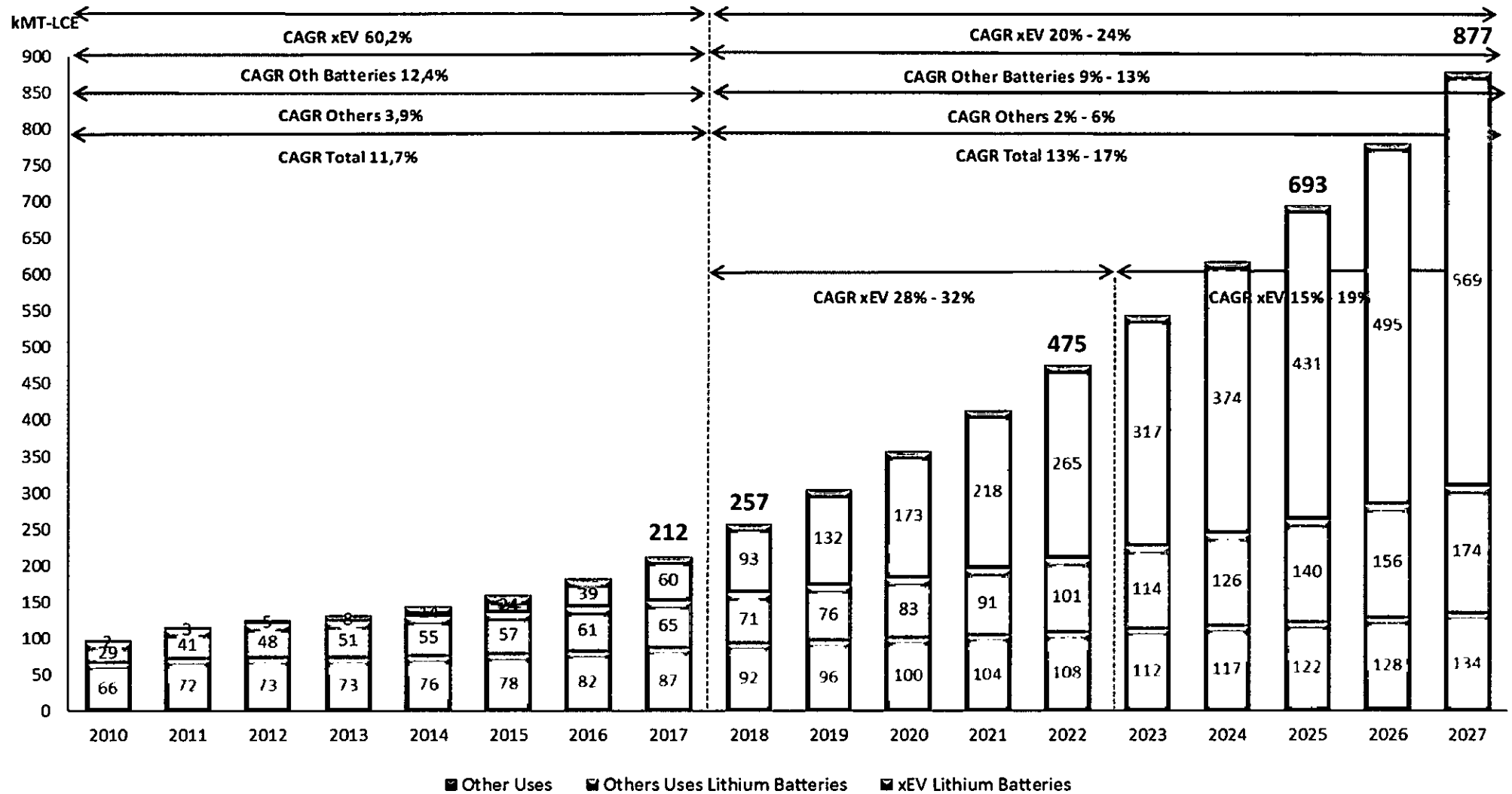
LiM = Lithium Metal

Buli = Butyllithium

Other Deriv = Inorganic and
Organic Derivatives

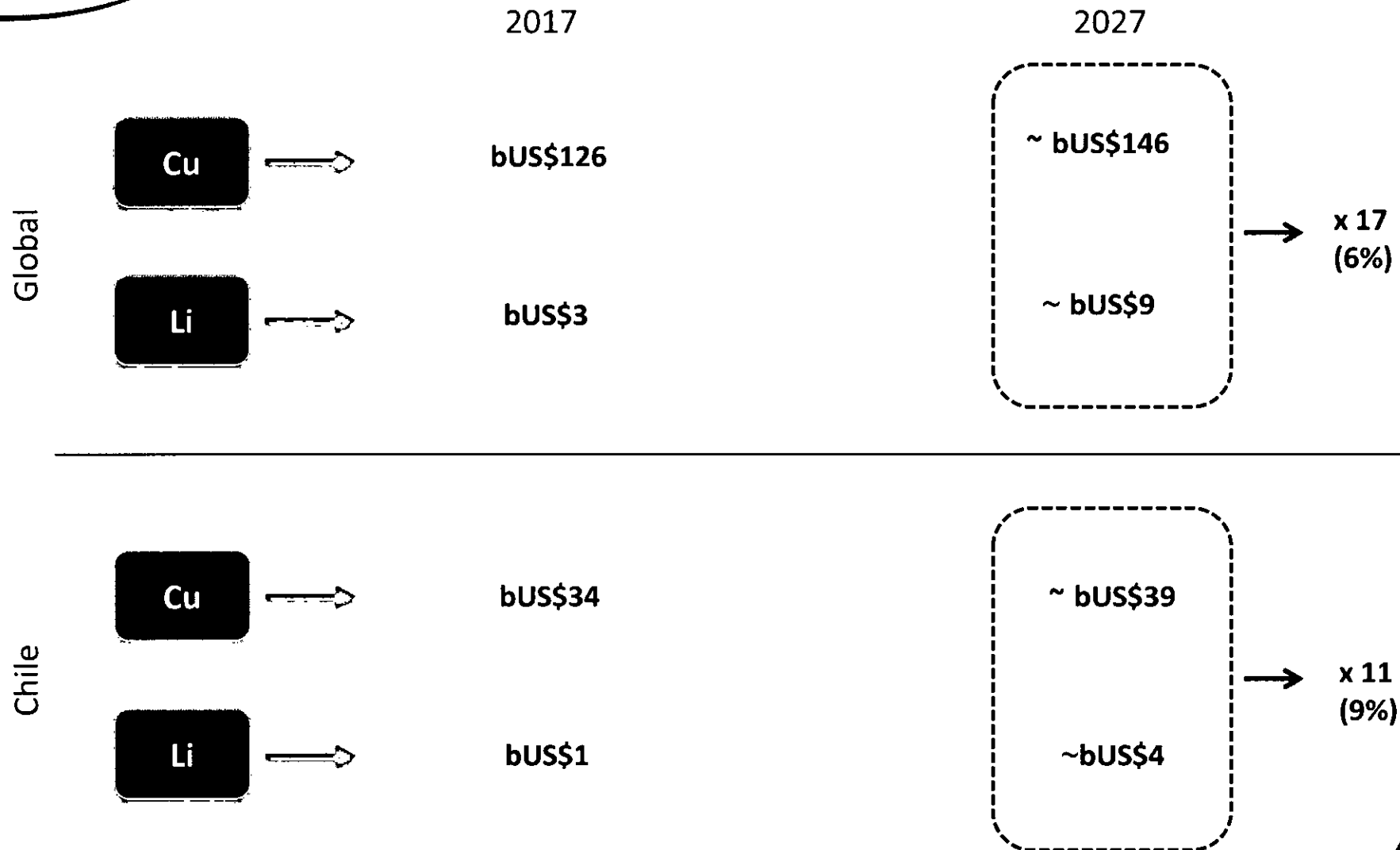
Demand: global Evolution

Required investment: USD 10-12 Billion over the next 10 years.
Typical greenfield Capex: KUSD/MT-LCE capacity 13-20



Demand: global

Lithium market relative to Copper market



Source: Cochilco, SQM

Note: Assuming a US\$2.8/lb as long-term Cu price

Agenda

1 Lithium Market

2 Demand

2.1 Global

2.2 Li-ion Batteries and Electric Vehicles

3 Supply

4 Lithium at SQM

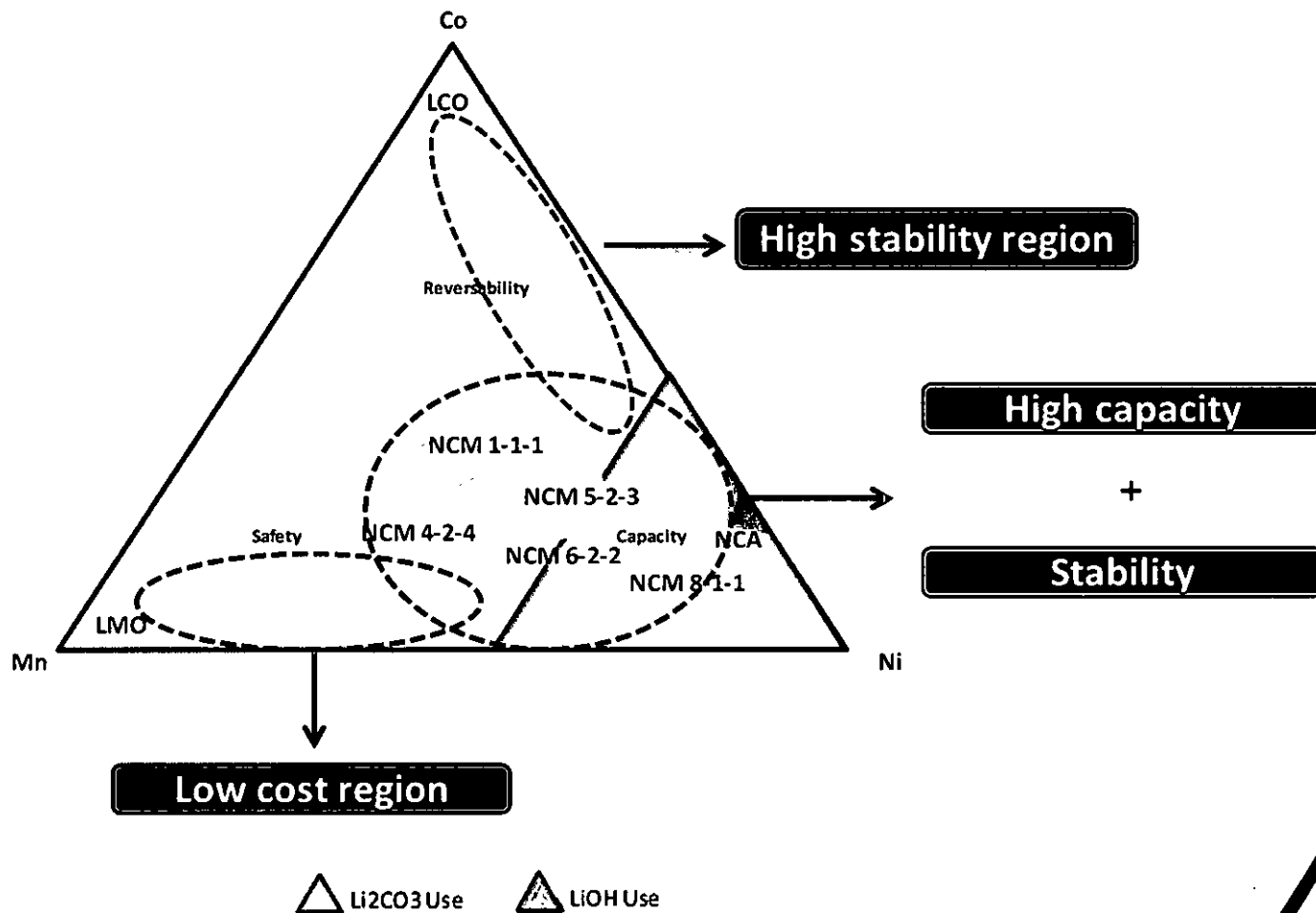
Demand: Li-ion Batteries

Cathode types

Higher Nickel content →
More Lithium Hydroxide use

NCM cathodes: Lithium (Li) mixed with Nickel (Ni), Cobalt (Co) and Manganese (Mn)

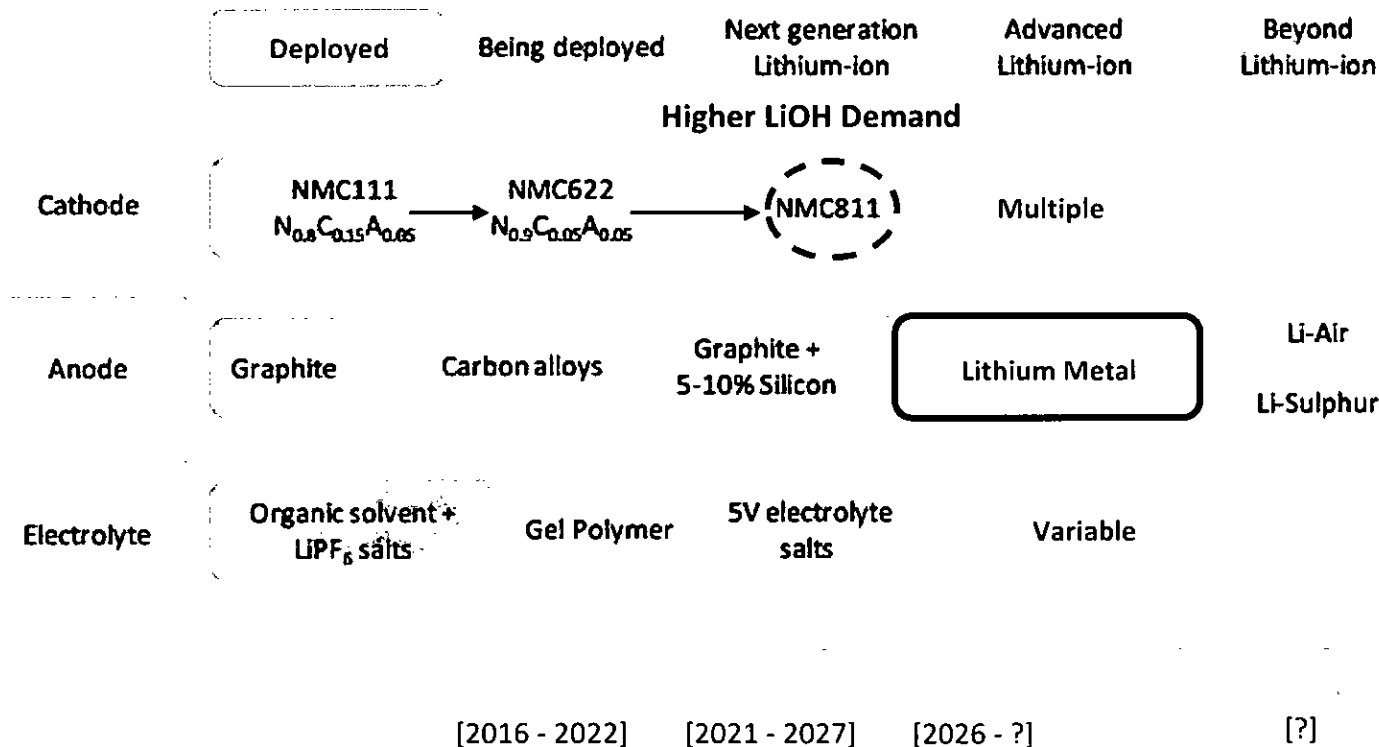
OEM target: higher energy density (High Ni) and lower cost (Low Co)



Demand: Li-ion Batteries

Expected battery technology commercialization timeline

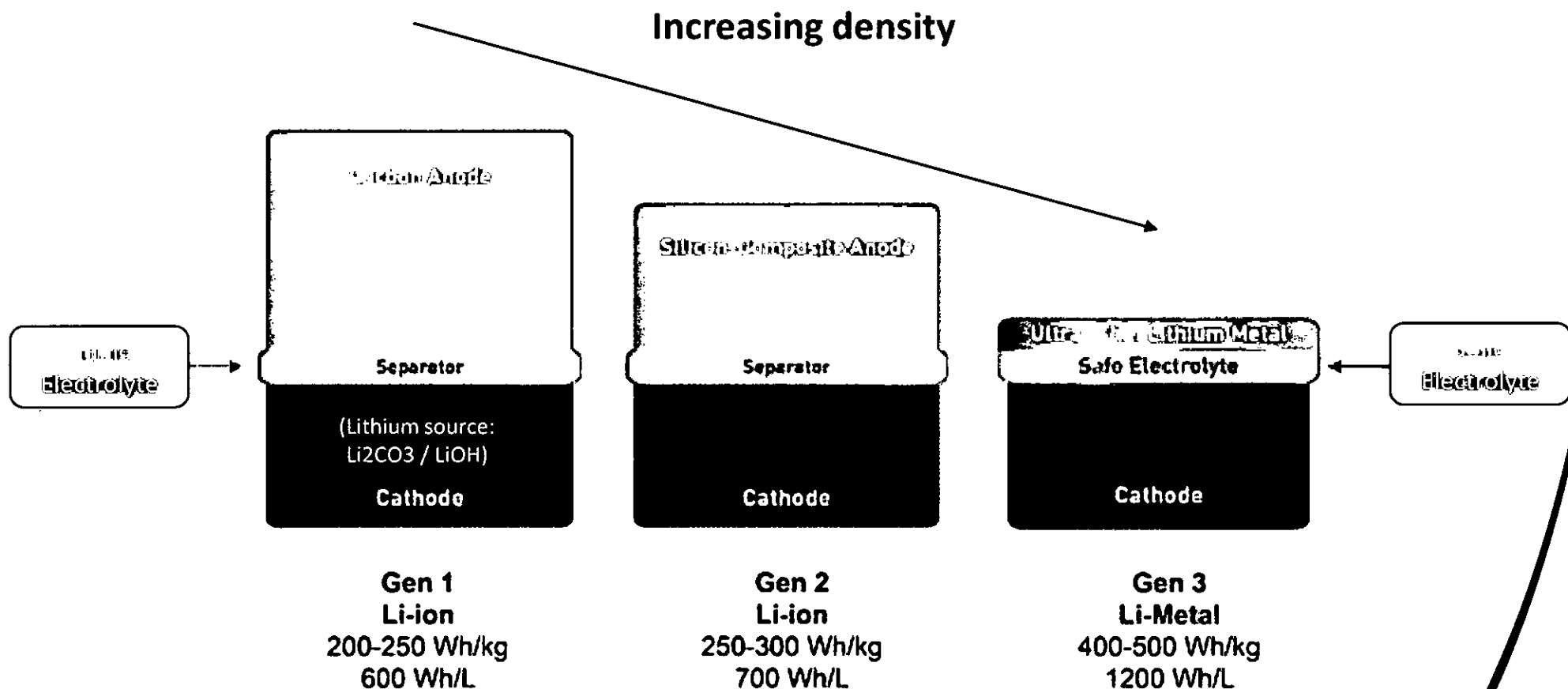
Higher Lithium Hydroxide demand compared to Lithium Carbonate



Demand: Li-ion Batteries

Li-ion vs Lithium Metal

Trend: higher energy density

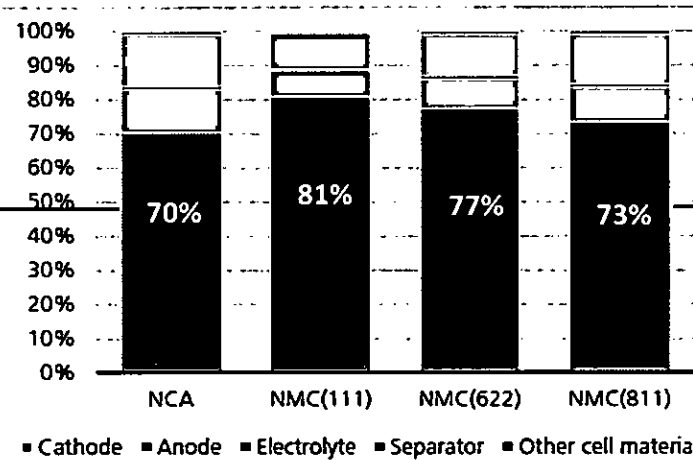


Demand: Li-ion Batteries

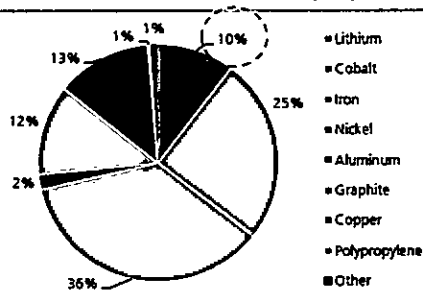
Li-ion battery cost breakdown

Lithium cost is ~ 7% of Li-ion battery materials

Active material cost (% of total bill of mat's)

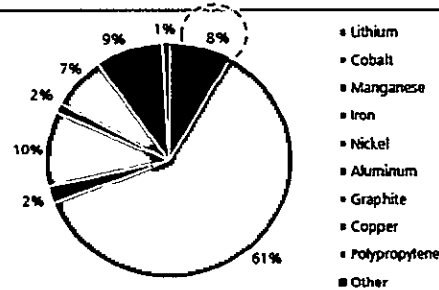


Total active material bill of materials (NCA)



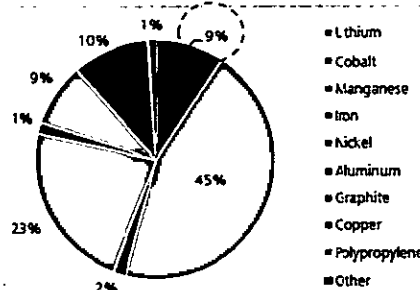
7% of cost

Total active material bill of materials (NMC111)



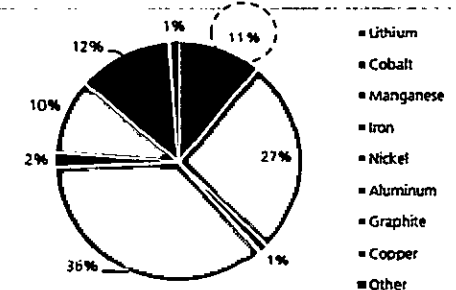
6% of cost

Total active material bill of materials (NMC622)



7% of cost

Total active material bill of mat's (NMC811)



8% of cost

Demand: Electric Vehicles

Lithium content today

Lithium content in each device, kg-LCE (Lithium Carbonate Equivalent)



Tesla Model S

51kg

Other Electric Vehicles

10-63kg

Hybrid Electric Vehicles

0.8-2kg



Power Tool Batteries

40-60g



Laptop Batteries

30-40g



Tablet Batteries

20-30g



Smartphone Batteries

2-3g

Demand: Electric Vehicles

Best selling Battery Electric Vehicles (BEV)

**Performance:
6-8 Km/kWh**

Renault Zoe



EU Q1-18 Sales: 8,947 units
Range: 241 Km
Battery Pack: 41 kWh
Li used: 31 Kg LCE
MSRP: US\$ 23,000

Tesla Model 3*



US Q1-18 Sales: 8,180 units
Range: 354 Km
Battery Pack: 50 kWh
Li used: 38 Kg LCE
MSRP: US\$ 35,000

BAIC EC-SERIES **



China Q1-18 Sales: 19,808 units
Range: 156 Km
Battery Pack: 20 kWh
Li used: 15 Kg LCE
MSRP: US\$ 24,000

Performance between 6-8 Km/kWh

Several sources

*Base Model

** Features for BAIC EC-180 EV



Demand: Electric Vehicles

OEMs announcements

Car manufacturers committed to Electric Vehicles

		Announcements		
Region	OEM	Year	Investment	xEV Target
NAFTA	Ford	2022	\$11 billion	40 xEV including 16 BEV
	GM	2022		>20 BEV
	Tesla	2024		Sales of Model 3 around 274 kunits
EMEA	BMW	2025		xEVs to account for 15-25% of sales
				25 electrified models (12 BEV)
	Daimler	2025	€ 12 billion	xEVs for 15-25% of sales
				>10 BEV models
				40 hybrid models
	Volvo	2025	Over € 20 billion	50% of sales to be electric
	VW	2025		80 xEV models
2030		\$40 billion		Electrified versions of all +300 global models
ASIA	Honda	2030		2/3 of total car sales to be electrified
	Toyota	2020		Launching 10 EVs
		2030		Selling 5.5 million electrified vehicles (including hybrids and hydrogen fuel cells)
	Nissan	2022		8 new EV models
				Sales of 1 million units
	Dongfeng	2022		xEV sales accounting for 30% of total sales
	BYD	2020		Sales of 600 kunits
	BAIC	2020		Production of 800 kunits



Several Sources
OEM: Original Equipment Manufacturer

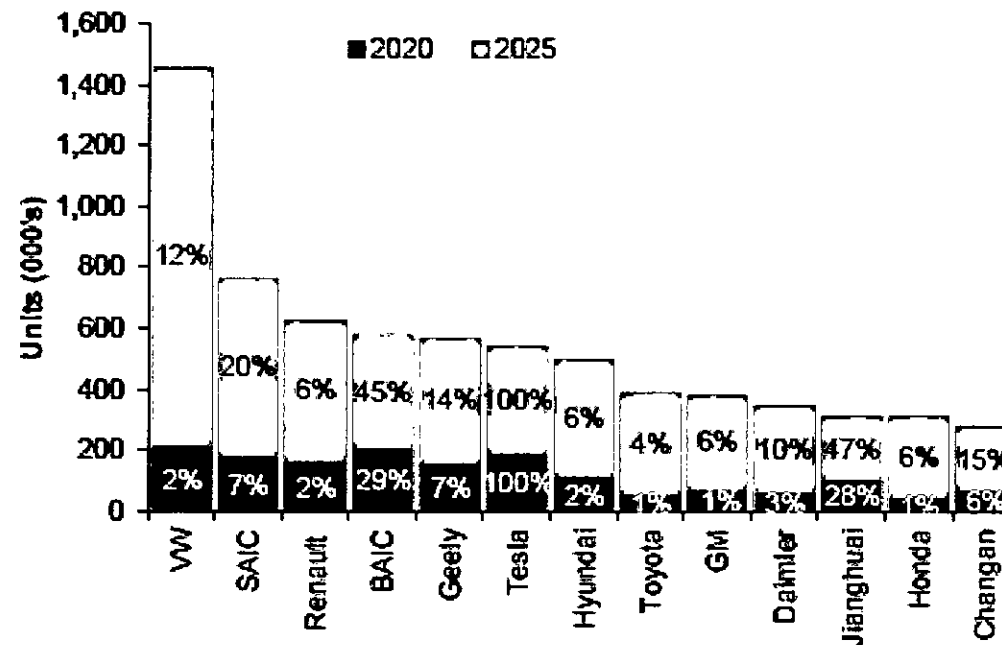
Demand: Electric Vehicles

Penetration by OEM 2020 and 2025

Car manufacturers committed to
Electric Vehicles

Most dramatic change in sales during 2020-2025

Automotive OEMs: BEV Volumes (Global; 2020 and 2025) and
% Penetration

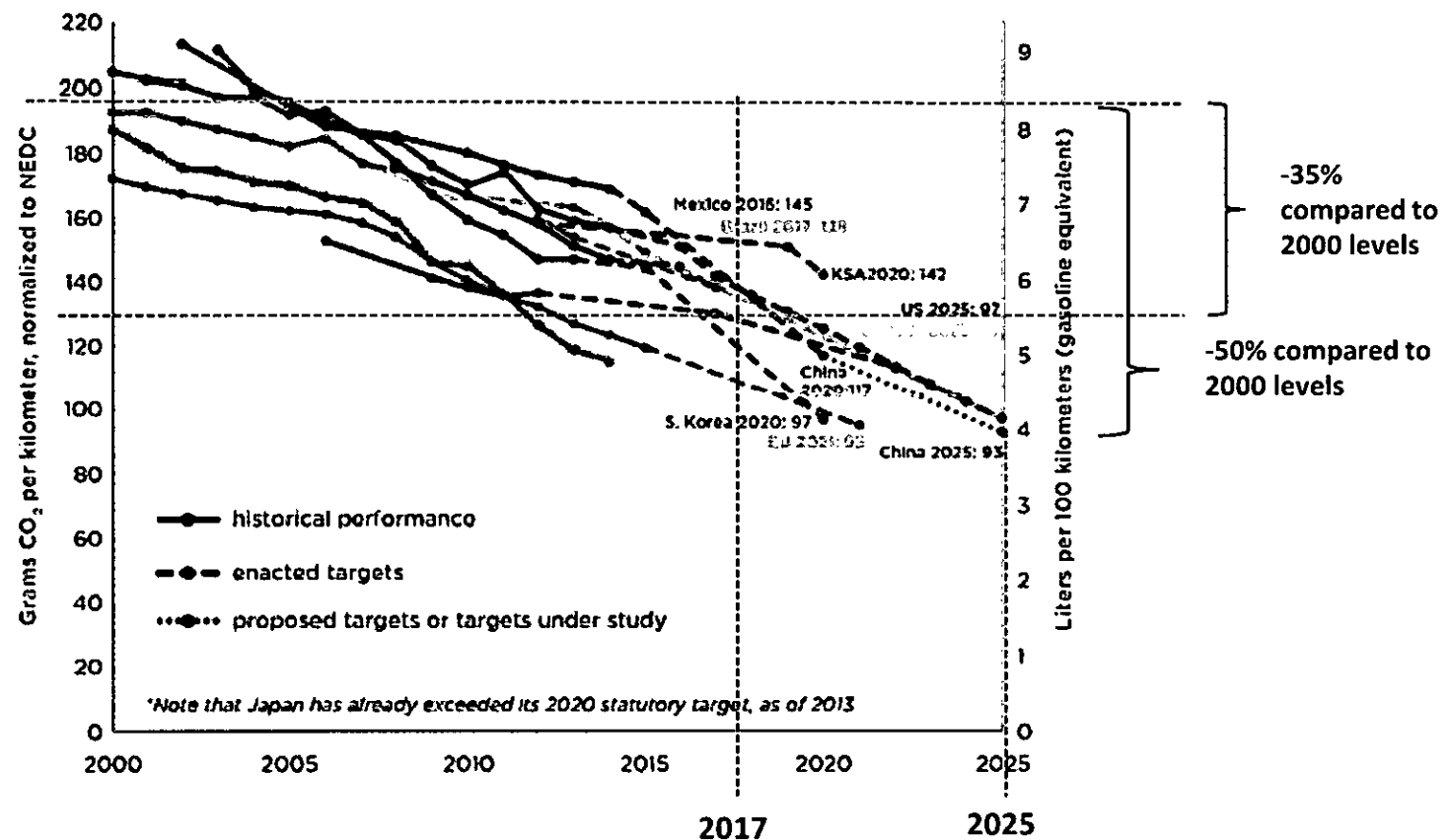


Demand: Electric Vehicles

Government CO2 regulation

Government push

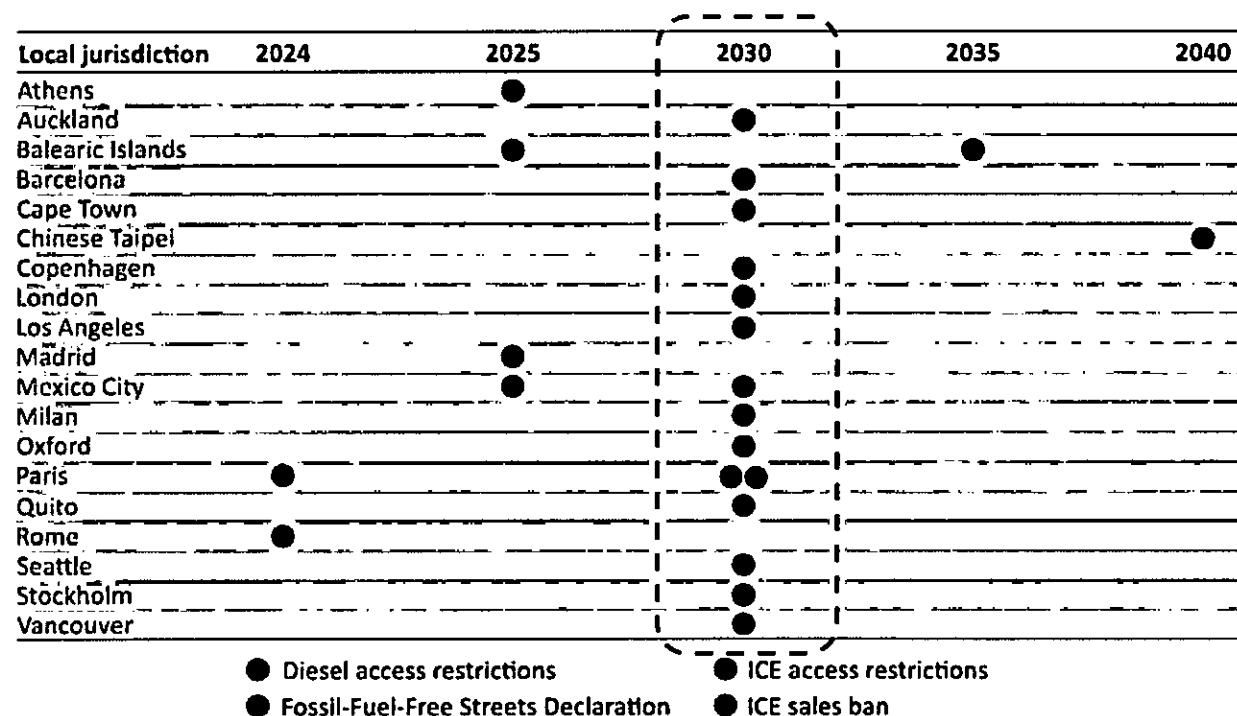
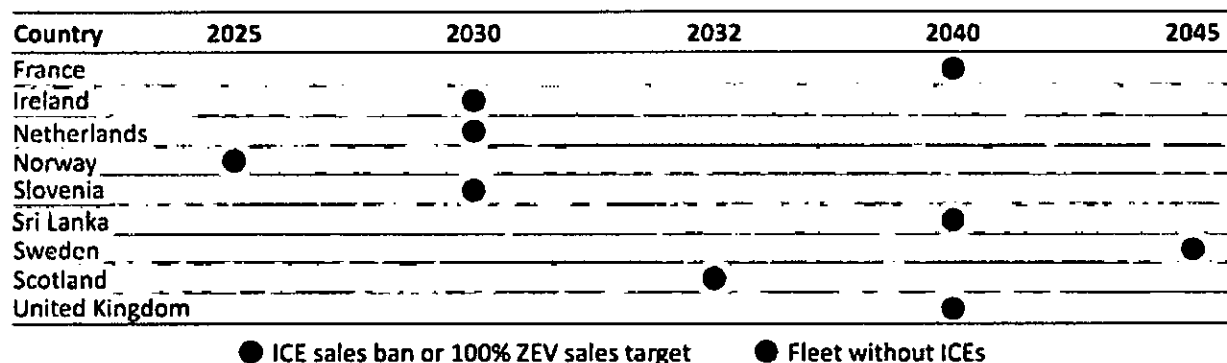
More stringent government regulations



Demand: Electric Vehicles

ICE announced sales bans and access restrictions

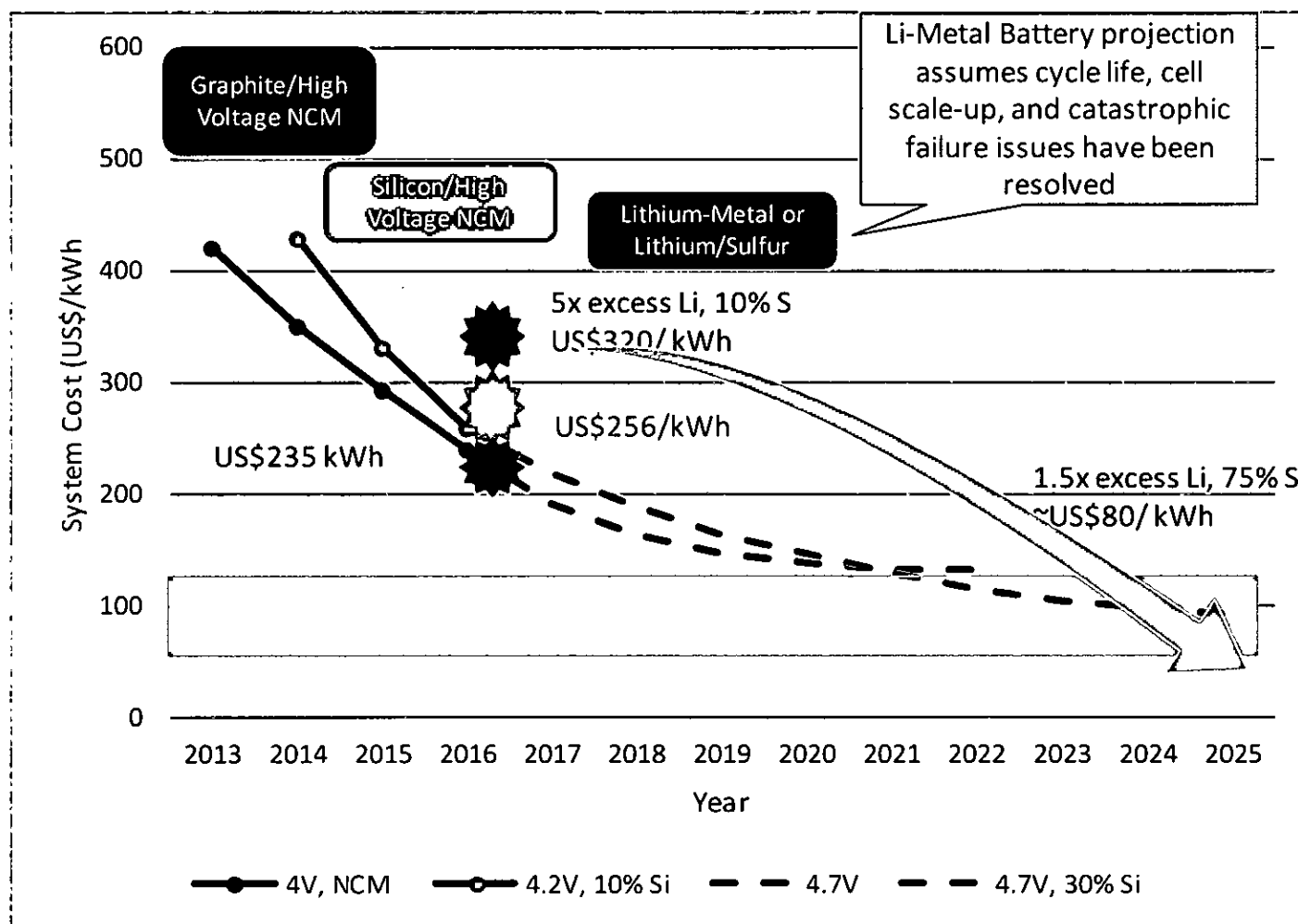
Internal Combustion
Engines (ICE) bans



Demand: Electric Vehicles

Lithium-ion battery cost forecast

Li-ion battery cost today:
barrier for adoption

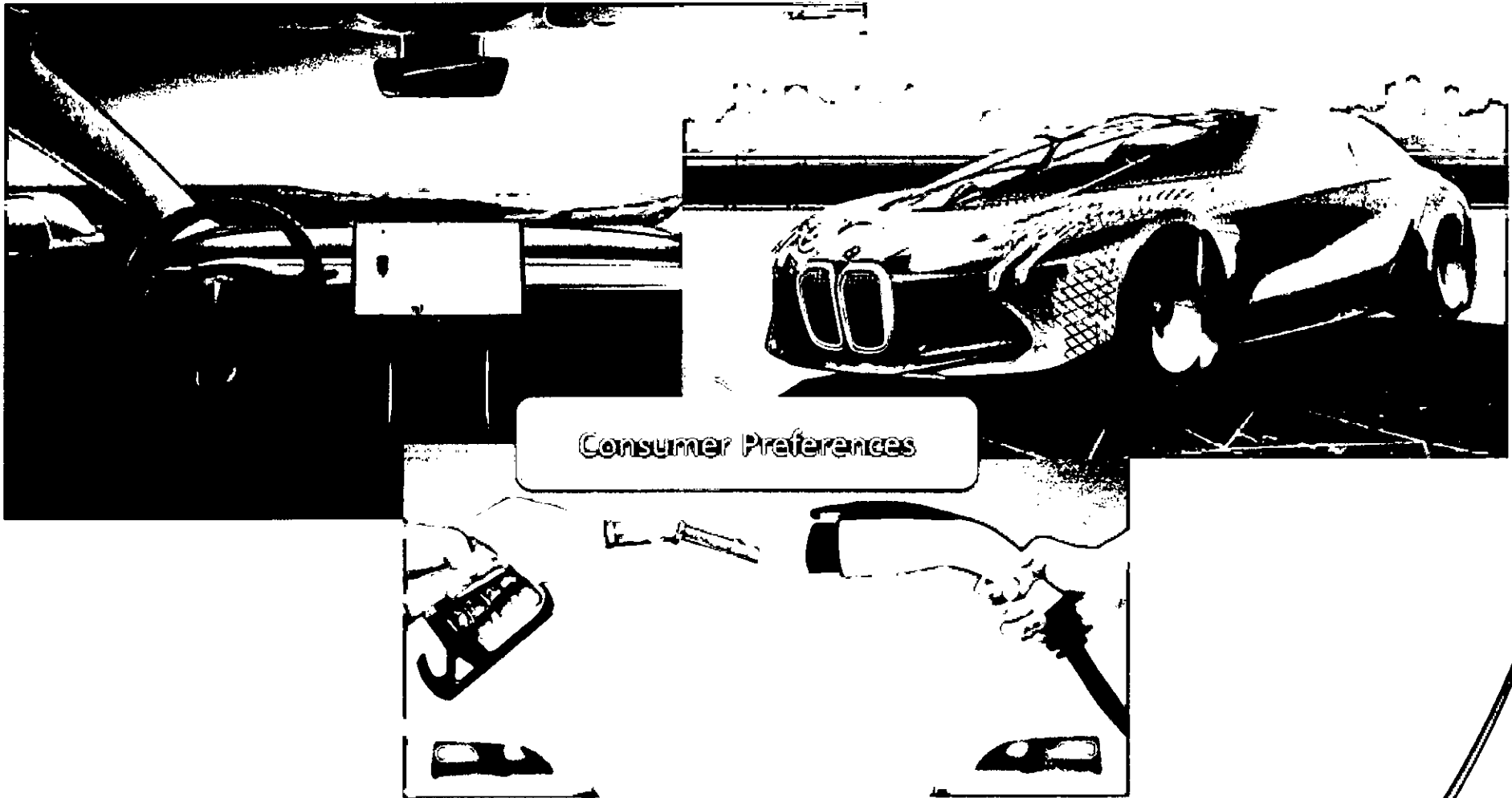


Demand: Electric Vehicles

Qualitative aspects

High Tech, forefront design &
environmentally friendly

The decision of buying an electric is not only economics



Agenda

1 Lithium Market

2 Demand

2.1 Global

2.2 Li-ion Batteries and Electric Vehicles

3 Supply

4 Lithium at SQM

Supply

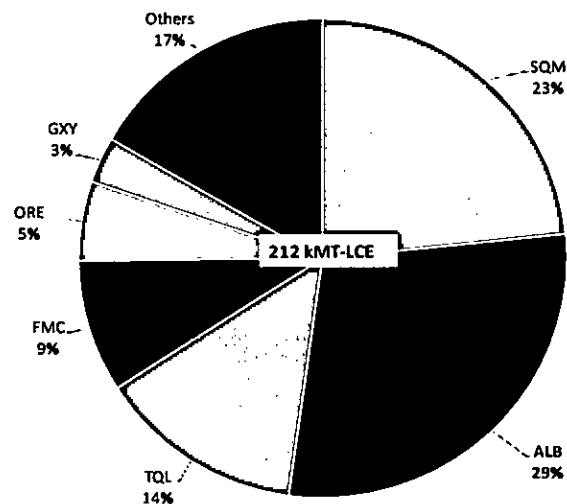
Capacity by player and country 2017 - 2022

Australia 2022: 46%

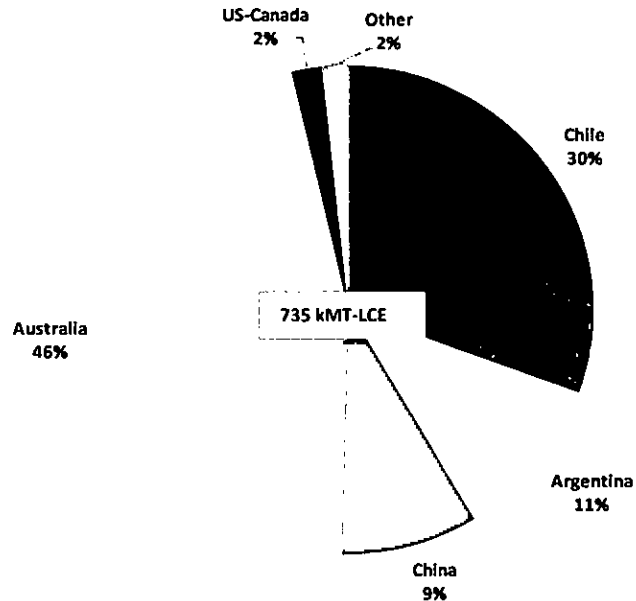
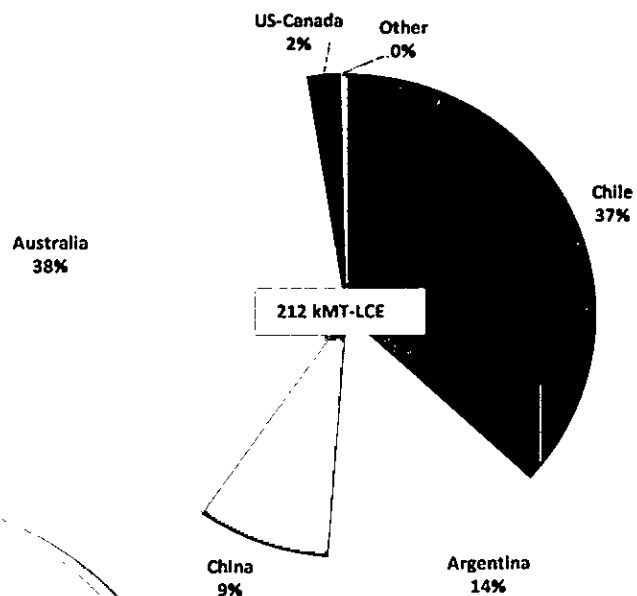
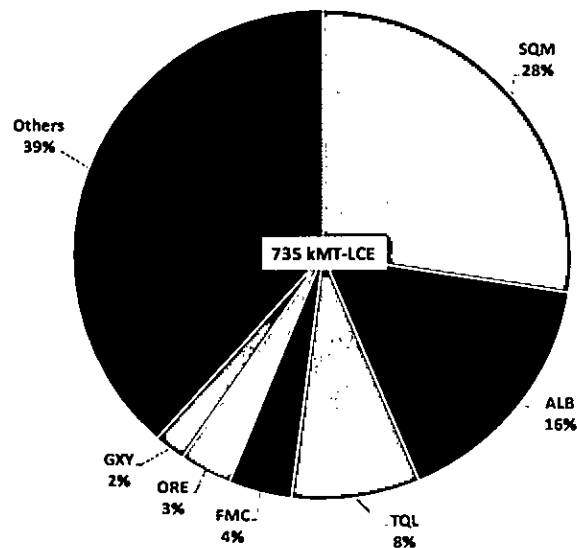
Lithium Chemicals Supply and Announced Capacity

Note: Raw material for direct use not included.

2017

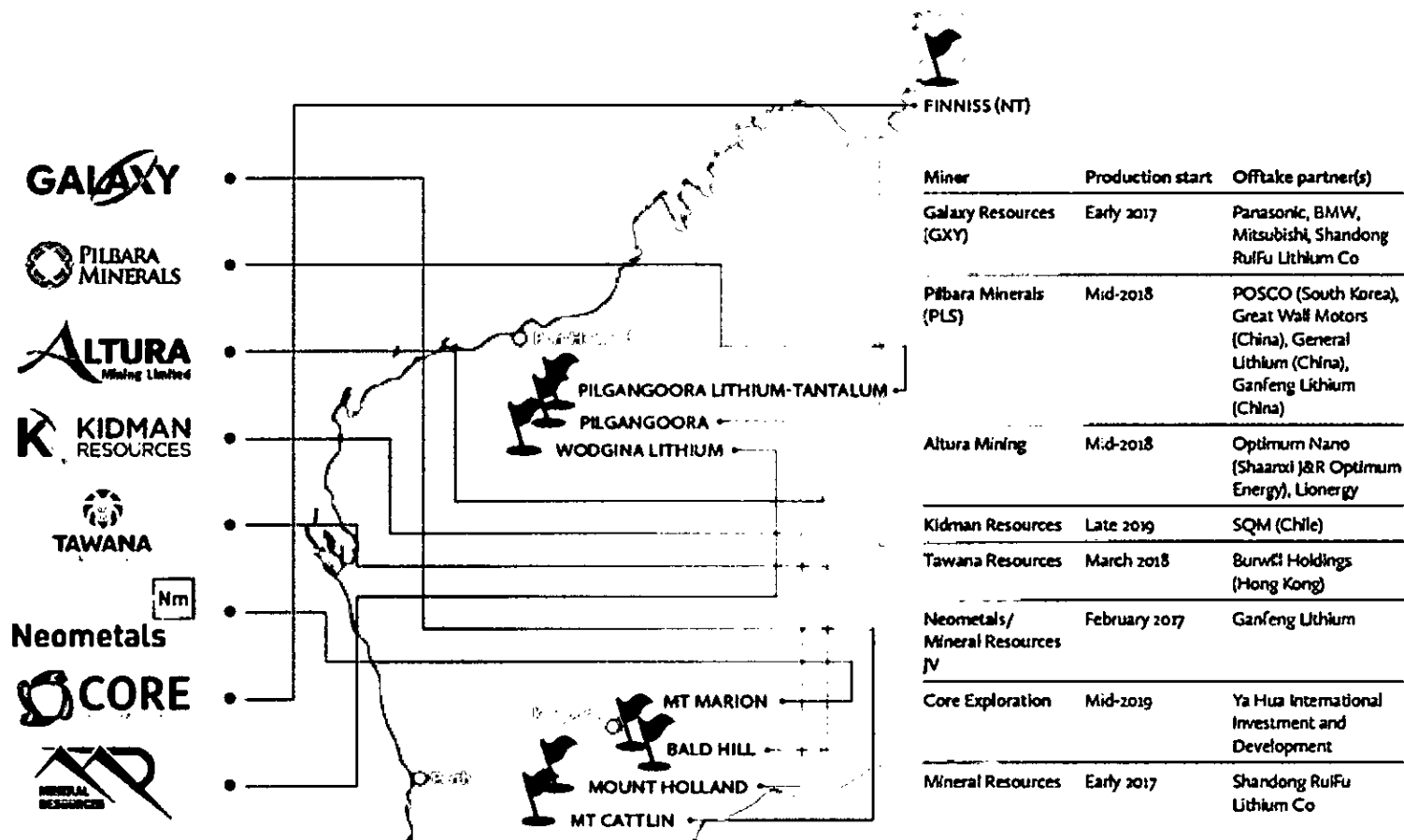


2022F



Supply

Competitors Australia



Agenda

1 Lithium Market

2 Demand

2.1 Global

2.2 Li-ion Batteries and Electric Vehicles

3 Supply

4 Lithium at SQM

Lithium at SQM

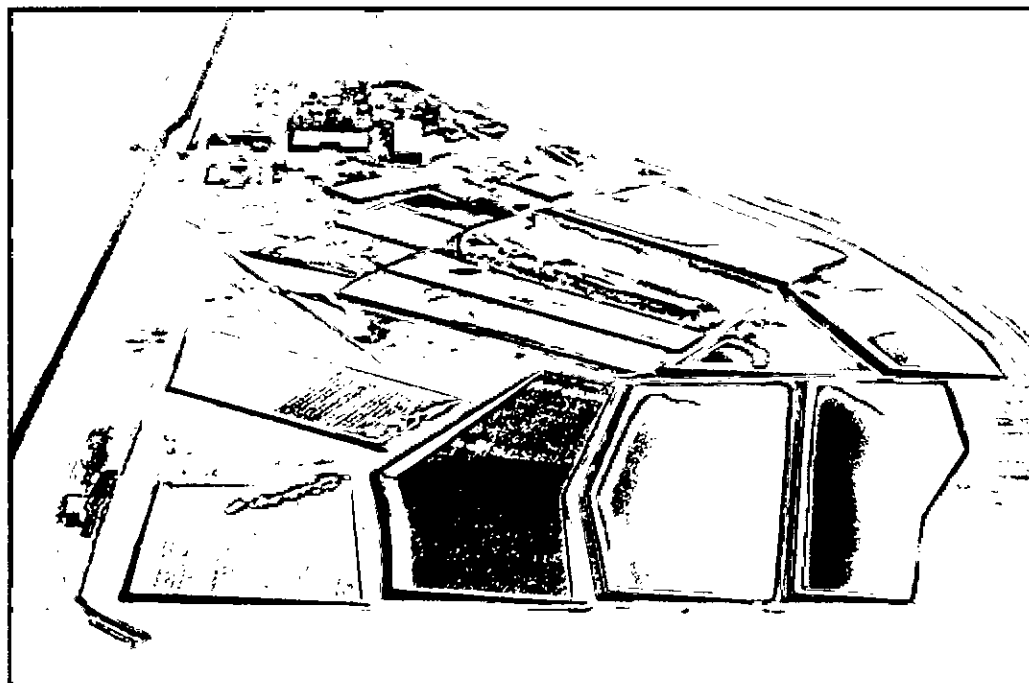
Immediate Lithium capacity - Chile

Lithium Carbonate

- Current capacity: 48 kMT/year
- Expansion to 70 kMT/year (end 2018)
- Expansion to 120 kMT/year (end 2019)
- Expansion to 180 kMT/year (end 2021)

Lithium Hydroxide

- Current capacity 6,000 MT/year
- Expansion to 13,500 MT/year (end 2018)



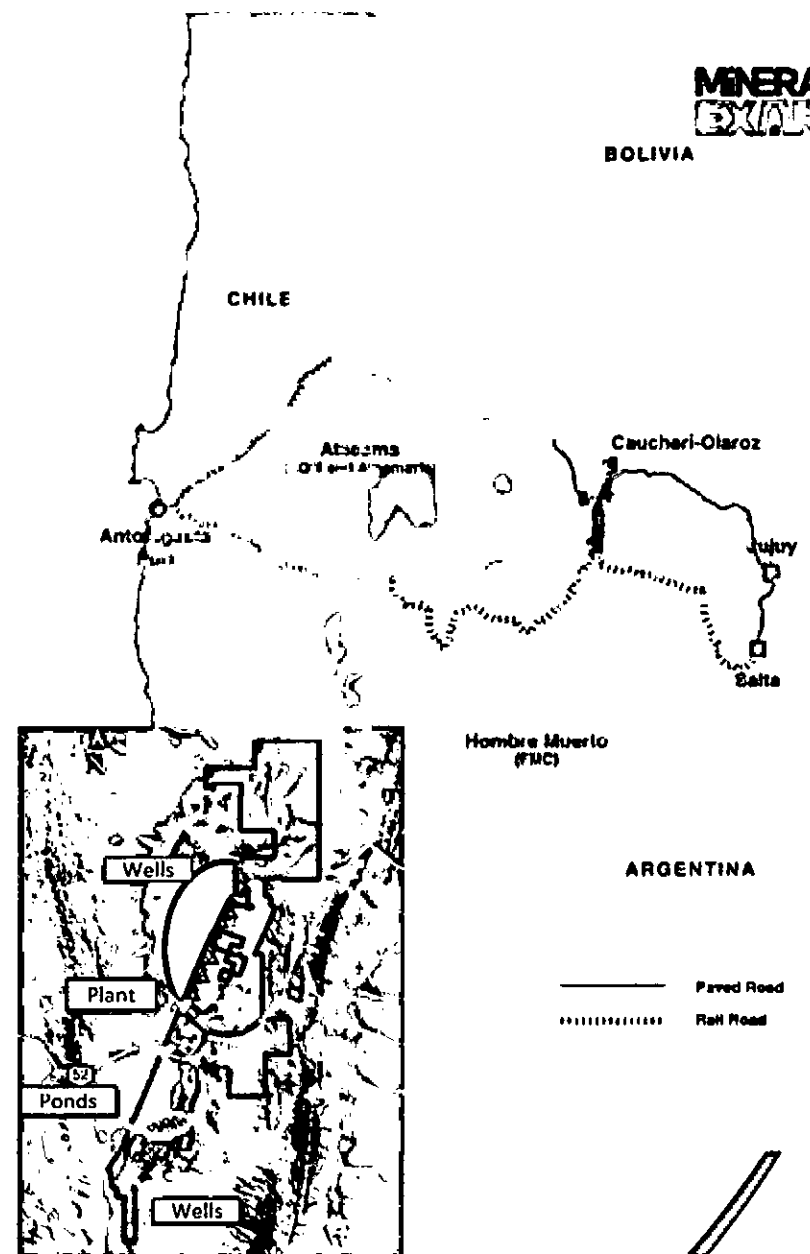


Lithium at SQM

Lithium projects - Argentina

Project description:

- Salar de Cauchari-Olaroz
- JV 50/50 with Lithium Americas Corp.
- Resource: brine
- Similar technology as in Salar de Atacama
- Capacity: 25 KMT-LCE/year (Li_2CO_3)
- Startup: 2020

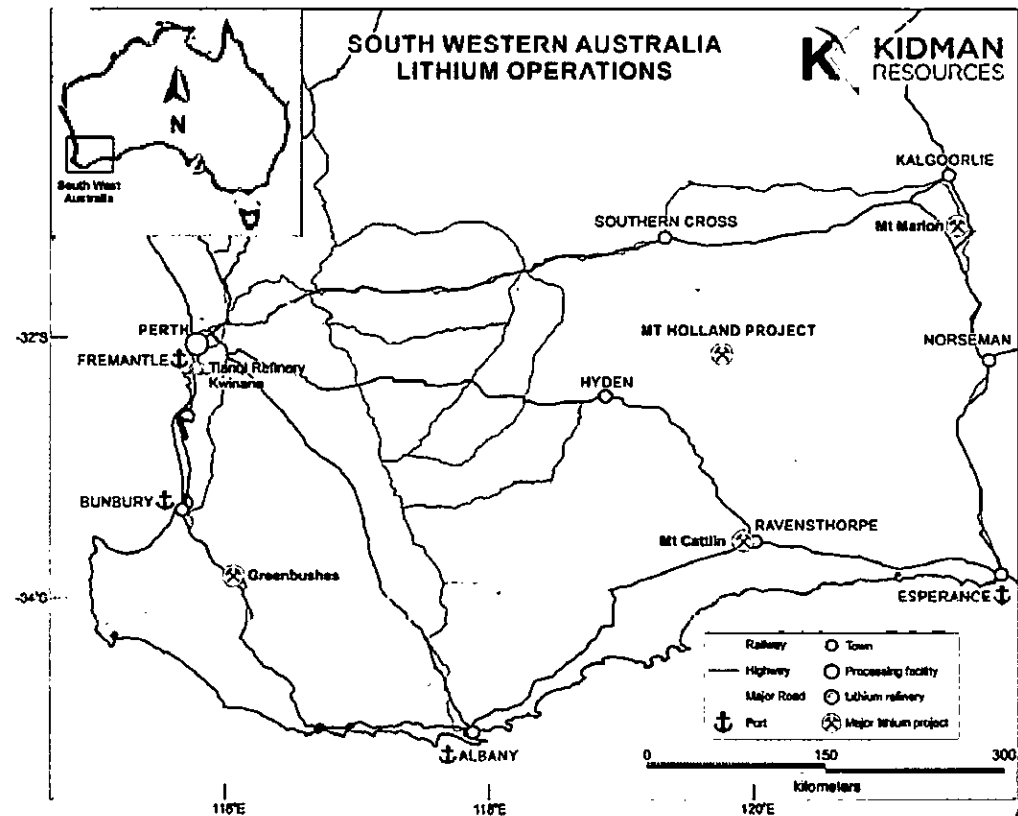


Lithium at SQM

Lithium projects - Australia

Project description:

- Mt. Holland
- JV 50/50 with Kidman Resources
- Resource: spodumene
- Capacity: 40 KMT-LCE/year ($\text{Li}_2\text{CO}_3/\text{LiOH}$)
- Startup:
 - Spodumene concentrate: 2020
 - $\text{Li}_2\text{CO}_3/\text{LiOH}$: 2021



Lithium at SQM

Challenges for brine producers

Continuous quality improvement

Lithium Carbonate

- Chemical:
 - Higher purity
 - Customized contaminants profile
 - Magnetic metallic particles
- Physical:
 - Micronization: Customized particle size distribution

Lithium Hydroxide

- Chemical:
 - Higher purity
 - Customized contaminants profile
 - Magnetic metallic particles
- Physical:
 - Micronization: customized particle size distribution
 - Caking
- Process Development:
 - Brine to Lithium Hydroxide

Lithium Metal

- Chemical:
 - TBD
- Process Development:
 - Efficiency
 - Low cost

Lithium Market Outlook

Final Remarks

Lithium is abundant and well spread geographically

Lithium demand growing at high rates: CAGR 15% (2017-2027)

Main driver: energy storage (particularly Electric Vehicles)

- OEM commitment + Environmental regulations + Consumer preferences + Mass production / Cost reduction

Lithium-ion battery the predominant technology for Electric Vehicles (10-15 years)

- High Nickel Lithium-ion: Lithium Carbonate / Lithium Hydroxide

New battery technologies will continue requiring lithium

- Solid-State: Lithium Metal

Lithium represents a small portion of Li-ion battery total cost

Many new lithium projects, Australia to become the leading Lithium producer

SQM to take back the # 1 global lithium producer:

- Technical know-how and deep commercial knowledge
- Diversified resource base
- Ready to face the future industry challenges (e.g. quality, product)

THE WORLDWIDE
BLACK & WHITE FORMULA

SOM

Thank You...

