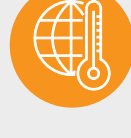


Lithium & Battery Supply Chain

Are electric vehicle makers putting the cart before the horse?

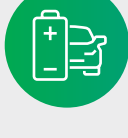
China is powering growth in Lithium-ion battery manufacturing



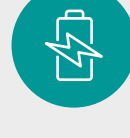
The dramatic impact of **global warming** on the environment has finally led governments to begin establishing strict targets to lower CO2 emissions.



Achieving these governmental goals will require **greener transportation modes** that are powered by clean electricity and stored in batteries – driving growth of EVs, renewables and energy storage.

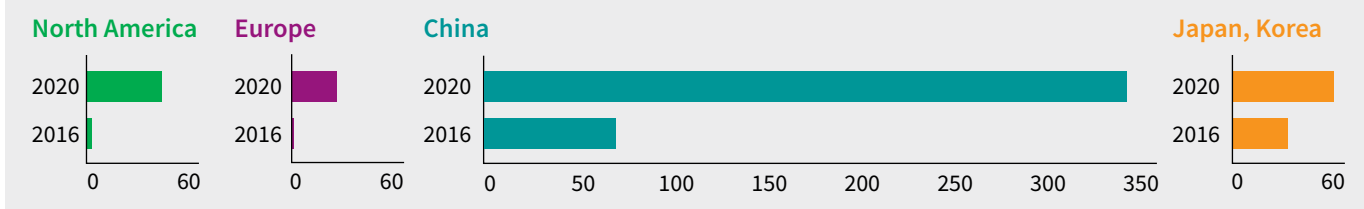
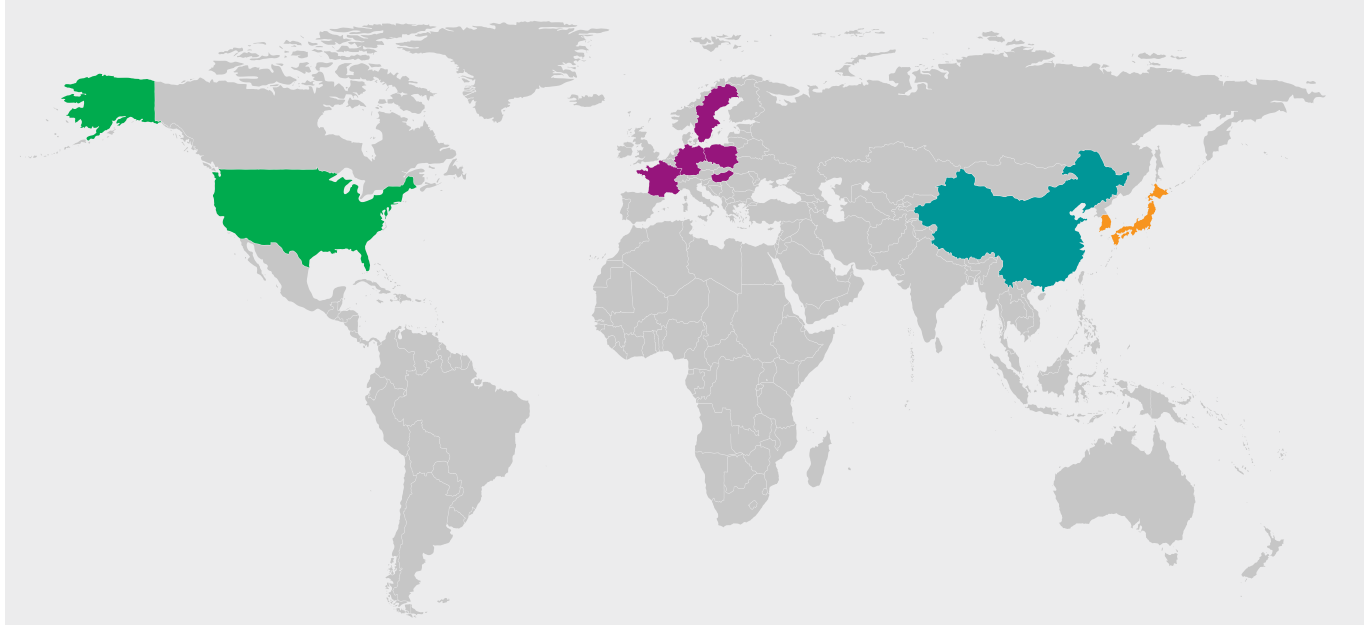


The main cost component of an EV is its battery pack. Battery costs for EVs decreased from around **\$900** per kWh in 2010 to approximately **\$200** per kWh in 2017, a drop of **80%**



Grid-connected batteries for energy storage will grow **16-fold** between 2017 and 2025

China is powering growth in Lithium-ion battery manufacturing



Lower CO2 emissions targets push faster EV adoption

In the coming years, the EU, China, and the US are expected to reduce transportation-related CO2 emissions.

In China, 20% of all vehicles sales are to have some form of electrification by 2025, while France and the UK propose to end the sale of all cars emitting greenhouse gases by 2040.

In addition, the unstoppable momentum of clean renewable energy sources such as wind and solar are driving a greater need for batteries to help balance supply and demand.

EV production drives lithium demand

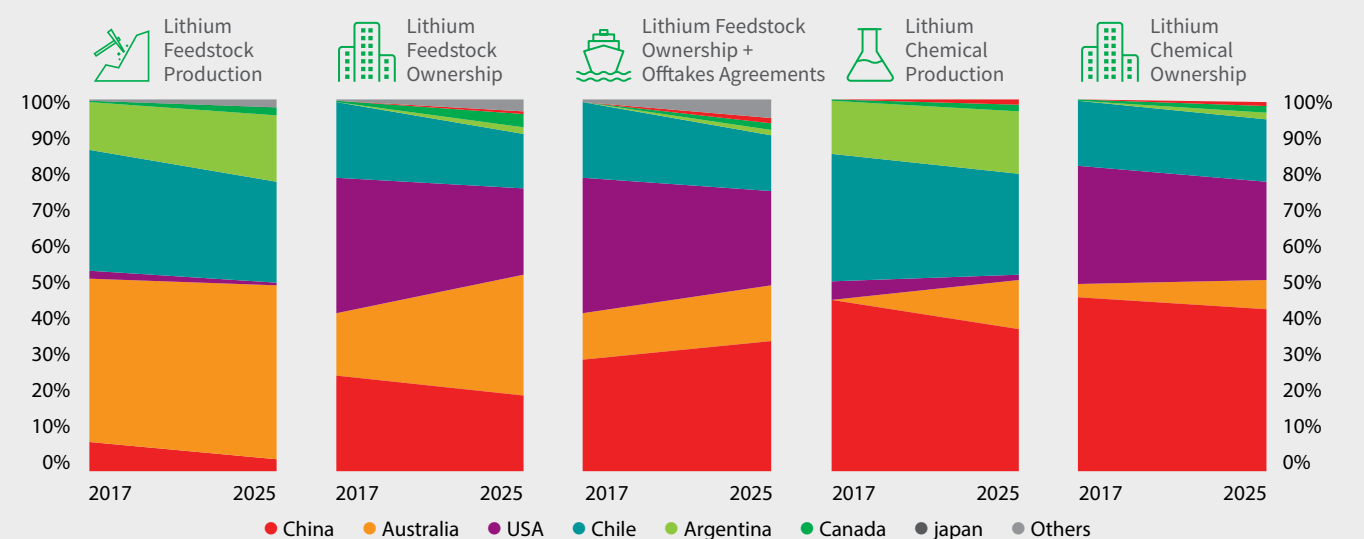
Lithium demand was estimated to be more than 220,000 tons LCE (lithium carbonate equivalent) in 2017.

Batteries will play a growing role in the electricity grid:

Changes in the way that home owners and businesses generate and use their own electricity (including the use of EVs) is leading to more behind-the-meter battery energy storage

Increasing use of intermittent renewables is driving the need for a more flexible electricity grid, leading to increased demand for batteries.

Who really controls lithium?



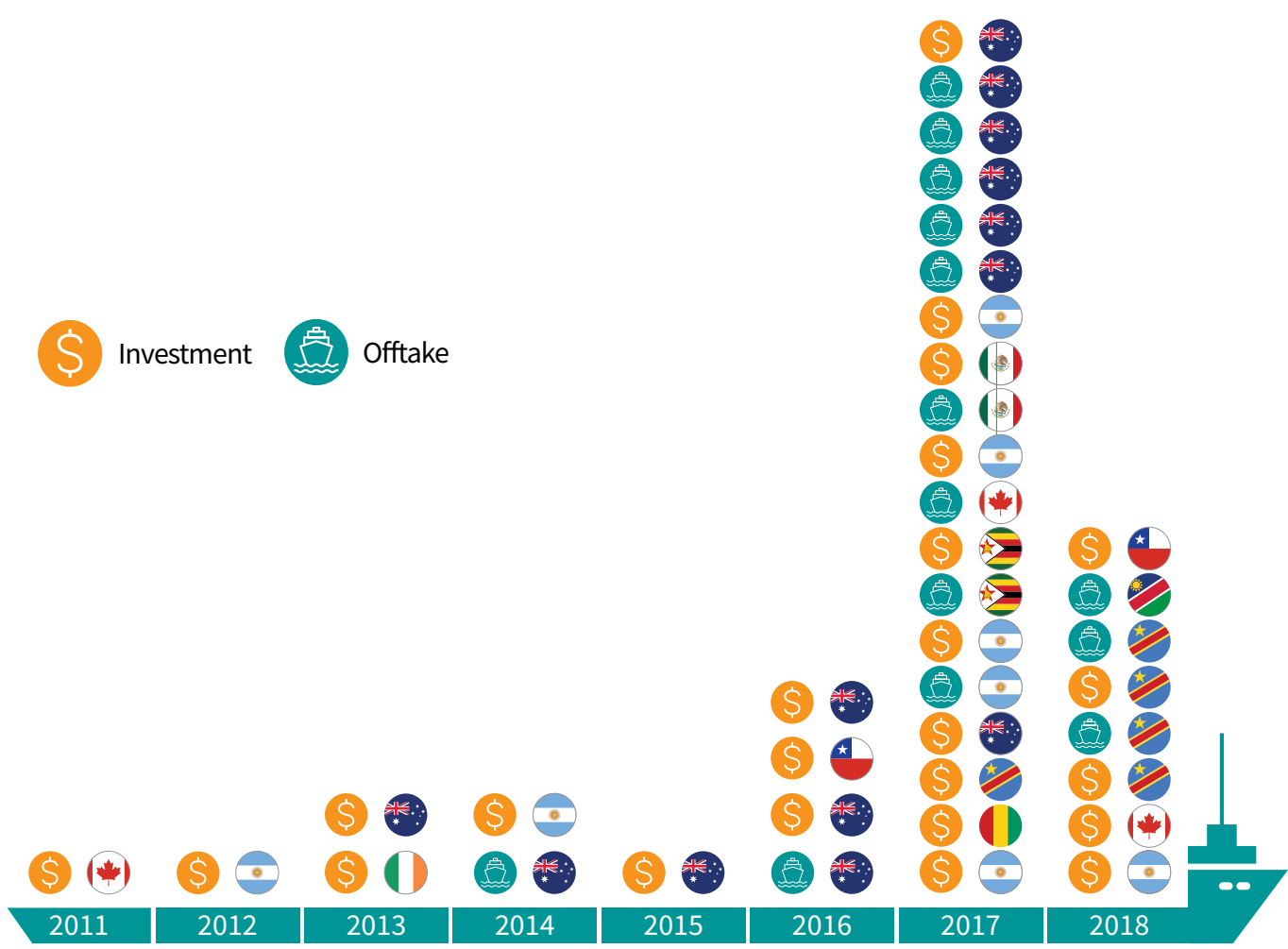
In order to meet 2025 demand, producers need to build a supply of approximately 500,000 mt of lithium - three times more than we have today. With an average capex of 16,000US\$ per ton, the industry requires an investment of at least \$7 to 8 billion during the next 10 years.

The lithium industry will require significant investment to allow a smooth transition to EV mobility. China accounts for only 7% of lithium extraction, but controls 48% of lithium chemical production and 62% of LIB capacity. China is also the largest EV producer today.

Chinese lithium, battery, and car producers have been negotiating foreign investment and offtake agreements to secure lithium supply, mainly with Australian projects. Approximately 70% of recent off take agreements were with Chinese lithium converters and battery manufacturers. In early 2018, only one site was sending product to its off-taker.

Developing lithium mining projects can take as long as 10 years. To overcome delays, a number of junior lithium producers are finding partners in the industry with available expertise and funding, both of which are crucial to developing a successful project.

China Securing Existing and Potential Future Source of Lithium



- List of Chinese Companies securing lithium supply across the world
- Ganfeng and Tianqi have been investing in lithium abroad for years, now others are joining in.
 - Most Chinese companies investing are existing lithium players, but more from further downstream (i.e. battery manufacturers and automakers) starting to invest

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