Lithium

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Lithium is the lightest and densest metal, and has huge potential for power generation.

Lithium, hydrogen and helium were the three key elements produced in the big bang.

Lithium’s unique properties make it vital for emerging technology such as electric vehicles.

Australia has 17% of the world’s lithium and is the world’s biggest exporter.

Global electric vehicle sales are expected to increase from 2 million to 50 million by 2030.

Australian lithium exports tripled to be worth $780 million in 2017.

Major Australian Lithium deposits

- Lithium deposits

Global uses of Lithium

- 46% Rechargeable batteries
- 26% Ceramics & glass
- 11% Greases & polymers
- 11% Other uses
- 4% Industrial powders
- 2% Air treatments
15.1 Summary

- Lithium hydroxide prices are expected to trend down — from around US$16,500 a tonne in 2018 to US$12,700 a tonne by 2020 — as supply growth outpaces demand. The supply surplus will likely reverse after 2020, as battery demand accelerates.
- Australian lithium production is expected to increase from 229,000 tonnes (in lithium carbonate equivalent terms) in 2017–18 to around 311,000 tonnes by 2019–20, as the Greenbushes mine is upgraded and several newer mines ramp up. All production is expected to be exported.
- Rising production is forecast to push export revenue up from $905 million in 2017–19 to $1.2 billion by 2019–20.

15.2 Prices

Prices are on a downward trend — for now

After peaking at around US$20,000 (in mid-2016) amidst fears of supply shortages, lithium hydroxide prices have retreated as substantial new supply has entered the market. From averaging around US$16,500 per tonne in 2018, prices are forecast to fall to around US$12,700 a tonne by 2020. Prices for the lithium precursor mineral (spodumene ore), which Australia exports, are expected to follow a similar trend (Figure 15.1).

Rising electric vehicle sales (Figure 15.2) remain crucial to lithium prices. Price falls for lithium hydroxide have been driven by China, which has recently scaled back subsidies for short-range electric vehicles, while increasing support vehicles with a longer range. As China is the world’s largest consumer of electric vehicles, changes to its incentive schemes have added significant volatility and uncertainty to lithium prices in recent months.

The recent massive surge in spodumene/lithium supply from Australia will have implications for lithium prices in the short-term. However, by 2020, rising demand for electric vehicles may outstrip this added supply, pushing prices back up again over the longer term.
15.3 World consumption

Lithium demand is rising rapidly — and the growth rate is set to increase. Electric vehicle batteries currently account for a minority of lithium demand, with other categories (including ceramics and greases) still accounting for the majority of use. However, rising electric vehicle sales are now accounting for virtually all growth in lithium demand (Figure 15.3), and are expected to dominate lithium use within a few years. In recent months, imports of battery grade lithium have increased sharply in Japan, South Korea, and Taiwan, as electric vehicle sales rise in those countries. China is also increasing its imports of lower grade lithium.

The two trends appear to be connected, with China using the lower grade material to feed its growing refinery network and expand its previously minimal export markets, as elements of the supply chain begin to solidify. However, China is yet to move strongly into scaled up production of battery grade material, an area which remains relatively undeveloped.

Demand for battery materials is set to grow, as large automakers scale up their output of electric vehicles. Tesla lifted its weekly output of Model 3s to more than 6,000 in the September — up from less than 4,000 per week in the first half of 2018. BYD and BMW announced large investments in new electric vehicle and battery facilities (with a combined investment value of more than US$3 billion) in the September quarter. Daimler has announced that battery manufacturing capabilities will be added to two key automotive plants, in order to accelerate a transition to electric cars. Jaguar Land Rover announced new investments in electric vehicle production facilities in September, with an aim to ensure that every car model produced by the manufacturer will have an electric version available by 2025. Volkswagen has set a target of one million electric vehicle sales annually by 2025.

This rising demand is expected to increase lithium consumption from around 211,000 tonnes in 2017 to 305,000 tonnes by 2020. However, far more rapid growth in vehicle demand is expected in the subsequent 3–5 years, and considerable new supply is likely to be needed in the longer term (Figure 15.4).

**Figure 15.3: Lithium usage by product**

Source: Roskill (2018); Department of Industry, Innovation and Science (2018). ‘Other’ includes glass, powders, primary batteries, and air treatments.

**Figure 15.4: Long-term electric vehicle sales projection**

Source: Roskill (2018); Department of Industry, Innovation and Science (2018)
15.4 World production

A wave of new supply is likely to boost lithium stocks in the outlook period. Mined supply has momentarily outstripped demand as a result of large investments that have unlocked significant new lithium deposits over the last two years. Spodumene ore production grew by almost 70 per cent (to 366,000 tonnes) in 2017, and further projects and ramp-ups are forecast to push output up further, to 411,000 tonnes by 2020 (Figure 15.5).

The largest contribution to this increase is rising output from Australia — where Greenbushes is ramping up towards its full capacity — and Chile, which holds the world’s largest deposits (Figure 15.6), and where Albemarle is increasing output from its brine projects. Chinese brine production is also on the rise, though it remains significantly behind Chile and Australia as a producer.

Falling prices for lithium carbonate have, however, led to the suspension of operations at Desert Lion’s mine facilities in Namibia. This will partly offset growth elsewhere, though supply will still remain ahead of demand in the short term.

Refined lithium supply is also on the rise, with China adding significant new capacity over the past 12 months. Refined lithium output from China is expected to have risen by 23 per cent between 2017 and 2018, with further rises in prospect over subsequent years. The largest growth source in the near term is likely to be in Tianqi’s substantial Chinese facilities, where extensive debottlenecking is planned for 2019.

A surplus in both mined and refined supply is likely over the outlook period, with stockpiles set to rise. However, demand growth is expected to outstrip supply beyond 2020, with stocks potentially coming under significant pressure from 2022. Recycling and secondary markets remain nascent for lithium: only around 2 per cent of lithium battery products are recycled in Australia, compared to 98 per cent of lead acid batteries. Better waste management is likely to become increasingly essential as a means to broaden lithium supply sources and reduce volatility and risks.
15.5 Australia

Production is expected to grow further over the next two years

Australia recorded a huge increase in spodumene ore output in 2017 and early 2018, taking a dominant position among global producers and leading to a global lithium supply surplus. Output growth is expected to continue over the outlook period (Figure 15.7).

The first lithium mine outside of Western Australia is now in prospect, with Core Exploration moving closer to commencing a new mine at Finniss in the Northern Territory. Regulatory processes have largely concluded and the project is likely to benefit from high ore grades, low transportation costs, and binding offtake agreements with firms in China. The mine is expected to commence in the September quarter of 2019, ramping up to around 200,000 tonnes of annual spodumene production by 2021.

Talison Lithium has formally approved a $516 million expansion of its Greenbushes mine. This mine — previously the only one operating in Australia — will triple its production capacity once the expansion is completed. The first phase will increase annual spodumene output to 1.34 million tonnes; a concentration plant will then be added in 2020, with a further expansion in capacity to 1.95 million tonnes to follow.

Output growth across new and existing projects should increase Australia’s production to around 311,000 tonnes (in lithium carbonate equivalent terms) by 2019–20, with Australia set to account for around 80 per cent of global supply from hard rock deposits.

Exports are set to grow strongly over the outlook period

Exports grew somewhat more slowly than production in 2017, as not all new production was exported in that year. However, this deferred growth is expected to lead to a strong rise in export revenue, which is forecast to lift from $900 million in 2017–18 to $1.2 billion by 2019–20 (Figure 15.8). Several new mines have begun exporting: Pilbara Minerals’ new mine at Pilgangoora marked its first shipment in August, while the Altura mine loaded its first transport to its offtake partners in October.