Uranium

Resources and Energy Quarterly June 2017

Australia holds **31%** of the world's proven uranium reserves

Australia is the **3rd** largest producer of uranium in the world

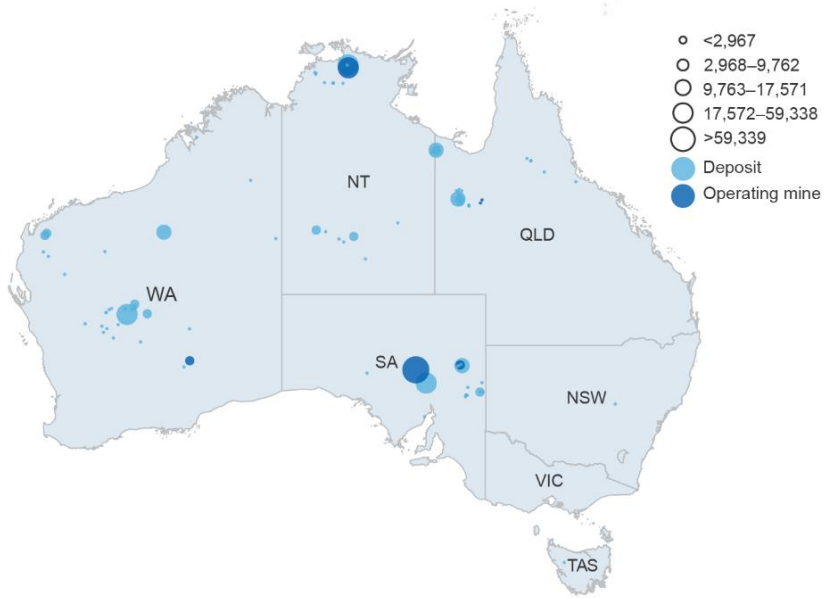
Uranium exports are expected to earn **$947 million** for Australia in 2016–17

Uranium makes up **11%** of global electricity generation

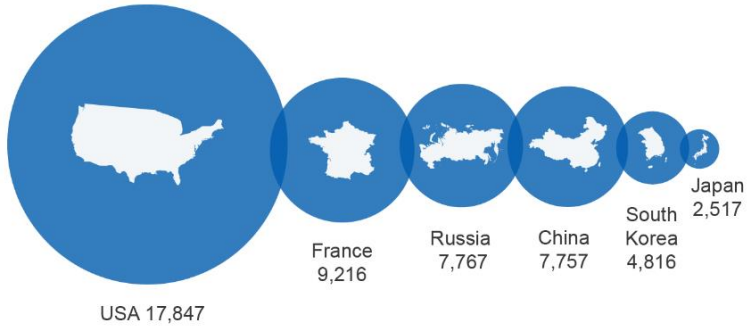
There are **447** nuclear power reactors across 31 countries, with 60 more being built

There are **245** civil research reactors operating across 55 countries

Major Australian uranium deposits (tonnes)



Uranium required in 2017 (tonnes)



Market summary

The global uranium market continues to experience low prices and significant oversupply, although there are tentative signs of some turnaround in conditions. Production cuts are likely to restrain an inventory build over the next two years, while on the demand side, significant new nuclear power generation capacity is being constructed in China and India.

Australian export volumes are estimated to have edged up to 7,724 tonnes of U308 over 2016–17. However, rising production at the Olympic Dam and Four Mile mines is forecast to support a rise in export volumes to 8,450 tonnes by 2018–19. Export values are expected to fall to $947 million in 2016–17, before recovering to $972 million in 2017–18 and $1 billion in 2018–19, as prices and production rise.

Prices

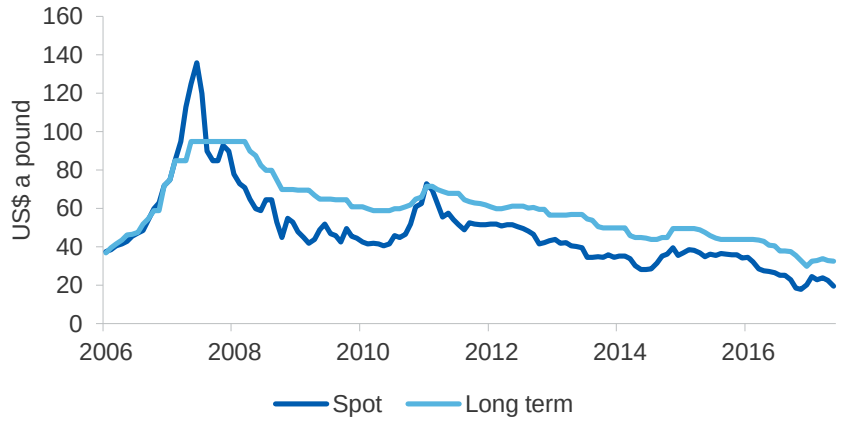
Uranium prices remain historically low

Uranium prices have been constrained by uncertainty and weak demand for more than five years. Although the Fukushima nuclear reactor meltdown in Japan has played a significant role in suppressing demand in recent years, there are also longer-term factors at work. Gradual improvements in reactor efficiency and technology are restraining global uranium usage, to the potential detriment of suppliers.

Uranium prices averaged $US25.64 a pound over 2016, reaching a historical low level of $US18 a pound last November. Spot prices remain low and inventories substantial, as a result of a surge of selling. Uranium markets have been destabilised as a range of generalist investment funds have exited. Ongoing political difficulties have also curbed the growth of the nuclear power industry in several countries.

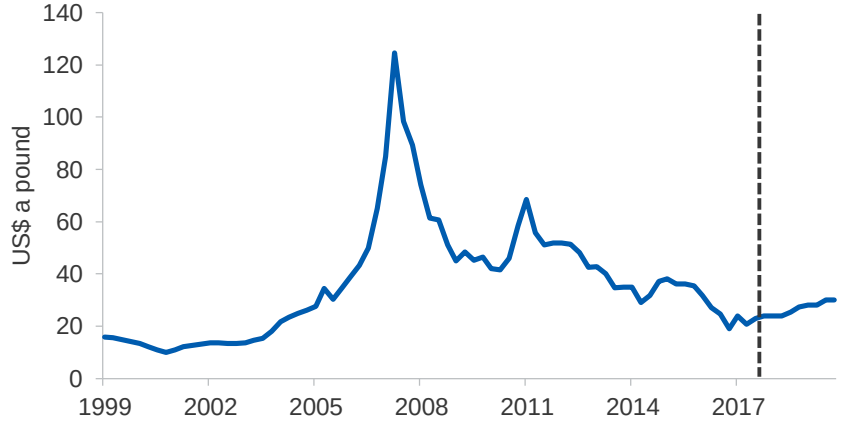
In the first half of 2017 prices lifted and then stabilised at an average level of around $US23 a tonne for four months, but lost ground again in May 2017, falling to $US19.60 a pound.

Figure 9.1: Uranium prices, monthly



Source: Cameco Corporation (2017) Uranium Spot and Long Term Prices.

Figure 9.2: Outlook, quarterly uranium spot price



Source: Cameco Corporation (2017) Uranium Spot Price; Ux Consulting (2017) Uranium Market Outlook.

Prices are expected to rise moderately in the medium term. World uranium extraction has declined, most notably in Kazakhstan, where Kazatomprom — a major supplier — announced substantial production cuts of around 5 million pounds in 2017. At the same time, new capacity in Eastern Europe and Asia is coming online, more than offsetting cuts and suspensions in Western Europe. The combined effect should see prices lift gradually, from an average of around $US22.90 a pound in 2017, to $US25.20 a pound in 2018, and $US29.00 a pound in 2019. Significant price growth is not expected in the short-term, as progress in re-opening reactors remains slow in Japan, and global inventories have held up better than expected.

Large uranium producers typically sell most of their output through long term contracts, rather than on the spot market. The Ux Consulting long term indicator contract price fell to an average $US39.00 a pound in 2016, and is estimated to average $US32.95 a pound in 2017. This price is expected to largely follow trends in the spot market; long term contracts typically vary across producers, however, due to differences in contract lengths, volumes and terms, as well as to market conditions at the time of signing. Australia's average export returns are generally much lower than the world indicator contract price.

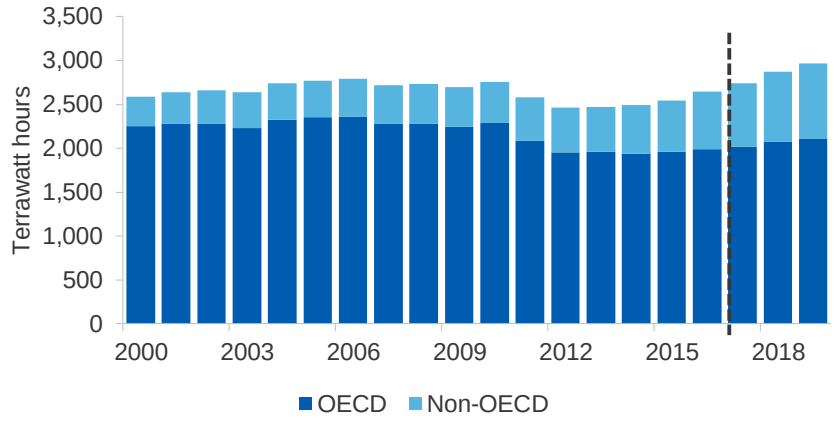
World uranium consumption

Emerging Asia is still the primary driver of nuclear power growth, though there are tentative signs of growth in Eastern Europe

In 2016, world uranium consumption increased by 1.1 per cent to 83,400 tonnes, with a further rise to 88,300 tonnes expected in 2017.

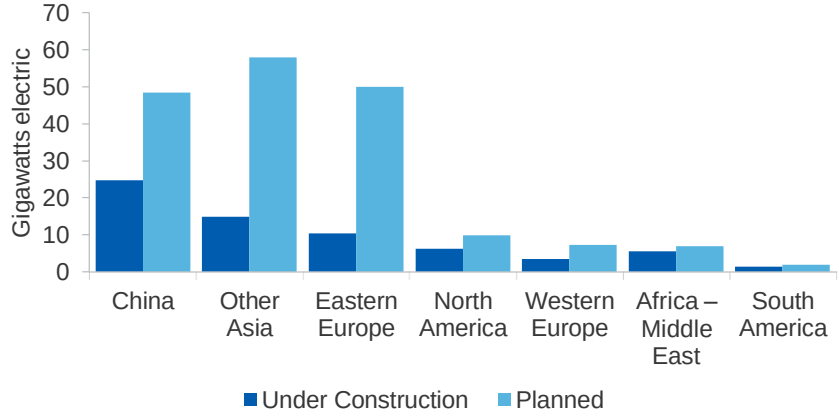
Solid aggregate growth masks divergent trends in individual countries. In Japan, the pace of reactor restarts remains slow: Kansai Electric Power's Takahama No. 3 reactor re-commenced production in June 2017, meaning a total of five reactors (from 42) have returned to operation. Three more reactors have received approval from Japan's Nuclear Regulation Authority, and thus are expected to come online by the end of 2017. However, a large number of reactors will remain dormant for the foreseeable future.

Figure 9.3: World nuclear power generation



Source: International Energy Agency (2017); World Nuclear Association (2017), DIIS estimates

Figure 9.4: New nuclear capacity



Source: World Nuclear Association (2017).

Nuclear power generation in China continues to grow strongly. At the end of April, China was operating 35 nuclear power plants, with another 21 under construction and a further 36 due to commence construction by 2020. Although reactor numbers are rising, greater efficiency in new designs (such as the Evolutionary Power Reactor system in Guandong) will constrain uranium consumption growth.

India has formalised previously vague proposals to expand its capacity, publishing proposals for a further 10 new reactors with a combined capacity (7000MW) that exceeds the entire capacity of the 22 reactors currently in operation. The Indian Government is now aiming to derive a quarter of India's electricity generation from nuclear sources by 2050.

Although there is significant uncertainty in parts of the US energy market, conditions for nuclear plants are relatively stable, and little direct impact is expected following the Trump Administration's announcement in March of a rollback in the Clean Power Plan. The US still has 99 reactors in operation, and a further four (with a combined capacity of around 4,500 megawatts) under development.

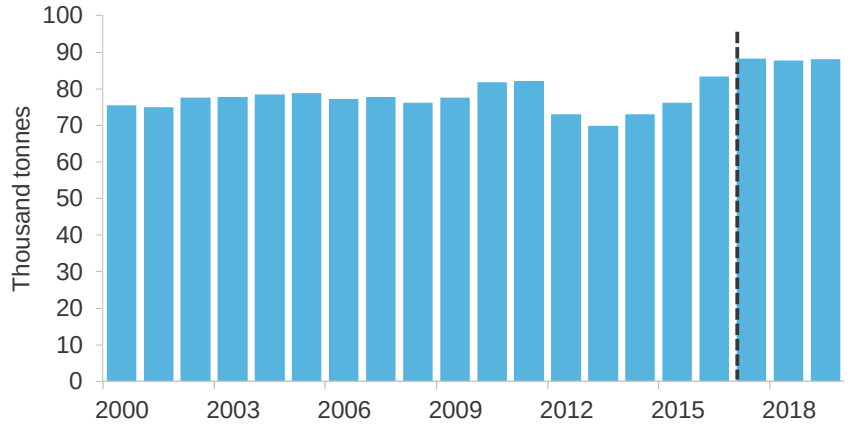
In April, the Polish state-owned energy group Polska Grupa Energetyczna announced plans to build Poland's first nuclear plant, with "localisation and environmental studies" now underway in Pomerania.

In late April, the UK opened a fusion reactor, and officially achieved first plasma. The reactor produces fusion by attaining a record-breaking plasma temperature of 100 million degrees — seven times hotter than the centre of the Sun. Reactor technology of this kind is highly efficient, and wider adoption of it will reduce average uranium use per reactor.

The South Korean Government is shifting in the opposite direction, with the election in May of a new President who has committed to closing one reactor (Wolsong-1) and cancelling the construction of two other reactors — which had been scheduled to open in 2021 and 2022. In May, a referendum in Switzerland approved revisions to the Energy Act, which bans the construction of new nuclear plants.

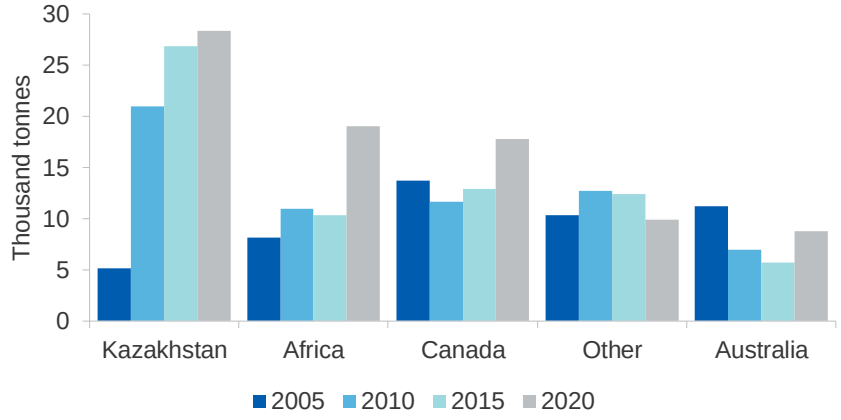
Globally, uranium requirements are forecast to edge down to 87,800 tonnes in 2018, as few new reactors are due to come online. Uranium use is then expected to grow marginally in 2019, with global demand reaching 88,100 tonnes. Higher demand in Asia is expected to offset declines in Europe.

Figure 9.5: World uranium consumption (U3O8)



Source: International Energy Agency (2017); World Nuclear Association (2017).

Figure 9.6: World uranium production (U3O8)



Source: Nuclear Energy Agency (2016); Ux Consulting (2016) Uranium Market Outlook; World Nuclear Association (2017).

World uranium production

Mine production is set to increase steadily

In 2017, world mine production is forecast to increase by 1.7 per cent to 74,000 tonnes, as output rises in Canada and Russia.

Production facilities in other parts of the world are curbing output, as low prices make extraction unprofitable. Kazakh production, in particular, is expected to decline significantly in 2017.

World uranium supply is increasingly being drawn from uranium inventories held by nuclear utilities and secondary market supplies. Ux Consulting has estimated that there are sufficient inventories held by nuclear utilities to cover forward demand for around 5 years in Japan, 30 months in the United States and Europe, and around 7 years in China. With inventories high, it is expected that uranium producers will focus on cutting costs rather than increasing production. High-cost mines are likely to scale back or cease production, and new projects will remain on hold until price increases improve their commercial viability.

A gradual erosion of inventories and a slow recovery in prices should see production edge back towards primary sources over the next year or so , with mine production expected to lift by 3,900 tonnes to 77,900 tonnes by 2018. This will be underpinned by continued increases in production at CGN/Swakop Uranium's Husab mine in Namibia, Peninsula Energy's Lance mine in the United States, and the Cameco Cigar Lake mine in Canada.

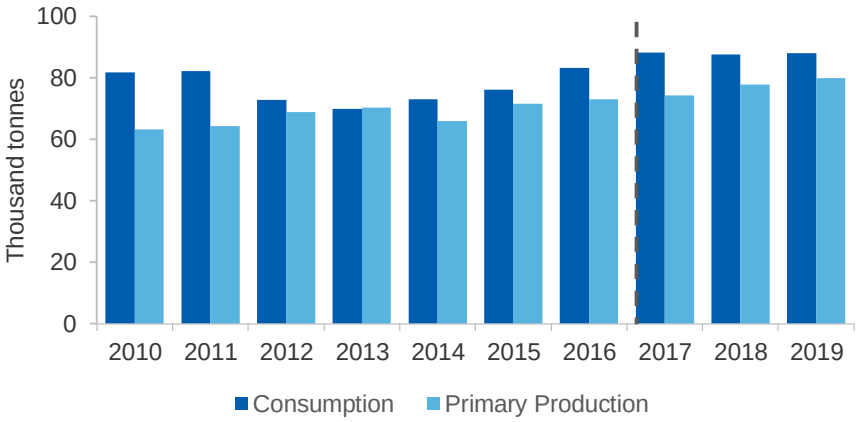
Australia's exploration, production and exports

Australia's uranium exploration expenditure continues to decline

Exploration for uranium continues to decline, with quarterly expenditure falling from $6.3 million in the December quarter 2016 to $5.1 million in the March quarter 2017. Exploration now sits well below the 2010 peak, when spending over the year reached $190 million.

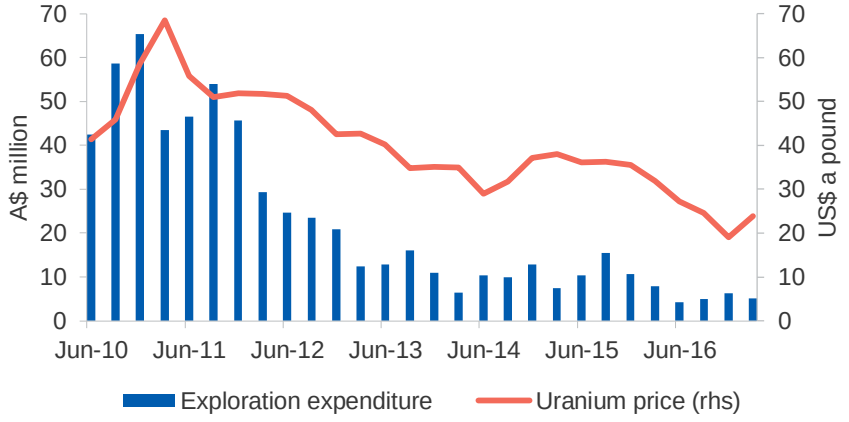
Western Australia announced a ban on uranium mining leases in June. While four existing projects (Cameco's Kintyre and Yeelirrie projects, Vimy Resources' Mulga Rock project and Toro Energy's Wiluna project) are exempt, future leases will not be issued, effectively terminating exploration in Western Australia.

Figure 9.7: Uranium supply–demand balance (U3O8)



Source: International Atomic Energy Agency (IAEA); Ux Consulting (2017); World Nuclear Association (2017).

Figure 9.8: Australia's uranium exploration



Source: ABS (2017) Mineral and Petroleum Exploration, cat. no. 8412.0; Cameco Corporation (2017) Uranium Spot Price.

Australia's production is set to increase from its low point in 2016

Australia's uranium production is forecast to be roughly steady in 2016–17, at 7,724 tonnes. Stronger production at the BHP Olympic Dam mine, and a ramp-up of production in Quasar Resources' Four Mile Mine, are expected to drive a lift in production to 8,073 tonnes in 2017–18 and to 8,450 tonnes in 2018–19.

In late April, Vimy Resources announced that the Mulga Rock mine in Western Australia is likely to have a larger metal deposit than earlier modelling had suggested, which may expand the yield in future years. However, growth from other sources is likely to be constrained by the recently announced ban on further mining leases in Western Australia.

Australian producers may face tough conditions during 2017 and 2018, as long-term supply contracts expire. It is likely that a greater share of global demand will be met from the spot market in 2017, as buyers capitalise on historically low prices.

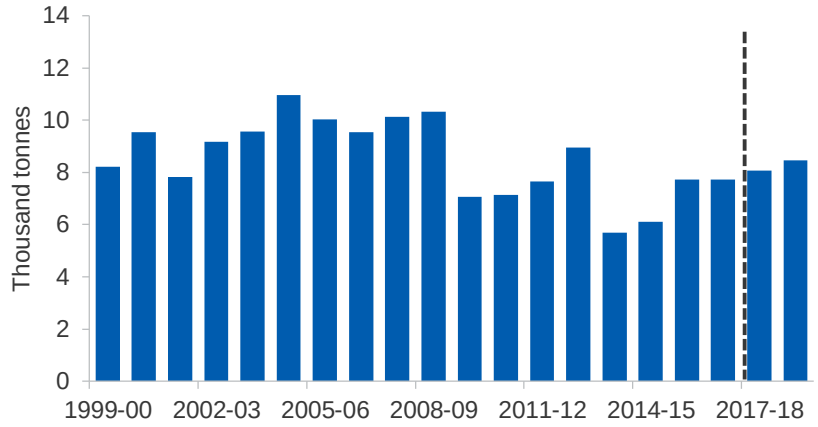
Nuclear power growth in China to drive Australia's uranium exports

It is estimated that Australia exported 7,724 tonnes of U308 in 2016–17. Australia does not use nuclear power, and robust demand in regional markets is expected to draw all of Australia's uranium production into export markets over the outlook period.

Prices remained below production costs throughout 2016–17, creating difficult conditions for producers. Export values are estimated to have been roughly steady at around $947 million in 2016–17 (in real terms). However, higher prices should encourage production to shift up slightly, increasing export values to $972 million in 2017–18 and $1,003 million in 2018–19.

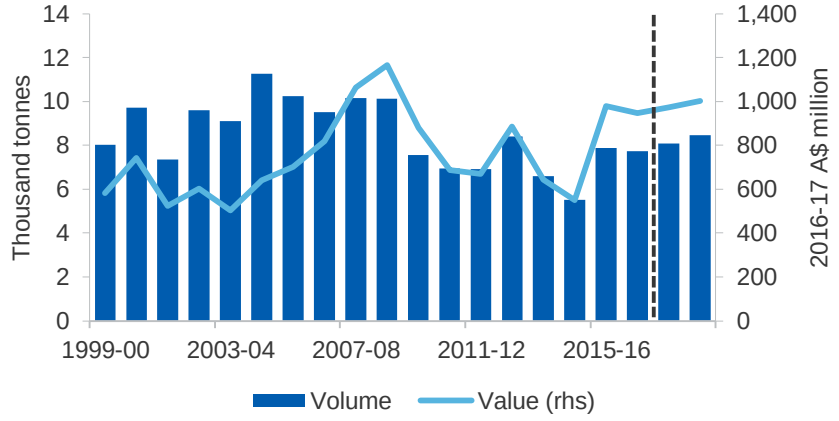
Although the outlook for exports remains tight in the short term, there is still strong potential for demand growth in several key regions, including North America, Western Europe, and China. There are also hopes of opening up new markets in India — with Australian Prime Minister Turnbull announcing an intention to resume uranium exports to India "as soon as possible" during a state visit in April.

Figure 9.9: Australia's uranium production



Source: BHP Billiton (2017) Operational Review; Department of Industry, Innovation and Science (2017); Energy Resources of Australia (2017) ASX Announcement – Operations Review; Company media announcements (2017).

Figure 9.10: Australia's uranium exports



Source: Department of Industry, Innovation and Science (2017).

Table 9.1 Uranium outlook

World	Unit	2016	2017 f	2018 f	2019 f	Annual percentage change 2017 f	2018 f	2019 f
Production	kt	73.1	74.4	77.9	80.1	1.7	4.7	2.8
Africa b	kt	9.5	11.4	13.1	14.9	20.1	14.7	13.9
Canada	kt	15.9	16.2	16.7	16.7	2.1	2.8	0.0
Kazakhstan	kt	28.1	26.7	27.4	27.4	-5.0	2.7	0.0
Russia	kt	3.6	4.0	4.2	4.3	9.4	5.7	2.7
Consumption	kt	83.4	88.3	87.8	88.1	5.9	-0.6	0.4
China	kt	13.8	17.1	17.5	18.7	24.0	2.3	6.7
European Union 28	kt	22.2	22.4	24.3	22.2	1.0	8.7	-8.9
Japan	kt	0.5	1.2	1.7	2.0	162.9	42.0	17.9
Russia	kt	6.1	6.6	6.9	7.0	7.0	4.6	2.5
United States	kt	23.0	22.5	22.1	22.5	-1.9	-1.9	1.6
Price								
– nominal	US$/lb	25.6	22.9	25.2	29.0	-10.8	10.0	15.2

Australia	Unit	2015–16	2016–17 s	2017–18 f	2018–19 f	Annual percentage change 2016–17 s	2017–18 f	2018–19 f
Production	t	7,717	7,724	8,073	8,450	0.1	4.5	4.7
Export volume	t	7,889	7,724	8,073	8,450	-2.1	4.5	4.7
– nominal value	A$m	963	947	993	1,047	-1.6	4.9	5.4
– real value d	A$m	979	947	972	1,003	-3.3	2.7	3.2
Average price	A$/kg	122.0	122.6	123.0	123.9	0.5	0.3	0.7
– real d	A$/kg	124.2	122.6	120.4	118.7	-1.3	-1.8	-1.4

Notes: ***b*** *Includes Niger, Namibia, South Africa, Malawi and Zambia;* ***c*** *In 2017 US dollars;* ***d*** *in 2016-17 Australian dollars;* ***f*** *forecast.*
Source: Australian Department of Industry, Innovation and Science (2017); Cameco Corporation (2017); Ux Consulting (2017) Uranium Market Outlook.