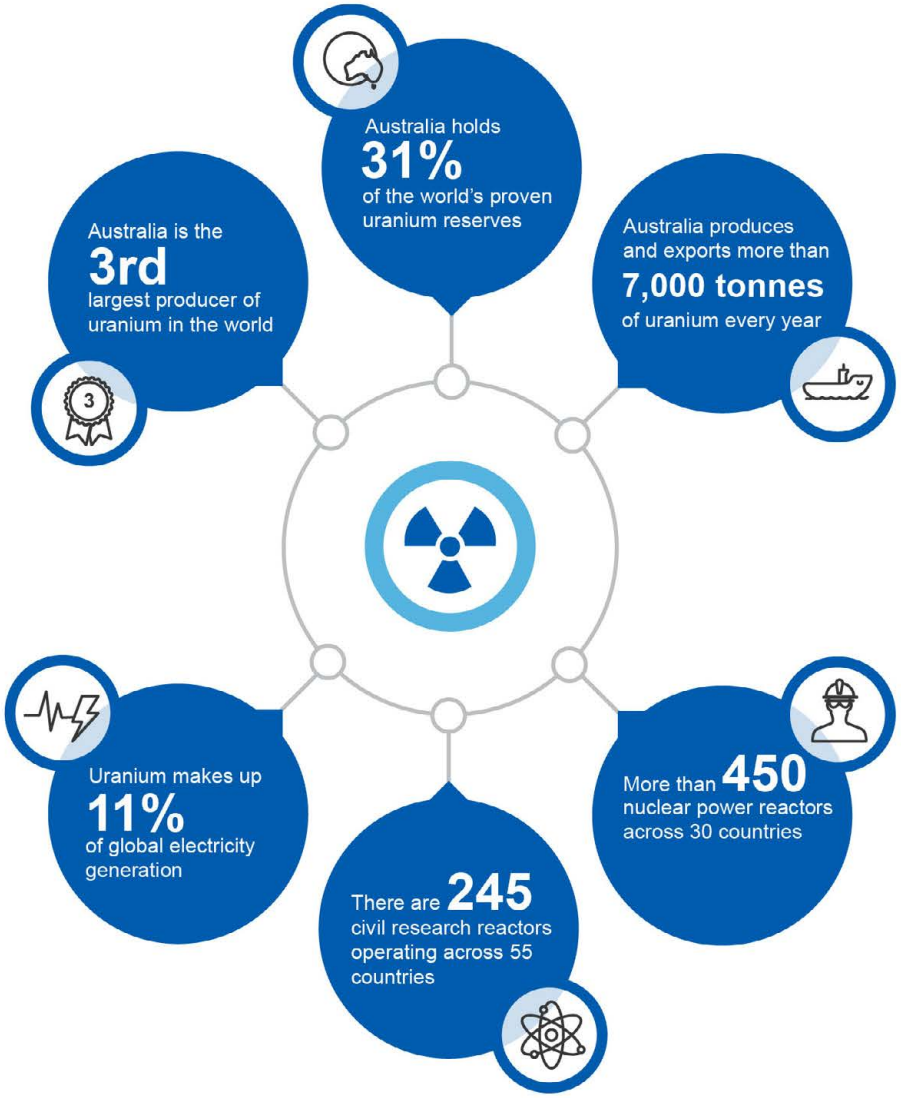
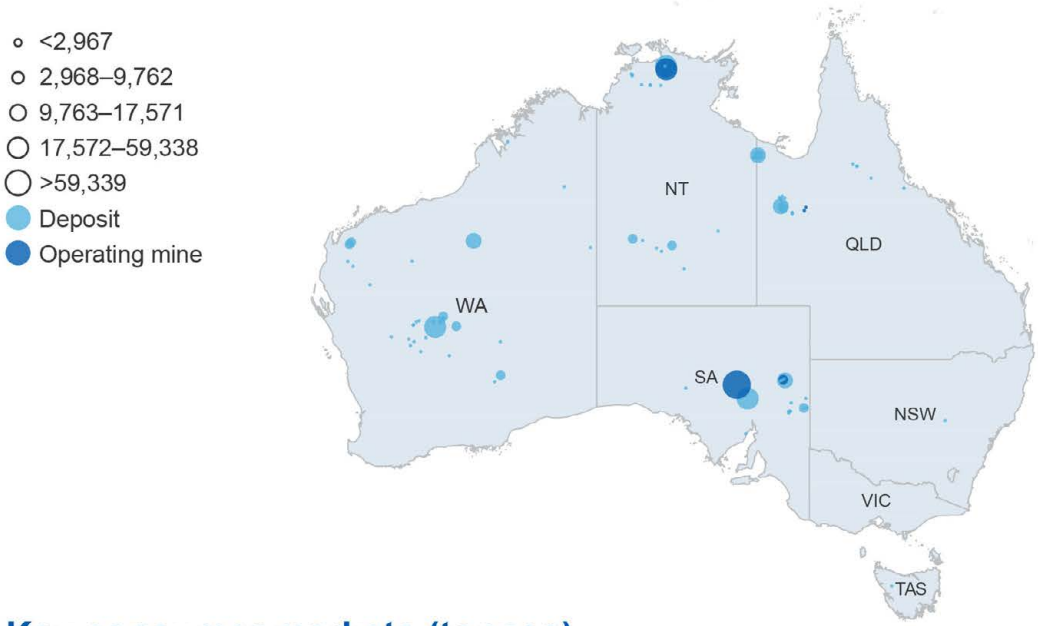
Uranium

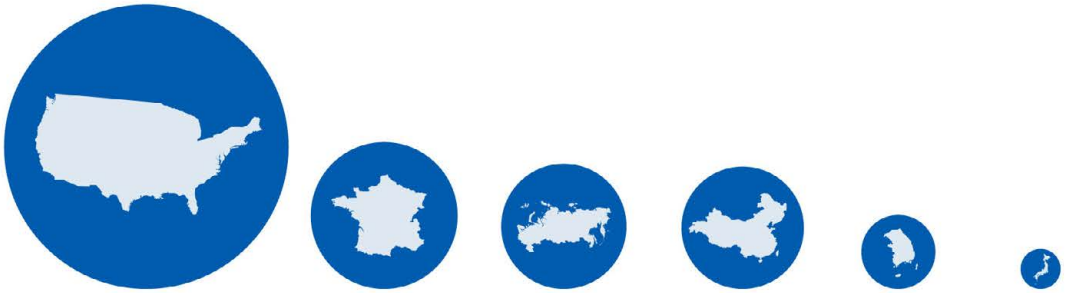
Resources and Energy Quarterly September 2019



Major Australian uranium deposits (tonnes)



Key consumer markets (tonnes)



USA	France	Russia	China	South Korea	Japan
17,847	**9,216**	**7,767**	**7,757**	**4,816**	**2,517**

9.1 Summary

- Gradually rising uranium demand, and production cuts imposed by large suppliers, are expected to push prices up from around US$25 a pound towards US$40 a pound over the next two years.
- Uranium production in Australia is expected to decline over the outlook period, as output winds down at the Ranger mine ahead of its scheduled closure at the start of 2021.
- Australia's uranium export earnings will likely be affected by falling production, with lower volumes offsetting the impact of higher prices, leading to a small decline in export values (to $614 million) by 2021.

9.2 Prices

Uranium prices are largely stable, but change is in prospect

Uranium prices have been stable at relatively low levels for around a year. Prices hit a historical low point in 2017, and lifted only when large producers in Kazakhstan and Canada cut their output, reducing global supply by almost one-fifth. Prices have remained between US$25 and US$28 a pound since this time, with many mines producing at a net loss.

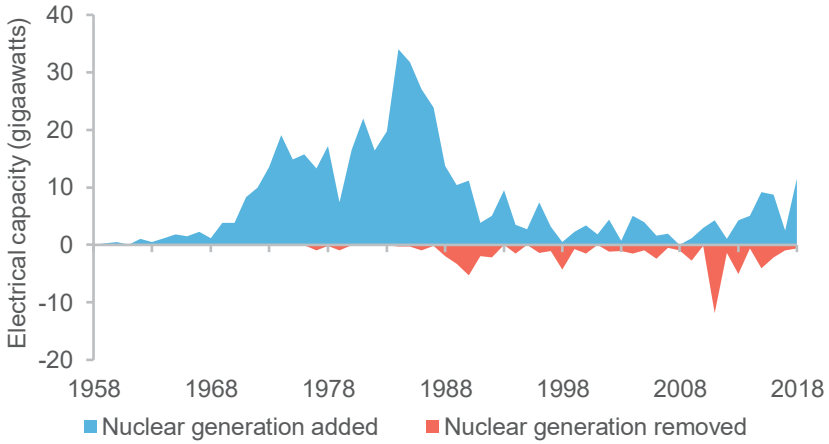
Prices eased back in June and July following a petition filing by US uranium miners. The miners sought an investigation into whether the US should seek to curb uranium imports under section 232 of the US 1962 Trade Expansion Act. The July announcement that uranium imports would not be subject to new tariffs or quotas has been welcomed by most global producers, and may be expected to restore confidence and raise prices slightly in coming months.

Over the longer term, new reactor constructions in China, South Asia, and Eastern Europe, should continue to drive gradual price growth in an environment of tight supply (Figure 9.1). Further out, prices may grow more strongly as deployment continues to rise (Figure 9.2) and the full effect of mine and project postponements over the period of relatively depressed prices plays out.

Figure 9.1: Uranium price outlook

Source: Cameco Corporation (2019) Uranium Spot Price; Ux Consulting (2019) Uranium Market Outlook

Figure 9.2: World nuclear power generation



Source: International Energy Agency (2019); World Nuclear Association (2019); Department of Industry, Innovation and Science (2019)

9.3 World consumption

Nuclear power growth faces a significant potential upside

Uranium demand is expected to grow moderately, from 85,300 tonnes in 2018 to 90,400 tonnes by 2021 (Figure 9.3).

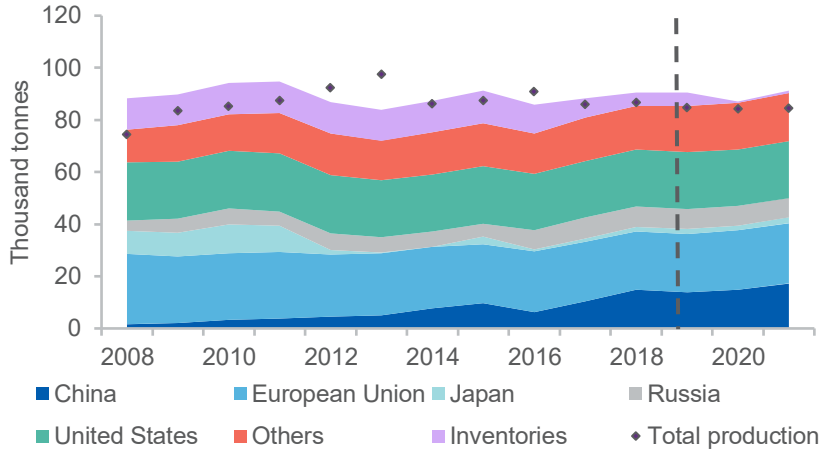
Recent indicators suggest a more positive outlook for nuclear power in the US, which remains the largest global user. In June, utility company Xcel Energy announced that the operation of its Monticello nuclear plant would be extended by at least 10 years, while its two coal plants would close 10 years ahead of schedule. Georgia Power also announced in August that fuel loading would begin for the Vogtle plant's newly constructed unit 3.

The US Department of Energy launched a new National Reactor Innovation Centre in August, with an intention of accelerating licencing and commercialisation, and to provide more opportunities for research and testing of fuels and materials. This is a notable change in direction, following a 15 year period in which no significant initiatives were announced, and several programs were cancelled. It follows announcements that nuclear power would now count as a renewable energy source under the California's Renewables Portfolio Standard, effectively qualifying nuclear power for large carbon-free energy incentives. The Ohio Clean Air program, which passed the state's lower house in August, also provides new incentives for nuclear plants.

Two new reactors in Western Europe have begun fuel loading in preparation for grid connection. The world's first European Pressurised Reactor (EPR) — sited at Olkiluoto in Finland — is expected to be grid-connected in October. A second EPR — located at Flamanville in France — is expected to be connected later in 2019.

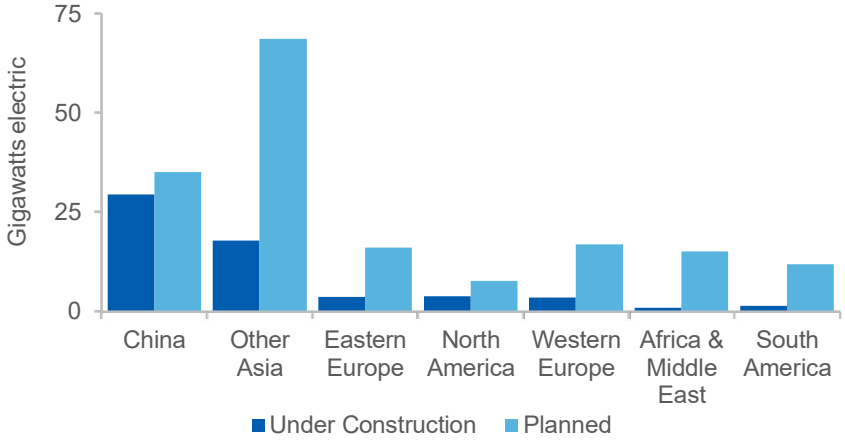
In China, the Taishan nuclear plant's second reactor achieved full generating capacity for the first time in August, following its grid connection in June. In August, the Yangjiang nuclear power plant announced that its recently completed unit 6 had met commercial operation conditions, and was starting to generate grid power.

Figure 9.3: World uranium consumption and inventory build (U3O8)



Source: International Energy Agency (2019); World Nuclear Association (2019); Ux Consulting (2019)

Figure 9.4: New nuclear capacity



Source: International Energy Agency (2019); World Nuclear Association (2019); Department of Industry, Innovation and Science (2019)

Also in August, Ghana's government announced the establishment of a new organisation to oversee construction and operation of the country's first nuclear plant. Site selection is now set to begin, with the government prioritising nuclear generation as a sustainable development goal.

Concrete pouring for unit 2 of the Rooppur power plant in Bangladesh concluded in August, with foundations for unit 1 having been completed earlier in 2019. The Russian state nuclear corporation has been contracted to build two large 1200 MWe reactors on the site.

The Russian and Indian governments have also recently signed agreements to construct 20 new reactors in India over the next 20 years.

Technological progress is picking up pace, with development of small modular reactors (SMRs) accelerating in recent months. In South Korea, a collaboration agreement has been announced between Doosan Heavy Industries and NuScale, a US-based small modular developer. The agreement includes a review process for NuScale's proposed reactor design, with development and deployment to be managed by Doosan. Utah Municipal Power Systems has already announced plans to commence construction of the first NuScale reactor in 2023.

In the UK, the Government has allocated resources from its Industrial Strategy Challenge Fund to support development of an SMR by a consortium of companies that includes Rolls-Royce, Siemens, BAM Nuttall, SNC Lavalin/Atkins, Assystem, Wood, Arup, Laing O'Rourke, National Nuclear Laboratory and Nuclear AMRC.

China's National Nuclear Corporate has launched a project to construct an SMR in July, with construction of a demonstration ACP100 model set to start in late 2019. The development of SMRs is recorded as a 'key project' in China's latest five year plan.

In July, Canadian Nuclear Laboratories launched a new R&D program to accelerate the development and construction of SMRs in Canada. Under the program, vendors will be able to access public research facilities, and incentives will be provided for collaboration and work to progress fuel development, reactor physics, and transportation. The Canadian government has also commenced environmental assessments for an SMR project proposed by the Ultra Safe Nuclear Corporation and Global First Power. The project would develop a micro modular reactor, intended as 'a model for future SMR deployments that could support remote industrial applications and provide a viable option to displace fossil fuel use'.

SMRs have significant potential to change the way uranium markets work. Some will offer pathways for thorium-based power generation as a substitute for uranium fuel. Some will have capability to act as 'breeder' reactors — burning used reactor fuel from other reactors as a power source, creating closed-loop production and removing nuclear waste. Some SMR models will have the capability to combine liquid fuel with fluoride or salt, creating a mixture which acts as both fuel and coolant. SMRs constructed in this way will be incapable of melting down, and small enough to transport on trucks. The long deployment window of traditional reactors may become avoidable with SMRs, which will be capable of assembly line production and rapid shipment and connection in markets around the world. This could create a uranium market with the potential for more rapid growth than the uranium market of today.

9.4 World production

Conditions for uranium producers are belatedly improving

In aggregate, global mine production is expected to edge up from 59,700 tonnes of U3O8 in 2018, to 62,700 tonnes by 2021. In August, Kazatomprom — Kazakhstan's National Atomic Company, and the largest uranium supplier in the world — announced that current production cuts will be maintained for a further year, taking them to the end of 2021. Supply cuts by the company will remove almost 6,000 tonnes of uranium supply over the outlook period, and will likely lead to a gradual ramp-up of supply pressures. Rising secondary supply and high inventories will likely absorb some of the resulting price pressure, at least in the short-term.

While many uranium projects have been postponed or placed in hiatus in recent years, some have continued to progress, in anticipation of a price recovery. A feasibility study released in July confirms that the Tiris project

in Mauritania is ‘one of the most compelling uranium development projects in the world’, according to Aura Energy — an Australian company. The study found the project has very low operational and capital costs, with Aura Energy estimating a total capital cost of around US$60 million to realise the project.

9.5 Australia

Low prices have sharply reduced uranium exploration

Only $3 million was invested in uranium exploration in Australia in the March quarter. This is higher through the year, but well below the peak in 2010, when quarterly exploration was above $40 million.

The closure of Ranger will drive a decline in production by 2021

Australian uranium output and production are set to decline from 2020, as the Ranger uranium mine remains on schedule to close in January 2021.

In August, the Government asked the House Standing Committee on the Environment and Energy to undertake an investigation of the nuclear fuel cycle, with a report to be provided by the end of 2019. The inquiry will report on the potential for nuclear deployment in Australia, and to study ‘the circumstances and prerequisites necessary for any future government's consideration of nuclear energy generation including small modular reactor technologies in Australia’. The inquiry will consider issues such as environmental implications, energy affordability, social licence, transport, waste management, and workforce capacity.

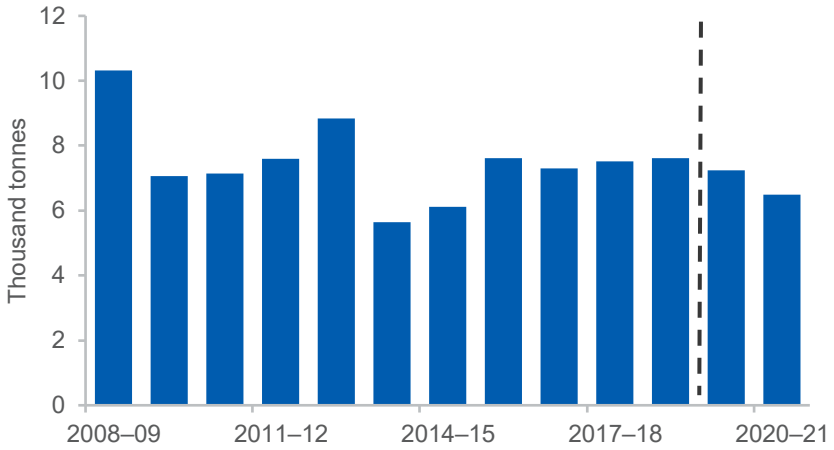
Conditions for exporters remain difficult, but price growth should help

Following the trajectory of production, export volumes are expected to decline from 2019–20, though price growth may provide some offset (Figures 9.6 and 9.7).

Revisions to the outlook

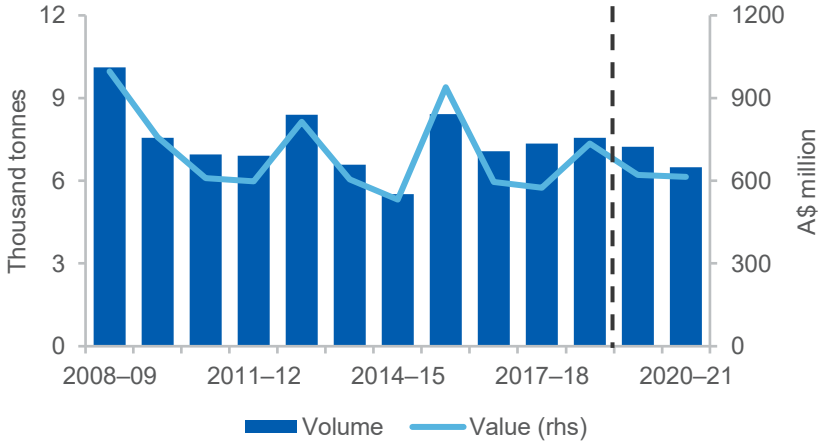
Australia’s forecast uranium export earnings for 2019–20 is largely unchanged from the previous release.

Figure 9.5: Australia’s uranium production



Source: BHP (2018); Operational Review, Department of Industry, Innovation and Science (2019); Energy Resources of Australia (2018); ASX Announcements — Operations Review; company media announcements (2019)

Figure 9.6: Australia's uranium exports



Source: Department of Industry, Innovation and Science (2019)

Table 9.1 Uranium outlook

						Annual percentage change		
World	**Unit**	**2018**	**2019[f]**	**2020[f]**	**2021[f]**	**2019[f]**	**2020[f]**	**2021[f]**
Production	kt	61.0	62.4	63.1	64.8	2.3	1.1	2.7
Africa[b]	kt	10.0	10.1	10.4	10.4	0.9	3.4	0.0
Canada	kt	8.3	8.2	8.2	8.2	-1.0	0.0	0.0
Kazakhstan	kt	25.5	26.7	26.8	29.5	4.5	0.3	10.1
Russia	kt	3.4	3.7	3.7	3.8	6.7	0.0	3.1
Consumption	kt	85.3	85.3	86.5	90.4	0.0	1.4	4.4
China	kt	14.8	13.9	15.0	17.2	-6.6	8.0	14.9
European Union 28	kt	22.5	22.5	22.6	23.1	0.0	0.8	2.2
Japan	kt	1.6	1.9	1.9	2.4	18.8	0.0	26.0
Russia	kt	8.0	7.7	7.4	7.4	-3.9	-3.2	-0.4
United States	kt	21.8	21.8	21.7	21.8	0.0	-0.7	0.6
Spot price	US$/lb	24.1	26.4	31.7	37.5	9.3	20.1	18.3
real[c]	US$/lb	24.7	26.4	31.0	35.8	7.0	17.4	15.8
Australia	**Unit**	**2017–18**	**2018–19[s]**	**2019–20[f]**	**2020–21f[f]**	**2018–19[s]**	**2019–20[f]**	**2020–21f[f]**
Mine production	t	7,521	7,618	7,240	6,500	1.3	-5.0	-10.2
Export volume	t	7,343	7,571	7,240	6,500	3.1	-4.4	-10.2
– nominal value	A$m	575	734	621	614	27.7	-15.4	-1.2
– real value[d]	A$m	604	739	621	599	22.4	-16.0	-3.5
Average price	A$/kg	80.0	86.3	85.7	94.4	7.9	-0.7	10.1
– real[d]	A$/kg	83.1	88.2	85.7	92.2	6.1	-2.8	7.5

Notes: **b** Includes Niger, Namibia, South Africa, Malawi and Zambia; **c** In 2019 US dollars; **d** in 2019–20 Australian dollars; **f** forecast.
Source: Australian Department of Industry, Innovation and Science (2019); Cameco Corporation (2019); Ux Consulting (2019) Uranium Market Outlook