Uranium
Resources and Energy Quarterly March 2018

Australia holds 31% of the world’s proven uranium reserves.

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

Uranium makes up 11% of global electricity generation.

There are 245 civil research reactors operating across 56 countries.

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

Major Australian uranium deposits (tonnes)
- <2,967
- 2,968–6,762
- 9,763–17,571
- 17,572–59,938
- >59,939

Uranium required in 2017 (tonnes)
- USA: 17,847
- France: 9,216
- Russia: 7,767
- China: 7,757
- South Korea: 4,816
- Japan: 2,517
9.1 Summary

- Uranium spot prices remain historically low, but are expected to rise slowly over the outlook period, lifting from $US25 a pound at the start of 2018 to just over $US38 a pound by 2023. This reflects supply cutbacks in Kazakhstan and Canada, and new reactor builds across Asia.
- Australian production is expected to trend down marginally over the next three years, as output from the Ranger mine edges down ahead of the cessation of production in 2021. However, production at the Mulga Rock mine is projected to begin in 2022, leading to some recovery in production by 2023.
- Australia’s uranium export earnings are forecast to decline slightly over the outlook period, with a rising spot price partly offsetting lower production.

9.2 Prices

Prices have stabilised, and are forecast to gradually increase


Although prices have turned slightly, they remain historically low and well below production costs for most mines. Price pressures on producers will also increase, as legacy contracts expire over the next 4-5 years, placing downward pressure on contract prices and narrowing the gap between contract and spot prices.

Low prices may force some high-cost producers out, potentially curbing supply over the outlook period. However, supply cuts will not necessarily lead to significant price growth: previous such cuts over 2017 produced only short-lived and temporary price lifts, due to demand volatility and the quantity of stored-up uranium accumulated since the Fukushima nuclear reactor accident.

There is thus little pressure for new supply to enter the market, although some extra output is expected to emerge from low-cost operations in Kazakhstan and Namibia.

Demand is expected to have more effect on price movements over the outlook period, with 50,000 megawatts (MW) of nuclear reactor capacity currently under construction across Asia. The completion of new reactors is expected to slowly increase uranium requirements, putting prices on a rising arc over the next five years. However, this price lift will be delayed and drawn out by the existence of substantial secondary markets and inventories, as well as demand volatility linked with intense competition from gas and renewables.

Spot prices are forecast to rise to around $US25 over the next six months, then make further gains over subsequent years, reaching around $US38 a pound by 2023 — a high enough level to encourage new exploration and additional primary supply to enter the market. Contract prices are expected to lift at a slower pace, broadly tracking the spot market but subject to additional drag, due to the expiry of legacy contracts.

Figure 9.1: Uranium prices, monthly

9.3 Consumption

Growth in nuclear power continues, but with heavy concentration in Asia. Uranium use is projected to grow solidly over the next five years, rising from 80,900 tonnes in 2017 to just over 97,000 tonnes by 2023. This is expected to be driven by a large wave of reactor constructions, many of which will have concluded by 2023. China is expected to complete almost 30 new reactors over this period, while significant construction programs are also underway in Turkey, India, and Russia.

The US, which failed to bring new reactors online for decades, has recently completed several, and is now expected to bring its large Vogtle 3 and 4 reactors online by 2023. A Bipartisan Budget Act passed by Congress has extended incentives for nuclear projects, providing tax breaks similar to those on offer for renewables. This will improve prospects for the Vogtle reactors as well as NuScale’s small modular reactor project.

Japan has reconnected five of the 42 operable reactors disconnected after Fukushima. A further four reactors (Kyushu EPC’s Genkai units 3 and 4, and Kansai EPC’s Ohi units 3 and 4) have received approval from Japan’s Nuclear Regulation Authority to restart, with reconnection expected by mid-2018. Another 21 reactors have applications in front of Japan’s Nuclear Regulation Authority for restart.

Germany is expected to shut down its 1284 MW Gundremmingen-B reactor by the end of 2018 in line with its Energiewende policy, which has seen nuclear power progressively replaced with coal and renewables. A further 7 reactors are mooted to close in Germany over the next 5 years, although the likely impact on carbon emissions and grid reliability may create pressure to delay. France has indefinitely postponed its own plans to reduce nuclear power from 75 per cent to 50 per cent of electricity use, opting instead to phase-out coal power by the early 2020s.

Longer term prospects for nuclear power depend in part on the rate at which reactors built during the 1970s are decommissioned. Technology will play an important role in enabling future nuclear power, with much depending on the progress of mass-producible Generation IV reactors.
9.4 Production

Mine output is falling, but huge inventories will fill the emerging supply gap

Low prices drove a series of production cutbacks in 2017, which will sharply cut global mine production — from 69,000 tonnes in 2017 to an expected 59,800 tonnes in 2018. Significant cutbacks are already in effect at Cameco’s majority-owned McArthur River/Key Lake project in Canada, and New AREVA’s SOMAIR project in Niger. Some cutbacks in Kazakhstan made over the past 12 months will also likely persist into 2021, with still more cuts in prospect should prices stay low.

Production is expected to bottom out in 2018, before rising slowly, to just over 78,000 tonnes by 2021. Two countries — Kazakhstan and Namibia — are expected to provide the bulk of this production growth. Kazakhstan has a range of mines due to ramp up production late in the outlook period. And Namibia’s newly developed Husab mine — which will become one of the largest mines in the world — is also expected to pursue higher production, though technical issues may delay the ramp-up into the early 2020s.

Growth in mined uranium will likely be offset in part by lower sales from US Government stocks. US Government sales are expected to be cut back in the early 2020s, leading to a temporary dip in overall supply. Total uranium supply (including mine production and secondary stocks) is likely to grow to 91,700 tonnes by 2023.

Mined supply is expected to remain below demand for each of the next five years, creating a persistent draw on inventories and secondary markets. However, with more than 1.5 billion pounds of inventories accumulated after Fukushima, uranium prices are likely to respond only slowly.

This provides little incentive for new supply in the near future. However, should prices reach around $US35 a pound, a range of alternative suppliers will become profitable, and new suppliers may emerge outside of Kazakhstan and Namibia. This is forecast to happen just beyond the outlook period.

Figure 9.4: World uranium consumption and inventory build

Source: International Energy Agency (2018); World Nuclear Association (2018); Ux Consulting (2018)

Figure 9.5: World uranium production and secondary supply

9.5 Australia

Australia’s uranium exploration expenditure remains low

Australia’s uranium exploration expenditure fell from $6.6 million to a new low of $2.9 million in the December quarter. Exploration was $19.8 million over 2017 as a whole — far below the peak of $190 million in 2011. The result reflects a combination of historically low prices as well as a recent ban on new mines in Western Australia.

Production is expected to remain largely steady over next five years

Production edged down from 7,295 tonnes in 2016–17 to an expected 6,421 tonnes in 2017–18. The fall is largely due to a pause in production at Olympic Dam, where mine upgrades have recently concluded. Production at the mine has now returned to its pre-upgrade level, and is expected to rise gradually over time.

Two major developments are expected to affect the outlook for future supply. ERA’s Ranger mine is scheduled to cease mining operations by 2020–21. ERA has sought to keep options open for the eventual development of its 3 Deeps uranium resource, which would extend the life of the project. However, major shareholder Rio Tinto opposes the development, making it unlikely. A cessation of mining operations at the Ranger mine will reduce uranium production considerably from 2021.

Partly offsetting this, prospects have improved for the Vimy Resources’ Mulga Rock project. A definitive feasibility study demonstrated that the Mulga Rock project has “robust financials” and a “simple, low cost” mining process, with a low operating cost of $US25.11 per pound.

Prices are expected to be above this by 2021, and annual production at the mine is likely to reach 1,300 tonnes. The company is now seeking project finance and is due to make a final decision by late 2018.

The cessation of production at Ranger is expected to lead to a decline in overall Australian production to 6,000 tonnes in 2021–22. However, a recovery to around 6,400 tonnes is projected in the subsequent year, as production commences at Mulga Rock.
Other potential mines include the Kintyre, Wiluna, and Yeelirrie mines in Western Australia, all of which were granted environmental approval prior to the state ban on new mine approvals. However, it is not expected that any of these mines will open within the next five years. The Yeelirrie project was approved against the advice of the West Australian Environmental Protection Authority, and remains under legal challenge from the Conservation Council of Western Australia and members of the Tjiwarl Native Title group.

Conditions for exporters remain difficult, but some improvement is expected over the outlook period

Export values are expected to lift slightly, to reach $620 million in real terms in 2017–18. A resumption of higher production at Olympic Dam will largely drive the improvement, offsetting the impact of ongoing weakness in prices and the likely expiration of some legacy contracts.

Export values are expected to remain roughly stable in 2018–19, with some benefit from higher spot prices offset by a potential decline in production at ERA’s Ranger mine. Spot prices are expected to continue to rise, bringing export revenue up in 2019–20, before a decline in overall revenue over the subsequent to years, as the Ranger mine moves towards closure in 2021.

A rebound in export revenues — to around $610 million — is expected towards the end of the outlook period, as production starts up at Mulga Rock.

Although overall export revenues are likely to edge down in coming years, improvements in prices should lead to steady improvement in the outlook for individual exporters, who currently face tough conditions.

There is also potential for exporters to benefit from faster-than-expected reconnections of plants in Japan, or a more rapid spread of nuclear technology (including the emerging Generation IV reactors, which have passive safety features and potential for mass-production in manufacturing plants) across Asia. Further production cuts in Kazakhstan and elsewhere may also create new opportunities for exporters to expand their share of a rapidly changing market.

Figure 9.8: Australia’s uranium exports

![Graph showing Australia’s uranium exports from 2007-08 to 2022-23.](Source: Department of Industry, Innovation and Science (2018))
## Table 9.1: Uranium outlook

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Notes: b Includes Niger, Namibia, South Africa, Malawi and Zambia; c In 2018 US dollars; d in 2017–18 Australian dollars; f forecast; z Projection; r Compound annual growth rate for the period from 2017 to 2023, or from 2016–17 to 2022–23.


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