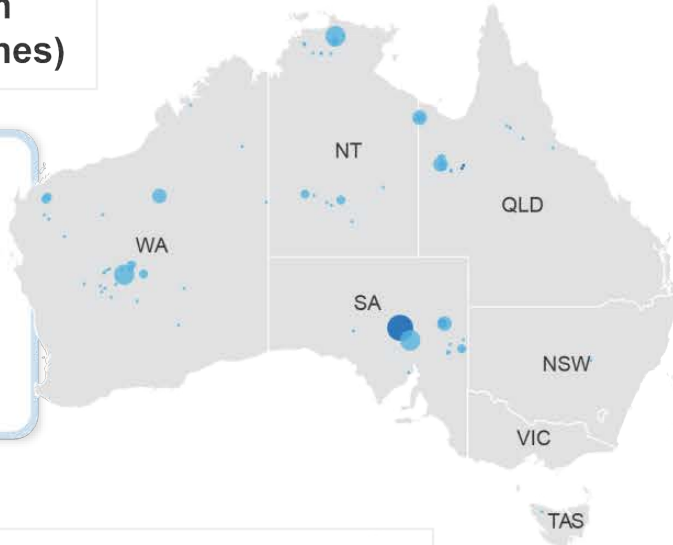
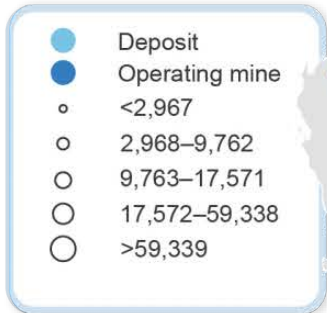


Uranium

Major uranium deposits (tonnes)



Uranium facts



Originally formed in supernovae more than **6 billion years ago**



Nuclear plants can supply electricity to **4-5 million people**



Nuclear has among the **lowest death and accident rates** of any power source

Consumer markets



27%
EU



26%
USA



21%
Others



15%
China



9%
Russia



2%
Japan

Australia's Uranium



Ranked no 1
for uranium
resources



3rd largest
uranium producer
in the world



Exports
worth more
than **\$400m**

9.1 Summary

- Investor demand has seen uranium prices lift in recent months, and further modest growth is expected over the forecast period. Prices are forecast to lift from US\$30 a pound in 2020 to US\$47 a pound by 2023.
- Australian production is forecast to decline from 2021, as the number of active uranium mines falls from three to two (see [Australia section](#)).
- Price growth is expected to see uranium export values increase from \$582 million in 2020–21 to \$623 million by 2022–23.

9.2 World consumption

More countries are showing interest in nuclear reactors

Nuclear power use continues to diversify: China, South Korea and Russia are all expected to bring new plants online by 2024. But development also continues in a range of other countries (Figure 9.1 and 9.2).

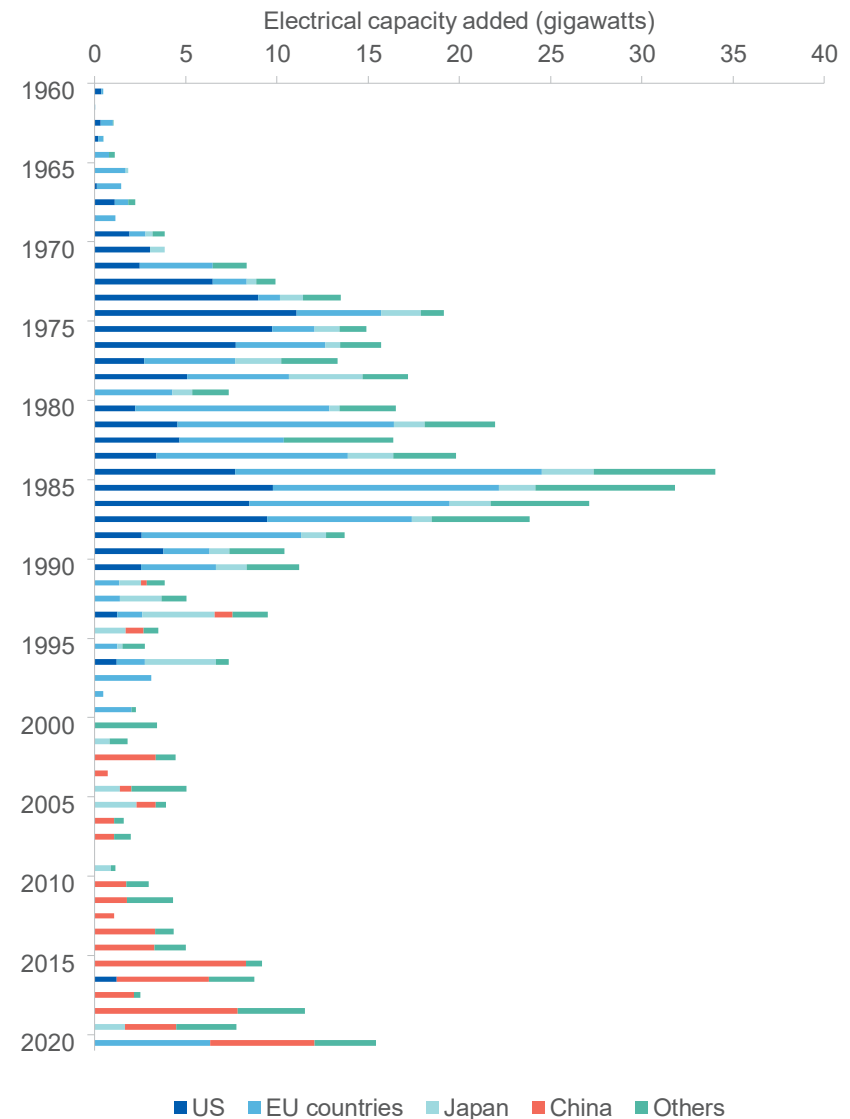
Work has finished on the third plant of the UAE's Barakah nuclear facility, with commercial operation expected to commence in 2023.

Nuclear Power Ghana — a body set up to oversee the country's first nuclear plant — has released a new timetable, which calls for a choice of vendor by 2025, and for generation to start from 2030. In South Africa, the cabinet has approved the country's new Multipurpose Reactor, which will produce radioisotopes. South Africa's energy regulator has also approved a ministerial determination to add 2500 MWe of new nuclear capacity for electricity generation, more than doubling existing capacity.

In South Asia, Bangladesh has announced plans to build a second nuclear plant once construction has concluded on its initial Rooppur plant.

In Eastern Europe, the Romanian government has announced plans to double its nuclear power supply, with two new CANDU reactors to be installed at Cernavoda by 2031. In Bulgaria, rising gas prices have generated strong profits for the country's Kozloduy nuclear plant, which produces electricity at a relatively low cost. Profits generated at the plant are being used to provide energy subsidies to industries affected by high LNG prices.

Figure 9.1: Growth in world nuclear power generation



Source: International Energy Agency (2021); World Nuclear Association (2021); Department of Industry, Science, Energy and Resources (2021)

The UK Government has confirmed that nuclear power will play a key role in its net zero emissions target. The Government has announced that up to GBP1.7 billion will be provided to fund a new nuclear power plant. This follows the recent passage of the Nuclear Energy (Financing) Bill, which seeks to attract private investment to new plants by cutting finance costs. In France, where most power generation comes from nuclear plants, President Macron has formally announced that new reactors will be built in order to improve energy security and reduce emissions.

Small modular reactors continue to develop. The US Air Force has announced plans for a micro reactor in Alaska by 2027. NuScale Power and Nuclearelectrica plan to build a small modular reactor in Romania by 2028. In China, steel containments have been laid for the ACP100 demonstration project, which the China National Nuclear Corporation describes as the world's first commercial small modular reactor.

On balance, uranium consumption is expected to edge down by 0.8% in 2022 and up by 1.1% in 2023, with growth picking up in subsequent years as a growing number of countries expand or commence their investment in nuclear power.

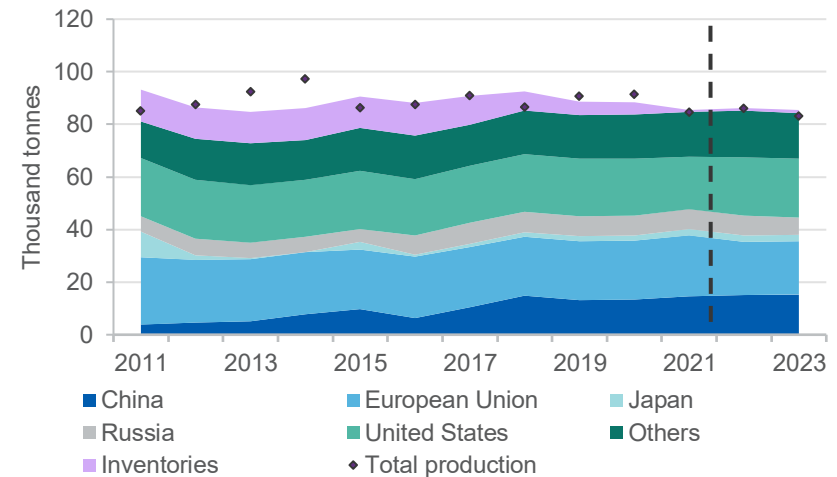
9.3 World production

Large suppliers are shifting back to full production

Utility requirements remain relatively modest, and are not expected to grow much over the next 12-18 months. Global supply remains constrained (Figure 9.3), but with potential to expand given large producers in Kazakhstan and Canada have not yet returned to full capacity. Price growth over the last few months may also encourage new mines, which have been in short supply. Among the first will be Dobrovolnoye in Russia, where operations are expected to begin in 2022.

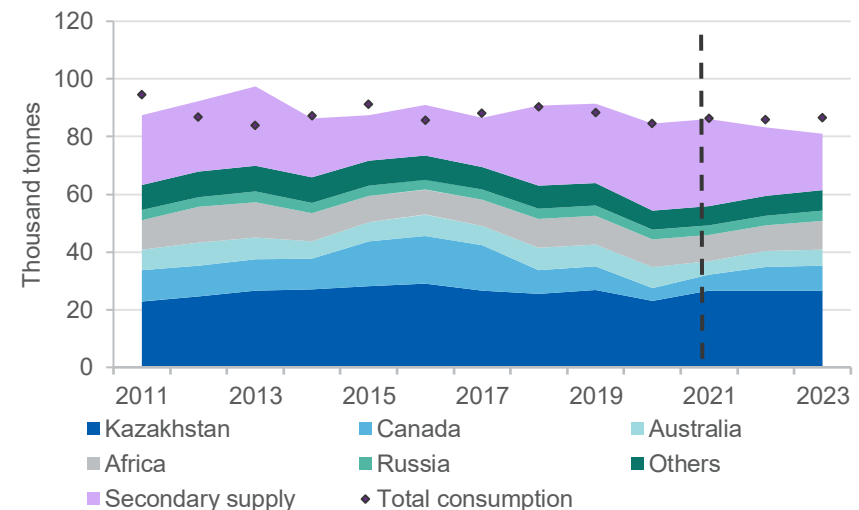
Work is being done to tap the potential of used nuclear fuel. Scientists in Slovenia and the UK have released research showing that radiation from nuclear fuel can be used to help create biodiesel, which is used as renewable fuel in a wide array of engines. This could potentially lead to greater re-use of nuclear fuel over the longer term.

Figure 9.2: World uranium consumption and inventory build (U3O8)



Source: International Energy Agency (2021); World Nuclear Association (2021); Ux Consulting (2021)

Figure 9.3: World uranium production and secondary supply (U3O8)



Source: International Energy Agency (2021); World Nuclear Association (2021); Ux Consulting (2021)

9.4 Prices

Prices are expected to rise slowly over the outlook period

Uranium prices have lifted in recent months, supported by greater investor interest in the uranium spot market. This has been driven in part by the commencement of a new purchase program started by the Sprott Physical Uranium Trust, which has significant funds to deploy. Supply to the spot market remains relatively contained, with the result that investor interest has lifted spot prices relative to contract prices.

Recent price gains are thus largely speculative and subject to downside risks. However, prices are expected to move to a firmer footing as utility demand rises towards the end of the outlook period (Figure 9.4).

9.5 Australia

Production and exports are set to decline in the short term

Australia's uranium exports have dropped since the closure of ERA's Ranger mine. However, approval of Vimy Resources' Mulga Rock project by the Western Australian Department of Mines, Industry Regulation and Safety may support future output, with the mine expected to start in 2025.

The Australian Nuclear Science and Technology Organisation has progressed with plans to construct a nuclear medicine manufacturing facility at Lucas Heights. An existing facility at the same site produces 10,000 to 12,000 doses of nuclear medicine each week, and output at the new facility is expected to increase output from this level.

Exploration spending rose to \$5 million in the September quarter (compared to \$1.8 million a year ago), suggesting prices and potential supply shortages are building interest in new deposits. Uranium export earnings are expected to fall by 13% in 2021–22, before recovering in 2022–23 as prices rise (Figure 9.5). Export volumes are expected to lift by 13% in 2022–23 as output recovers at Olympic Dam.

Revisions to the outlook

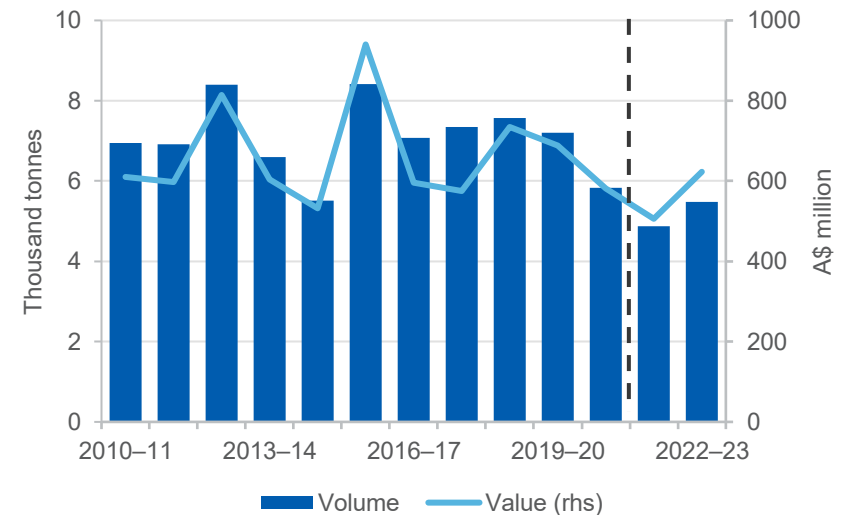
Export earnings have been revised up by around \$80 million for 2022–23, reflecting recent price gains. Other forecasts are largely unchanged.

Figure 9.4: Uranium price outlook



Source: Cameco Corporation (2021) Uranium Spot Price; Ux Consulting (2021) Uranium Market Outlook

Figure 9.5: Australia's uranium exports



Source: Department of Industry, Science, Energy and Resources (2021)

Table 9.1 Uranium outlook

World	Unit	2020	2021 ^s	2022 ^f	2023 ^f	Annual percentage change		
						2021	2022 ^f	2023 ^f
Production	kt	54.4	56.0	59.4	61.4	2.8	6.2	3.3
Africa ^b	kt	9.6	9.1	8.9	10.0	-5.2	-1.8	12.4
Canada	kt	4.8	5.4	8.2	8.6	14.3	50.0	5.0
Kazakhstan	kt	22.7	26.6	26.6	26.6	17.6	0.0	0.0
Russia	kt	3.4	3.3	3.3	3.7	-3.2	0.0	12.2
Consumption	kt	84.1	85.5	84.8	85.7	1.7	-0.8	1.1
China	kt	13.5	14.7	15.1	15.2	8.9	2.6	1.1
European Union 27	kt	22.4	23.1	20.3	20.3	3.2	-12.4	0.1
Japan	kt	1.9	2.4	2.4	2.4	26.0	0.0	0.0
Russia	kt	7.4	7.6	7.6	6.8	2.6	-0.6	-10.6
United States	kt	21.7	19.8	22.0	22.2	-8.6	11.5	0.7
Spot price	US\$/lb	30.0	35.5	46.1	47.4	18.6	29.8	2.8
real ^c	US\$/lb	31.1	35.5	44.6	44.6	14.4	25.5	0.1
Australia	Unit	2019–20	2020–21	2021–22 ^f	2022–23 ^f	2020–21 ^f	2021–22 ^f	2022–23 ^f
Mine production	t	7,348	6,213	4,871	5,480	-15.4	-21.6	12.5
Export volume	t	7,195	5,830	4,871	5,480	-19.0	-16.4	12.5
– nominal value	A\$m	688	582	506	623	-15.4	-13.1	23.2
– real value ^d	A\$m	716	596	506	610	-16.7	-15.2	20.6
Average price	A\$/kg	95.6	99.9	103.9	113.7	4.4	4.0	9.5
– real ^d	A\$/kg	99.5	102.3	103.9	111.3	2.8	1.5	7.2

Notes: **b** Includes Niger, Namibia, South Africa, Malawi and Zambia; **c** In 2021 US dollars; **d** in 2020–21 Australian dollars; **s** estimate; **f** forecast;
Source: Department of Industry, Science, Energy and Resources (2021); Cameco Corporation (2021); Ux Consulting (2021) Uranium Market Outlook