Uranium

Major uranium deposits (tonnes)
- Deposit
- Operating mine
  - <2,967
  - 2,968–9,762
  - 9,763–17,571
  - 17,572–59,338
  - >59,339

Uranium facts
- Originally formed in supernovae more than 6 billion years ago
- Uranium is the biggest source of heat within the earth
- Uranium powers around 450 nuclear plants, with 50 more under construction
- Nuclear is the safest power source, with the lowest death rate per unit of power generated

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 $734m in 2018–19
9.1 Summary

- A pause in production at Canada’s Cigar Lake mine has led to a surprise lift in the uranium price in May. Spot prices are currently around US$33 per pound, and are expected to lift past US$50 a pound by late 2022.
- Production in Australia is set to decline from 2021, due to the closure of the Ranger mine. However, new prospects, including Boss Resources’ Honeymoon mine, could lift production beyond the outlook period.
- Price growth is expected to push the value of Australia’s uranium exports up from an estimated $650 million in 2019–20 to $747 million by 2021–22.

9.2 Prices

Uranium prices are largely stable, but change is in prospect

Uranium prices have risen significantly since the start of the COVID-19 pandemic (Figure 9.1). This is largely a result of a recent series of production cuts in Canada, Namibia and Kazakhstan. The largest of these cuts was announced by Cameco on 13 April, when the company confirmed that its Cigar Lake mine — one of the world’s largest uranium mines — would close indefinitely. The Canadian mine, which accounts for 10 per cent of global uranium output, had been placed on temporary suspension. But the COVID-19 pandemic (and a subsequent fall in global electricity generation) appeared to represent a tipping point for the company.

More than 85 per cent of uranium is traded through contracts, and the relatively small size of the spot market has left it highly responsive to the recent supply cut announcements. However, short-term price risks have now moved firmly to the downside. Uranium inventories remain significant, and recent price growth is more related to supply constraints than growth in demand. These supply constraints could be revisited at any time should prices increase further.

In the longer term, price risks remain on the upside, with generation rising in recent years (Figure 9.2), while many potential supply projects remain on hiatus after years of low prices.
9.3 World consumption

Nuclear power growth faces a significant potential upside

Production cuts will likely result in a growing uranium supply deficit over the next two years, with a gradual drawdown in global inventories expected. However, the pace of drawdown will be mitigated by lower global energy use in the wake of the COVID-19 pandemic. Over the longer term, consumption is expected to rise as nuclear reactor production returns to normal and new reactors are constructed in Asia and Eastern Europe.

In Canada, Ontario Power Generation’s Darlington plant unit 2 completed its refurbishment and rebuild cycle, reaching criticality in early April. The reactor is expected to return to operation by mid-2020, with the successful refurbishment extending its operating life by 30 years.

Nuclear generation in France is expected to reduce considerably in 2020 as industrial production is shut down across the country. Électricité de France — the country’s largest electricity supplier — has reduced its projection for annual nuclear output in 2020 from 375-390 terawatt hours (TWh), to around 300 TWh this year, and 330-360 TWh in 2021 and 2022. Load-following reactors will reduce output over the year, while maintenance outages at Flamanville units 1 and 2 will be extended by five months. Neither unit is now expected to re-open until the end of October 2020.

In Japan, many reactors remain closed as a result of the 2011 Fukushima accident, with progress towards their reopening remaining slow. In addition, the Japanese government has announced that four reactors are expected to temporarily close in 2020 in order to undergo anti-terrorism retrofits, with a fifth reactor likely to face the same requirements following a recent court injunction.

In Ukraine, Energoatom — an important energy supplier — has announced plans to place three of its fifteen nuclear plant units into temporary hiatus. The decision follows an estimated 9 per cent fall in nuclear power demand across the country, which has closed substantial parts of its industrial base as a COVID-19 safety measure. In the US, unit 2 of the Indian Point nuclear power plant closed permanently on 30 April 2020. The reactor, which has run for 45 years, has faced issues with falling demand and low prices, as well as rising competition from gas and renewables.

The COVID-19 pandemic is not expected to affect the prospects for reactors under construction. Reactors close to completion include Belarus’ first nuclear reactor, which successfully completed hot-tests in May. The Czech Republic is moving ahead with plans to expand its reactor fleet, with the government entering talks with the European Commission to lay out a roadmap for construction of a new power plant. ČEZ — one of the country’s largest utilities — has also applied to construct two more reactors in the country’s Vysočina region. Both are expected to have a capacity of up to 1,200 megawatts.

In Uzbekistan, the Minister of Energy has released an update to its electricity generation strategy. The strategy aims to reduce reliance on gas fired generation, while increasing the country’s share of nuclear generation to 15 per cent. Nuclear generation is considered more secure due to the capacity to store fuel on-site rather than rely on constant imports through pipelines, which face risks of disruption.

Russia has also released a new energy strategy, which includes a focus on low-carbon development and an associated expansion in nuclear output from 203 TWh in 2017 to 260 TWh by 2050.

The South African government has announced work on a roadmap to develop 2.5 gigawatts of additional nuclear capacity. The government will consider a range of options including small modular reactors as well as more traditional builds.

The United Arab Emirates has announced that the first unit at its Barakah nuclear plant will reach criticality in June, with all units at the site remaining on schedule to enter operation by the end of 2020.

Other uses of nuclear energy are set to increase in the short-term. Around half of all healthcare products — including clothing, gloves, syringes, and
other equipment — are routinely sterilised using nuclear generated X-rays or gamma rays. Rising demand for personal protective equipment as a result of COVID-19 is creating a considerable new demand for this service. In addition, companies such as Bruce Power — a Canadian energy provider — are adjusting supply chains to provide additional medical isotopes and other essential items to frontline medical workers during the COVID-19 pandemic.

On balance, it is expected that global uranium demand will trend down over the coming year, with a slow subsequent recovery and then a more rapid rise as new projects are completed across Asia, Africa, and Eastern Europe (see Figures 9.3 and 9.4).

9.4 World production

Large suppliers have reduced output in the wake of COVID-19

Low prices have resulted in a series of cut-backs in uranium production since 2017. The latest of these was announced by Cameco, which advised in April that output would be suspended at its large Cigar Lake mine in Canada. The McLean Lake Uranium Mill, which handles output from the mine, is also suspending production, effectively bringing uranium supply from Canada to a halt. Output from both facilities was initially expected to stop for around four weeks, but subsequent announcements have extended the shut-down to an ‘indeterminate period’. The decision may be revisited should global conditions improve.

In Kazakhstan, the Kazatomprom company, which supplies more than one-fifth of all global uranium, has announced that its 2020 production will be 4,000 tonnes lower than previously expected. The cut has been linked to new requirements and safety measures imposed during the COVID-19 pandemic.

In Namibia, CNNC Rössing Uranium will suspend production at its Rössing uranium mine following an announcement by the Namibian government of new lockdowns in the Erongo region, where the mine is located. The mine is expected to reopen once the COVID-19 lockdown measures are removed.

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

![Figure 9.3: World uranium consumption and inventory build (U3O8)](image)

Source: International Energy Agency (2019); World Nuclear Association (2020); Ux Consulting (2020)

Figure 9.4: New nuclear capacity: medium-term expansion

![Figure 9.4: New nuclear capacity: medium-term expansion](image)

Source: International Energy Agency (2020); World Nuclear Association (2020); Department of Industry, Science, Energy and Resources (2020)
All these output cuts are expected to push mined global uranium output down to 62,800 tonnes of triuranium octoxide (U3O8) in 2022 (Figure 9.5).

While mined output remains in decline, the last few months have seen some significant technological breakthroughs in the uranium refining step. Framatome, a French company, has recently entered agreements to supply nuclear fuel for the SMR-160 reactor, which is one of the leading small modular reactor builds. Uranium-molybdenum fuel alloys developed by Framatome in conjunction with the University of Munich present virtually no nuclear proliferation risks.

The TRISCO manufacturing facility in Virginia is also developing a new form of reactor fuel. BMX technologies, which owns the facility, is adding new furnaces, and has developed a new fuel type which includes layers of carbon and silicon. These compositional changes will result in fuel with very low proliferation risks and significantly improved heat resistance. Improvements to nuclear fuel could support new growth, and may draw additional capital to the sector over the coming years, with potential to drive broader growth in nuclear power beyond the outlook period.

### Figure 9.5: World uranium production and secondary supply (U3O8)

![World uranium production and secondary supply (U3O8)](chart)

Source: International Energy Agency (2020); World Nuclear Association (2020); Ux Consulting (2020)

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**9.5 Australia**

**Production and exports are set to decline from 2021**

The Ranger uranium mine in the Northern Territory is now well into its final year of operation, with closure scheduled for January 2021. This will leave Australia with two operating mines: Olympic Dam, and Four Mile, both in South Australia. These two mines still hold significant untapped resources, while at least six proposed mines still have potential to develop. The closure of Ranger will reduce export volumes from 2021, though price gains are expected to support export earnings (Figure 9.6).

**Figure 9.6: Australia’s uranium exports**

![Australia’s uranium exports](chart)

Source: Department of Industry, Science, Energy and Resources (2020)

**Low prices have sharply reduced uranium exploration**

Only $1.1 million was invested in uranium exploration in the March quarter. With prices rising, some recovery is possible over coming quarters.

**Export earnings forecasts have risen, due to a recent jump in prices**

The recent lift in uranium prices has improved Australia’s export earnings prospects. The March 2020 Resource and Energy Quarterly estimates (for earnings of $597 million in 2020-21 and $623 million in 2021-22) have been revised up to $750 million and $752 million, respectively.
Table 9.1 Uranium outlook

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<th>World</th>
<th>Unit</th>
<th>2019</th>
<th>2020f</th>
<th>2021f</th>
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<td>47.6</td>
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**Australia**

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<th>World</th>
<th>Unit</th>
<th>2018–19</th>
<th>2019–20&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2020–21&lt;sup&gt;f&lt;/sup&gt;</th>
<th>2021–22&lt;sup&gt;f&lt;/sup&gt;</th>
<th>2019–20&lt;sup&gt;s&lt;/sup&gt;</th>
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<td>7,329</td>
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<td>5,800</td>
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<td>Export volume</td>
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<td>7,270</td>
<td>6,500</td>
<td>5,800</td>
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<td>– nominal value</td>
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<td>650</td>
<td>745</td>
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<td>– real value&lt;sup&gt;d&lt;/sup&gt;</td>
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<td>Average price</td>
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<td>– real&lt;sup&gt;d&lt;/sup&gt;</td>
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Notes: <sup>b</sup> Includes Niger, Namibia, South Africa, Malawi and Zambia; <sup>c</sup> In 2020 US dollars; <sup>d</sup> in 2019–20 Australian dollars; <sup>f</sup> forecast; <sup>s</sup> estimate.

Source: Department of Industry, Science, Energy and Resources (2020); Cameco Corporation (2020); Ux Consulting (2020) Uranium Market Outlook