Uranium mining in Western Australia

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Introduction

As the global shift to cleaner sources of energy accelerate, along with a push to improve energy security, the interest in nuclear power is resurging, fuelling a significant increase in the demand for uranium. The World Nuclear Association is forecasting demand for uranium to climb 28 per cent by 2030 and to nearly double by 2040.[1] In 2022, global exports of uranium were worth an estimated US$10.2 billion, doubled from $5.1 billion in 2018, driven by higher prices and demand for nuclear fuel. With demand expected to continue to soar, global trade value of uranium will continue to grow.

Australia is home to the largest uranium reserves in the world, with a considerable share of these in Western Australia. WA cannot, however, capitalise on this, due to the State Government's ban on uranium mining.

This paper seeks to provide some background on uranium, including the current state of the global market for uranium, the regulatory context and the current policy that prevents new uranium mines from being developed. We have consulted with various stakeholders, including business, Aboriginal Corporations, and government to help inform the following content.

Brief overview on uranium

Uranium is the heaviest naturally occurring element. As well as being dense, it's highly soluble and weakly radioactive. It is mined by different methods, depending on the type and location of the ore deposit. The main methods are:

- **Open-pit mining:** This involves digging a large hole in the ground and removing the ore and the surrounding rock. This method is used when the uranium ore is close to the surface and the grade is high enough to make it economical.
- **Underground mining:** This involves digging tunnels and shafts into the earth and extracting the ore by blasting, drilling, or other means. This method is used when the uranium ore is deep underground or the grade is too low for open-pit mining.
- **In-situ leaching (ISL):** This involves pumping a chemical solution into the ground through wells and dissolving the uranium from the ore. The uranium-rich solution is then pumped back to the surface and usually processed on site into yellowcake. This method is used when the uranium ore is porous and permeable and the grade is suitable for ISL. This is the most common method used globally, accounting for 56 per cent of the total global production volume of uranium in 2022.[2]

Uranium, once enriched, is primarily used as fuel in nuclear reactors for electricity generation. Nuclear power plants produce about 10 per cent of the world's electricity

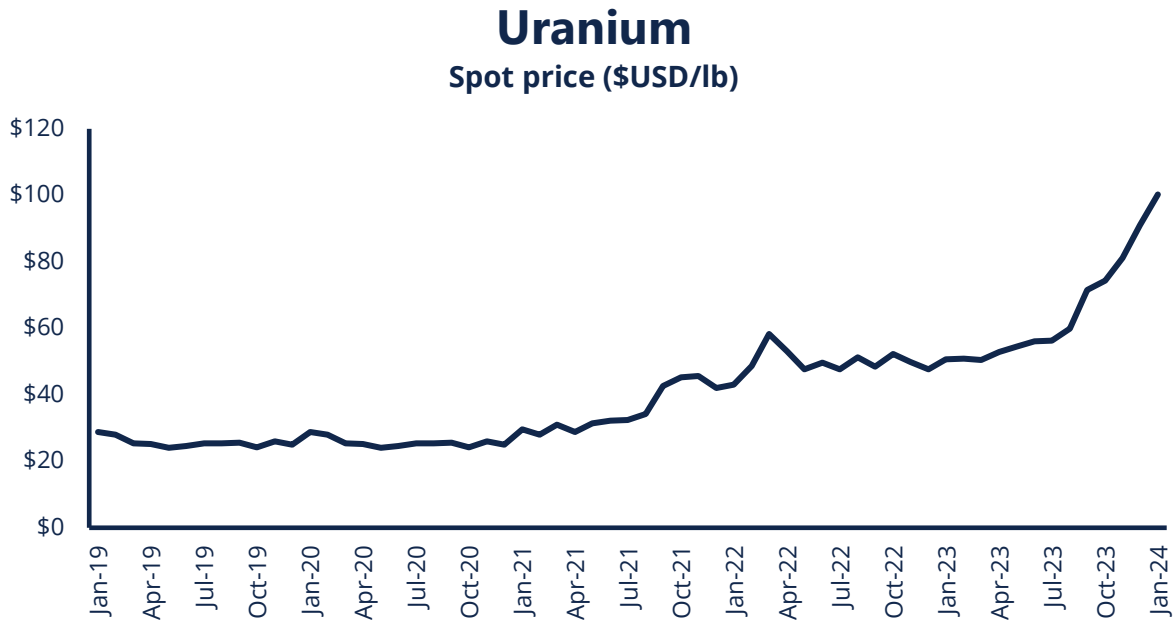
[1] Reuters, 2023. Demand for uranium for reactors seen jumping 27% by 2030 - report
[2] World Nuclear Association, 2023. World Uranium Mining Production

and are a low-carbon source of energy. Besides nuclear power generation, uranium is also used for other purposes such as medical and industrial application and general scientific research.

Scoping the opportunity: the global context

2023 saw a sharp increase in the uranium spot price, and this trend continues with prices at the end of January 2024 already around 98 per cent higher than January 2023 (Graph 1). In January 2024, the spot price jumped to $USD 100.25 per pound and is currently at its highest price point in 16 years. It's expected to climb even further on the back of continued supply challenges.[3]

Graph 1: Spot price of uranium since 2019



Source: UxC

The material increase can be attributed to several factors, including:

- the revival of nuclear power as a low-carbon and reliable source of energy;
- the tightness of uranium supply; and
- changing consumer sentiment for small modular reactors.

Uranium as a low carbon and reliable source of energy

For many countries on the path toward net zero, nuclear power will underpin the achievement of their global decarbonisation goals, as it can provide large amounts of clean and reliable electricity without emitting carbon dioxide. According to the International Atomic Energy Agency (IAEA), nuclear power can avoid more than one gigatonne of carbon dioxide emissions annually and has cumulatively avoided about 70

[3] FNArena, 2024. Uranium week: Borat rattles the market

gigatonnes of carbon dioxide emissions over the past five decades.[4] Moreover, it can enable the production of low-carbon hydrogen, which can be used to decarbonise hard-to-abate sectors. As countries look to nuclear power to facilitate their transition to net zero, this only serves to bolster the need for more uranium.

In addition, the reliability of nuclear power is gaining prominence in addressing energy market volatility. Countries are also looking for alternative fuel sources to provide flexibility and stability in the grid, especially in the wake of the energy crisis caused by Russia's invasion of Ukraine and as a complementary energy source to wind and solar. As a result, previously shut mines are now raising capital and resuming production. For example, in 2022, Paladin Energy raised AU$218 million to restart its Langer Heinrich mine in Namibia, which had been placed into care and maintenance since May 2018 due to low uranium prices.[5]

Several countries such as China, India, Russia, South Korea, Japan, France, the UK, and the US have announced plans to expand or extend their nuclear power capacity (see Table 1).[6] These collective efforts are projected to double annual uranium demand to 130,000 metric tonnes by 2040.

Table 1: Reliance on nuclear power use across economies

Country	Nuclear-generated electricity in 2022 (GWh)	Share of total electricity use in 2022	Number of operational reactors	Number of reactors under construction	Number of planned reactors
China	395,354	5.0%	55	22	70
France	282,093	62.6%	56	1	6
India	41,972	3.1%	19	8	At least 10
Japan	51,908	6.1%	12	2	At least 13[7]
Russia	209,517	19.6%	37	3	29
South Korea	167,514	30.4%	25	3	2
UK	43,605	14.2%	9	2	4
USA	772,221	18.2%	93	1	At least 8

[4] IAEA, October 2021. Nuclear Energy for a Net Zero World
[5] Paladin Energy. Langer Heinrich Mine
[6] Mining.com, 2023. Uranium price expected to rise in 2023 on nuclear power revival
[7] At least 13 more of Japan's operable reactors have either been approved for restart or being reviewed for restart.

The use of long-term contracting by utilities and financial entities has also tied up a portion of current supply, reducing the availability of uranium for the spot market.[8]

The tightness of uranium supply

While demand is rising, supply has been unable to keep up after a long period of ultra-low uranium prices led to production closures, halted expansion plans, and reduced exploration efforts. Compounding this, the COVID-19 pandemic impacted mining operations and reduced new projects and investments. In addition, geopolitical events like Russia's war on Ukraine, political instability in Niger, production cuts by Cameco, and increased speculative buying have exacerbated supply chain instability, creating what some are calling a "supply black hole" in the medium term. In the interim, the supply gap has been filled by secondary sources, such as inventories and reprocessed uranium, but these sources are expected to quickly dwindle.

Changing consumer sentiment for small modular reactors:

In recent years, there has been a change in consumer awareness and sentiment around small modular reactors (SMRs). SMRs are compact nuclear reactors, typically 300 MWe capacity or smaller, designed with modular technology for quicker and more cost-effective assembly. Globally, there are approximately 90 SMR designs being developed, with the first land-based commercial SMR, LingLong One, finishing its core module in August 2023. Countries such as China, Russia, Canada, Europe, and the US are the most active in this space with SMRs currently under construction or undergoing the licencing process.

The increased popularity of SMRs is underpinned by the multitude of benefits they offer, including for example, deployment in remote areas, export potential, and reduced construction costs due to prefabricated components. They also have longer refuelling intervals (3 to 7 years) compared to conventional nuclear plants (1 to 2 years), which lowers long-term operating costs.[9]

Scoping the opportunity: the national and local context

Globally, Australia has the largest amount of uranium resources, with approximately 1,684,100 tonnes, representing 28 per cent of the world's known uranium resources in 2021. Despite this, it is only the fourth largest producer, producing around 4,553 tonnes in 2022, which places Australia behind Kazakhstan (21,227), Canada (7,351) and Namibia (5,613).

Western Australia alone has known deposits of about 226,000 tonnes, which would place our State the eighth largest uranium source in the world. The four uranium mining projects that had been approved in Western Australia were estimated to produce over 10,800 tonnes per annum. If all projects had progressed, then their

[8] Yahoo Finance, 2023. Sprott's Thirst for Uranium Sends Prices Soaring
[9] Global X, 2023. Uranium, Explained

combined output would have placed WA as the second largest global producer. Although only one of the four projects has moved forward, with the others stalling in part due to low uranium prices at the time. It's essential to recognise that the commercial viability of these projects may change in the future, especially as uranium prices show signs of recovery.

Policy and Regulatory Context

In Australia, the first significant discoveries of uranium were at Radium Hill (1906), Mt Painter (1910), Rum Jungle (1949), South Alligator Valley (including Coronation Hill) 1953, Mary Kathleen (1954) and Westmoreland (1956). But it wasn't until 1954 that uranium was first produced in quantity at Rum Jungle, Northern Territory. [10] During that decade, other significant uranium mining operations were developed in South Australia and Queensland, including the Ranger mine in the Northern Territory that was officially opened in 1981. In WA, it wasn't until 1970 that uranium was first discovered at the Yeelirrie deposit near Wiluna.

By the 1970s and 1980s, uranium mining faced strong opposition from the anti-nuclear movement, which protested against the purported environmental and social impacts of the industry, as well as the risk associated with the potential proliferation of nuclear weapons. Ukraine's Chernobyl nuclear accident in 1986, resulting in a plume of radiation over much of Europe, perpetuated the concern surrounding uranium and nuclear energy. Given these concerns, the 'three mine policy' by the federal Labor Government was introduced in 1984, which limited Australian uranium mining to three existing sites: Ranger, Nabarlek, and Olympic Dam. Strong opposition from the Trade Union Movement within the Labor party meant that the 'three mines policy' evolved into a 'no new mines' policy by the 1990s.

In 2002, the Western Australian Labor Government banned uranium mining in the State due to environmental and safety concerns (outlined below), community fear and questions over its economic viability. However, exploration was allowed to continue. Six years later, the ban on uranium mining was overturned by Western Australia's newly elected Liberal Government in 2008. This decision also followed the Federal Government's decision to abandon the 'no new mines' policy. Following the lifting of the ban, four projects were approved in WA: Wiluna, Kintyre, Mulga Rock and Yeelirrie.

In 2017, Labor returned to Government, and in fulfilment of an election promise, implemented a "no uranium" condition on future mining leases, but allowed the four approved projects to proceed if they met certain conditions within five years. This included demonstrating "substantial commencement" of their plans on site. In 2022, only one of the four projects, Mulga Rock, received notice that "substantial commencement" had been achieved and was able to proceed. Mulga Rock is currently undertaking a revised Definitive Feasibility Study to optimise project parameters by

[10] Australian Parliament, 1994. Chronology of ALP uranium policy 1950 – 1994.

including critical mineral recovery optimisation work, detailed resource definition drilling and mining studies. The other 3 projects either failed to meet the deadline or requested an extension.[11]

Rationale for revisiting the ban

Uranium is increasingly positioned as a key part of the energy mix underpinning the global energy transition. As a result, CCIWA considers it appropriate to revisit Western Australia's uranium mining ban, given the potential missed economic opportunity. The convergence of key market factors – rising demand, supply deficits and upward price pressure – has made uranium mining more attractive than ever.

There also appears to be shifts in community sentiment around uranium mining. A recent survey of 866 Western Australians, conducted by the Minerals Council of Australia, found that 49 per cent supported uranium mining compared to just 16 per cent who were opposed. The remaining 35 per cent were "neutral" or didn't have a position on the issue.[12]

If the ban was lifted, Western Australia stands to benefit from potential opportunities in the stabilising uranium market. The State holds substantial uranium deposits, estimated at about 226,000 tonnes, indicating significant economic potential. Maintaining the ban places our State at a disadvantage compared to the Northern Territory and South Australia, which have embraced the opportunities that uranium mining presents. The proactive and supportive approach of NT and SA governments towards uranium mining has not only solidified their positions as key contributors to the global uranium market but also bolstered their economies. In South Australia, for example, there are three operating uranium mines, one of which is the largest uranium deposit in the world. Collectively, they produced approximately 5,469 tonnes of uranium oxide during the 2023 financial year, valued at over $878 million. The four WA projects could see approximately 8,000 tonnes of uranium produced per annum, with up to around 9,000 jobs (both direct and indirect) created over the life of these projects. WA's vast amount of uranium resources and the continued rise of the price of uranium could see even greater economic value added to our State's economy.

While the commercial viability of Western Australia's deposits are undoubtedly improving, regardless of this it's important to let market forces determine whether they are worth proceeding with. Concerns about economic feasibility are not a valid reason to implement or maintain a ban – it should be the prerogative of businesses, not government, to decide whether something is worth investing in. The goal is to position the State proactively and stay ahead in anticipation of potential opportunities.

[11] ABC News, 2022. Western Australia's uranium future in doubt as just one in four projects to proceed
[12] The West Australian, 2023. Minerals Council pushes to lift WA uranium ban as surprise poll reveals voter support for contentious move

The concerns surrounding uranium mining in Western Australia have primarily related to environmental, health, and safety issues. These concerns are not fundamentally different from those faced in other extractive mining activities within the region. Environmental challenges include managing radioactive tailings, containing radium, and addressing long-term hazards associated with radioactive by-products.[13] However, Western Australian regulations, which require mines to plan and demonstrate the effectiveness of tailings management and rehabilitation, can effectively address these issues, just as they do for other mining sectors. Western Australia is a mining state – it should be confident it can effectively address operational and regulatory matters like these.

In terms of health and safety, uranium mining shares common occupational risks with other mining industries, such as exposure to radon in underground mines and dust inhalation. These risks can be managed through air sampling, ventilation, and the use of appropriate breathing apparatus. Radiation exposure is monitored using thermoluminescent devices, already required in settings where radiation exposure is a concern. There are currently five uranium mines in operation in Australia, operated by five different companies with more than 1,400 people employed. In addition, 51 companies listed on the ASX are involved in uranium operations in some capacity.

The bottom line is that existing policy and regulatory frameworks are well-equipped to handle the environmental, health, and safety aspects of uranium mining. However, it has become evident through conversations with stakeholders, there is a gap in public understanding surrounding the potential benefits and economic opportunities associated with this industry. This lack of understanding likely stems from the current ban, which has limited the necessity for public discourse on the topic. Nonetheless, with the evolving landscape and increasing interest in uranium mining, there is a pressing need to address any concerns.

To bridge this knowledge divide, targeted education and awareness initiatives are crucial. These efforts should aim to provide clear and accurate information about the economic advantages of uranium mining, including job creation, revenue generation, and contributions to regional development, as well as information on the regulatory framework that will enable uranium mining to occur safely and responsibly.

The Australian regulatory framework governing the uranium industry is widely recognised for its effectiveness and adherence to global best practices. In addition, licences allowing companies to export uranium are granted under strict Commonwealth legislation and ensures that the exported uranium is used solely for the generation of electricity. Drawing from the experiences in South Australia and the Northern Territory, where uranium mining has been conducted safely and responsibly for years, and where transparency with community has been key in obtaining social licence, it is reasonable

[13] Once uranium ore is extracted, it undergoes the milling process to recover the uranium before it is exported. Radioactive tailings are the solid radioactive wastes left over from the milling process and contain most of the radioactivity from the ore.

to assume that Western Australia can similarly navigate the industry with the same commitment to safety and environmental stewardship.

As such, we recommend the State Government lift the ban on new uranium mining in WA, which is underpinned by a robust regulatory framework that will ensure its safe extraction, transportation and export.