Athabasca Basin: the cornerstone of Western uranium supply and US national security

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Uranium grades up to x100 higher than averages mined elsewhere in the world

Canada's Athabasca basin has the **highest grade uranium deposits in the world**, with grades up to **x100** higher than averages mined elsewhere in the world.

And now, the region is at the center of a geopolitical struggle to secure the uranium to supply the West's massive expansion of nuclear energy to power AI, data centers, EVs and net zero targets. The West's clean energy ambitions and national security are heavily reliant on current and future Athabasca Basin uranium production.

Athabasca Basin

The Athabasca Basin currently produces **approximately** 20% of global uranium supply.

It's a region that covers about 100,000 sq km, the same size as South Korea, and has produced uranium consistently for the last **70+ years**.

But, in 2009, with the development of massive, low-grade deposits amenable to **In Situ Leaching**

(ISL) extraction, **Kazakhstan** became the world's largest uranium supplier. In 2020, **Australia** moved into second place.

Then, in 2022, Canada became the **world's second largest producer of uranium** with 7351 tons, up from third place in 2021 with 4693 tons – an almost 57% increase.

The reason for Canada's dramatic return: the Athabasca Basin.

Today, the Athabasca Basin is home to the world's largest, high-grade uranium mine at **McArthur River** and world's second largest high-grade deposit at **Cigar Lake**. And, at Key Lake, is the world's largest uranium mill.

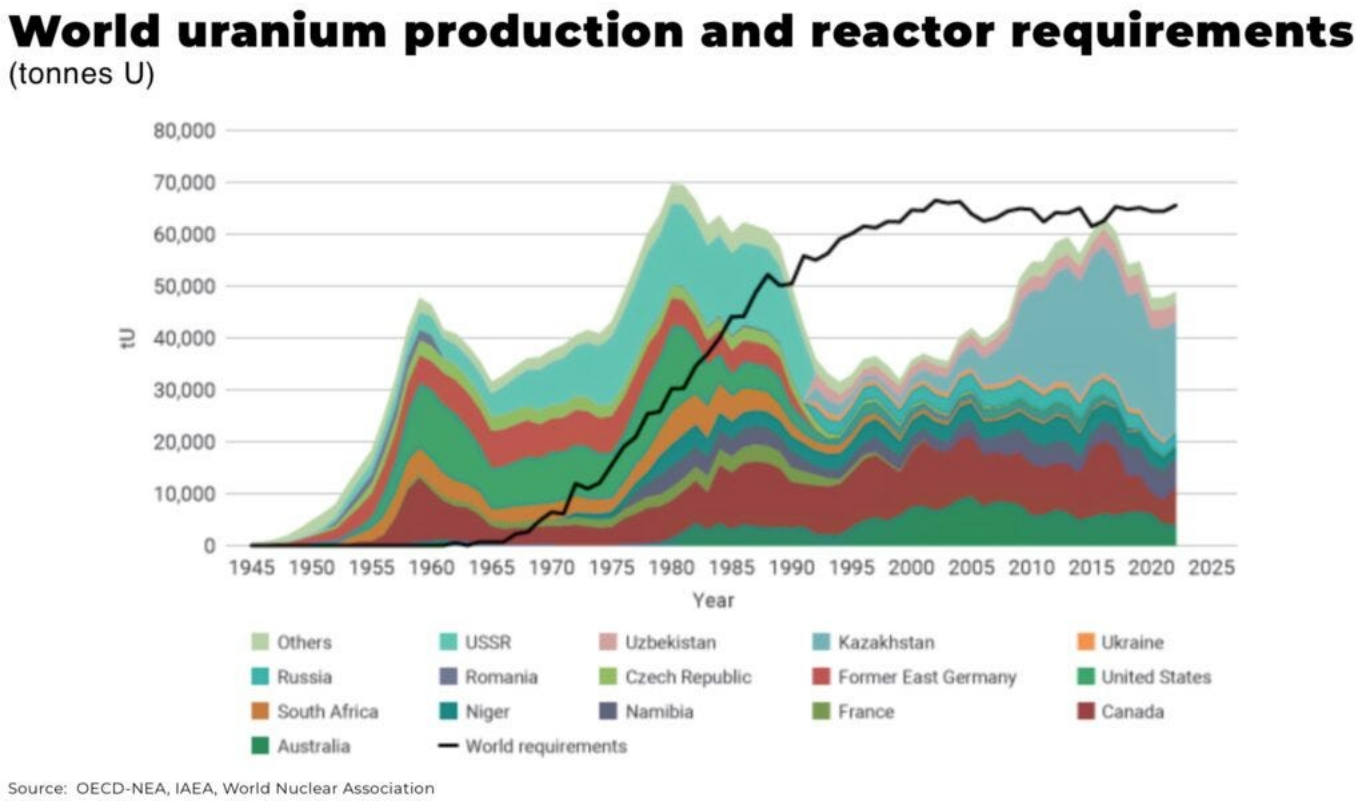
And now with the war in Ukraine and tension with China, geopolitics and supply chain security have now elevated the region's importance even further. The region has become critical to the national security and energy security of the West.

Source: World Nuclear Association

The West’s insecure supply chains

So, if there are other globally significant suppliers of uranium, why are we describing the Athabasca Basin as the cornerstone of Western supply?

The problem is geopolitics.



Kazakhstan

The world’s largest supplier is **Kazakhstan**, with 41% of supply and 12% of global reserves, but there are significant concerns over its capacity to supply the West, including:

- the country’s uranium production **fell in 2022 and 2023**
- long-term supply contracts often **prioritize** China and Russia
- Kazakhstan is heavily dependent on Russia to enrich and process its uranium, as Russia **controls** 40% of global

uranium processing facilities and 46% of total world enrichment capacity

Australia

Despite having the **largest known uranium reserves in the world** (almost one-third of the world's total reserves), and the fourth largest producer, Australia has a difficult relationship with uranium mining, with it banned in much of the country:

- in July, 2024, Australia's government intervened to block a renewed attempt to mine under Kakadu National Park in the country's Northern Territory, "all but ending a decades-long dispute over one of the world's largest untapped deposits of high-grade uranium", **according** to the Financial Times
- Western Australia state government has a '**no uranium**' condition on future mining leases. Of the four uranium projects that received State Ministerial approval under the former Liberal National Government, only one has received **approval** to proceed to next stage of development
- New South Wales has had a **30-year ban** on uranium mining
- Queensland revoked a ban on uranium mining in 2012, only to **reinstate** it again three years later

The main opposition party has **proposed** a $211 billion taxpayer-funded nuclear power plan, with expectations this would also involve lifting the uranium mining bans – something **backed** by the Minerals Council of Australia.

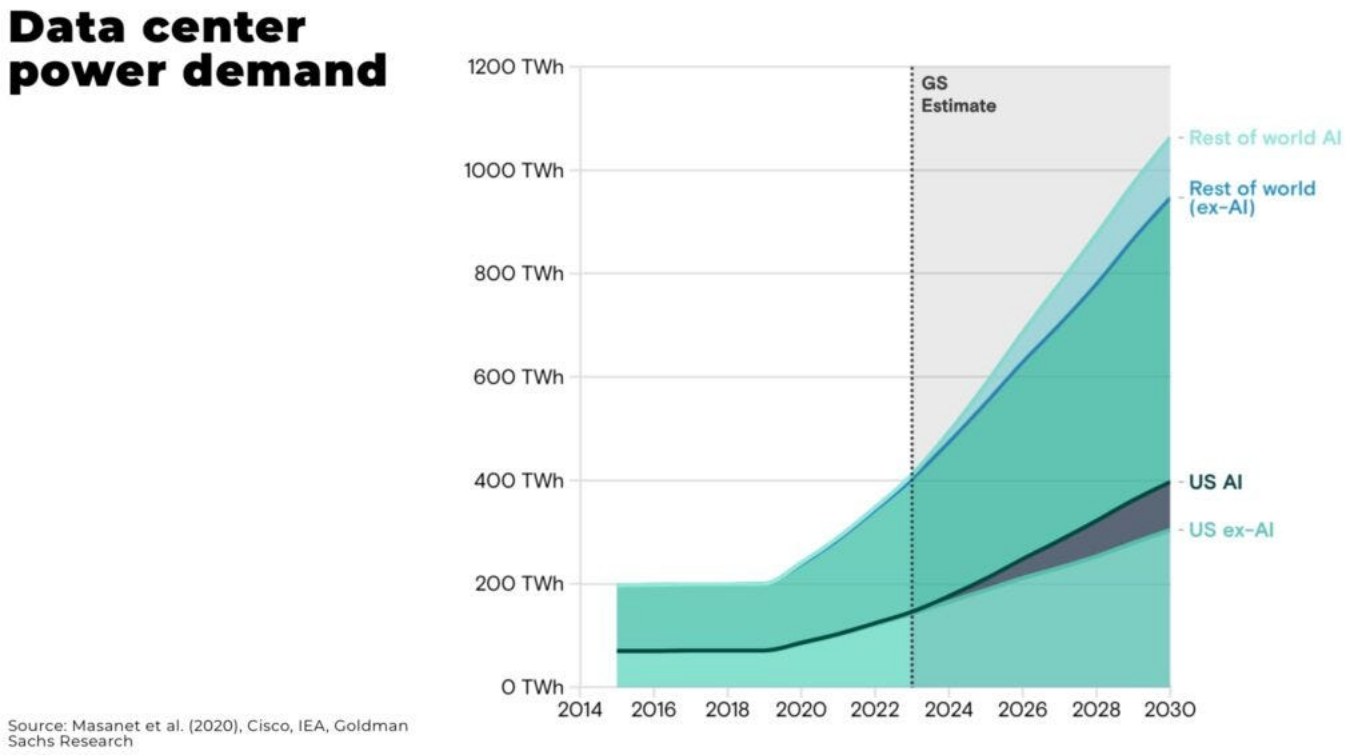
But, even if it all went ahead, it could take between **10-15 years** to develop any new mines.

The West’s Nuclear Renaissance

In the meantime, we are experiencing an **historic moment in nuclear energy**. The West – and much of the rest of the world – is embarking on a second nuclear renaissance.

About 60 reactors are **under construction** across the world, and at least another 110 are planned. To put into context, there are about 440 nuclear power reactors currently operating globally. Restarts and expansions of older reactors are announced on an almost weekly basis.

The main reasons include the high energy demand of data centers to power artificial intelligence and the race to meet net-zero targets.



Such an historic expansion of nuclear energy will require significant amount of uranium.

The US, for example, would need to **triple** uranium supply to

support plans to expand to 300GW of nuclear power.

The West, however, does not want to put itself at the mercy of supply chains vulnerable to influence from China and Russia. Just, this month, China **banned** the export of critical minerals antimony, germanium and gallium to the US.

Cornerstone of the West's supply

There are, of course, other sources of uranium in the world, but none so abundant and securely located as the resources in the Athabasca Basin.

The Athabasca Basin's significance stems from several factors:

- **high-grade deposits:** as highlighted at the top, the concentration of uranium in the Athabasca Basin deposits is exceptionally high, exceeding the global average by 10 to 100 times – allowing for cost effective extraction
- **proximity to US:** the US is **the world's largest producer of nuclear energy**, accounting for about 30% of worldwide generation of nuclear electricity, and with the surge of investment in data centrers for artifical intelligence and net zero, **old reactors are being restarted and new reactors being brought online** – creating significant demand for uranium. Critically, there is a **bipartisan agreement** in the US to secure supply chains from China. The US-Canada Free Trade Agreement also provides **support for US government investment** in the region. 85% of Canada's uranium production is **exported**, with the US and then Europe as the two largest markets (Asia is third). But, also, domestically, Canada is set to significantly expand it's own nuclear power fleet, for example the expansion of **Bruce Power** in Ontario to be the world's

biggest reactor

- **stable geopolitical environment:** Canada's stable political landscape and supportive regulatory framework provide a secure environment for uranium investment and mining companies (for example, in Niger, the military junta has **seized** Orano's uranium mine)
- **established infrastructure:** the Athabasca Basin benefits from well-developed infrastructure, including roads, power lines, and a skilled workforce. Saskatchewan province is **one of the top rated mining jurisdictions in the world** – third in 2024 – for mining investment, and Alberta ranks 10th in the world. "Saskatchewan's uranium is key as the world looks to transition to sustainable power generation and source minerals from secure, democratic regions" – Jim Reiter, **Energy and Resources Minister**
- **technological advancements:** Canadian companies operating in the Athabasca Basin are at the forefront of innovation in uranium extraction and processing. For example:
    - Jet Boring System (JBS), at Cigar Lake, Cameco uses high-pressure water to carve out cavities in the orebody and collects the ore slurry through pipes with high concentration extraction
    - SABRE (Surface Access Borehole Resource Extraction), at McClean North deposit, developed by Orano and Denison Mines, uses high-pressure water jet drilling from the surface to make small, high-grade deposits economically viable

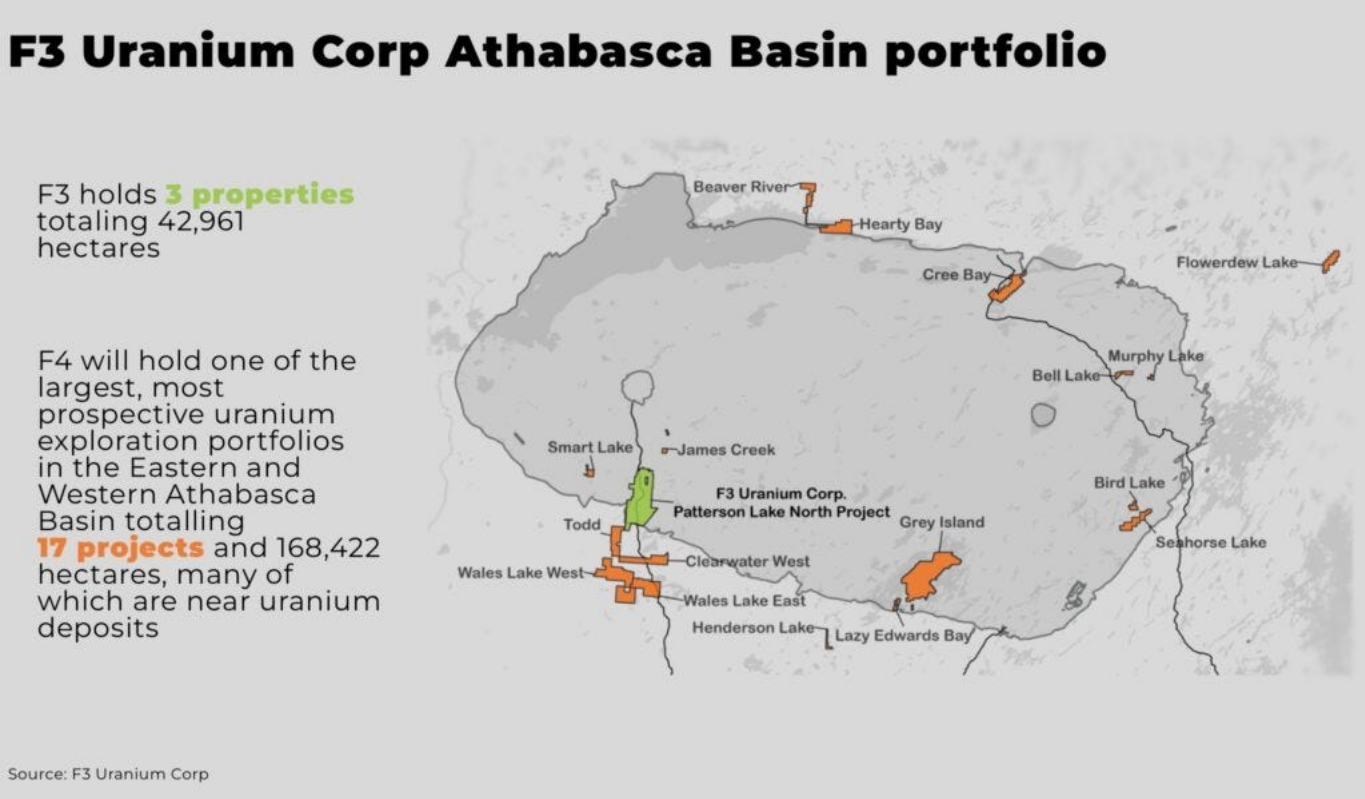
There are now more than **60 junior mining companies currently in the Athabasca Basin**, up from **34 in 2023**, highlighting the shift in the region's importance.

One company at the forefront of the race to develop the region's

next big uranium deposit is **F3 Uranium Corp (TSXV: FUU | OTCQB: FUUFF)**.

A uranium exploration company, headed up by Dev Randhawa as CEO & Chairman, F3 Uranium is focused on a high-grade discovery at Patterson Lake North (PLN), in Saskatchewan's Athabasca Basin. The company has made headlines with its series of high-grade discoveries:

- **Nov 21, 2022:** High Grade Discovery Hole PLN22-035 (15.0m @ 7% U3O8 including 5.5m @ 18.6%)
- **Mar 27, 2023:** High Grade Intercept Hole PLN23-060 (14.5m @ 9.4% U3O8 including 5.0m @ 26.7%)
- **Jun 12, 2024:** High Grade Intercept Hole PLN24-116 (12.0m @ 7.6% U3O8 including 2.0m @ 31.4%)
- **July 30, 2024:** B1 Exploration highlight: PLN24-152 (2.0m @ 216ppm U including 0.5m @ 409ppm U and 7.0m @ 107ppm including 0.5m @ 412ppm)
- **Aug 13, 2024:** Drill hole PLN24-168 extends B1 shear zone by 700m and new geophysics inversion model defines an 80% increase in the total implied strike length to 2.7 km



Key highlights include:

- **experienced management:** F3's award-winninng technical team has a **track record of three major uranium discoveries in the Athabasca Basin**
- **well-funded:** the company has approximately $40 million in cash, including a $15 million strategic investment from **Denison Mines**
- **recent developments:** F3 **completed** a spin-out of 17 exploration properties into F4 Uranium Corp, allowing F3 to focus on developing PLN
- **ESG certified:** F3 has been assessed by independent mining ESG experts and awarded the Digbee ESG disclosure certification

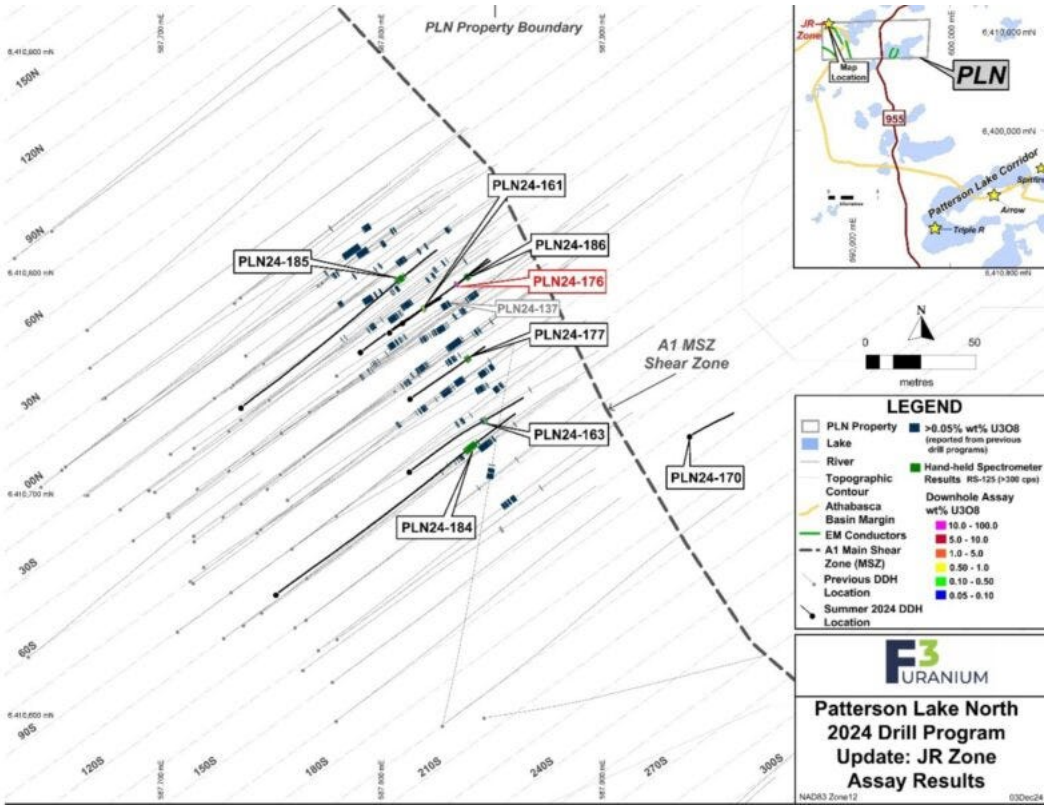
Dev Randhawa, CEO of F3 Uranium Corp., emphasizes the company's experienced team and recent exploration success:

"Our technical team's track record of three major uranium

discoveries in the Athabasca Basin speaks volumes about our expertise. At Patterson Lake North, we've made a high-grade discovery that's truly exciting – the JR Zone. With intercepts like 15.0m @ 6.97% U3O8, including 1.0m @ 59.2% U3O8, we're demonstrating the potential of this property. Our approach of challenging legacy ideas and using advanced techniques has paid off. We've drilled over 1000 holes in the region, and that experience is invaluable. The race is on to find the next big deposit, and with our recent discovery, we believe we're just getting started. The Athabasca Basin is undergoing a historical transformation, and F3 is well-positioned to play a significant role in securing the West's nuclear future."

The **latest drill results** from the company, from PLN24-176 at JR Zone, returned 4.5m of 50.1% U3O8, including 7.5m of 30.9% U3O8. This marks the best hole drilled to date.

F3 Uranium JR zone drill holes with uranium results



Source: F3 Uranium Corp

Securing the West's nuclear future: key players in the Athabasca Basin's uranium mining supply:

Cameco Corporation (TSX: CCO | NYSE: CCJ) is the largest uranium producer in the Athabasca Basin, operating two major mines. The company's **Cigar Lake operation** is the world's highest-grade uranium mine, producing approximately **14% of global supply**. Cameco's McArthur River/Key Lake complex is the world's largest high-grade uranium mine and mill.

In November, 2024, Cameco **raised** their uranium production guidance due to strong output at its McArthur River/Key Lake operation.

Orano Canada, a subsidiary of the French company Orano, operates the McClean Lake mill, which processes ore from Cigar Lake under a toll milling agreement. Orano Canada also holds a 77.5% interest in the McClean Lake Joint Venture (MLJV) with Denison Mines

Uranium Energy Corp (NYSE: UEC), is a Texas-based company with several uranium projects in the Athabasca Basin. In October 2022, UEC **completed** the acquisition of the Roughrider uranium project from Rio Tinto for US$150 million, as well as the Shea Creek, Horseshoe-Raven, and Christie Lake projects in eastern Athabasca Basin

NexGen Energy (TSX: NXE | NYSE: NXE | ASX: NXG), is developing the Rook I project in Saskatchewan's Athabasca Basin, the largest development-stage uranium project in Canada

Denison Mines (TSX: DML | NYSE: DNN) is focused on developing the Wheeler River project, the largest undeveloped uranium project in the eastern Athabasca Basin.

Denison also holds a 22.5% stake in the McClean Lake mill and has optioned interests in multiple exploration properties while maintaining discovery exposure; in particular, a **$15 million strategic investment** in F3 in the form of unsecured convertible

debentures

Fission Uranium (TSX: FCU | OTCQX: FCUUF) is developing the Patterson Lake South (PLS) property, which hosts the Triple R deposit, traced by core drilling over approximately 3.18 km of east-west strike length in five separated mineralized zones.

These companies represent the major players in uranium exploration and production in the Athabasca Basin, each with significant projects at various stages of development.

Conclusion

A new era of uranium production is being developed in the Athabasca Basin, as geopolitical tensions rise and the demand for clean energy surges, this Canadian treasure trove of high-grade uranium is set to play a pivotal role in securing the future of nuclear energy.

But, for investors, the race to developing this future has just begun.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