



# **A Generational Moment for Commodity Trading Strategies**

Report #2

## **MINING FOR OPPORTUNITIES IN URANIUM**

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## Mining for Opportunities in Uranium

Geopolitics and economics fire up demand amid stubborn supply deficits, supporting uranium’s price

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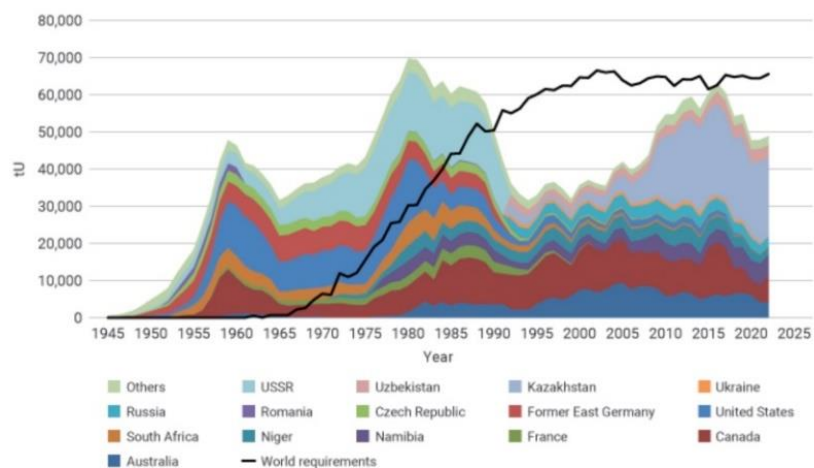
At the turn of the 21st century, nuclear power companies watched the price of their most vital ingredient — uranium — steadily drop as Russian warhead fuel was converted for use in nuclear reactors. By January 2001, these abundant inventories sank the price of uranium to a 30-year low of \$7.10/pound. However, a mere six years later, prices surged 19-fold to \$136 due to reduced production and dwindling inventories.

Today, we believe uranium prices are again under strong upward pressure, this time due to surging power consumption, an imbalance between production and demand, and fraught geopolitics. These trends have left uranium inventories in deficit, gradually lifting its price since the start of the decade. With no end to these trends in sight, the prospect of higher prices ahead merits serious analysis.



The 2011 Fukushima disaster in Japan severely unbalanced the global supply/demand of uranium. Japan suspended operations at all 48 of its reactors, and Germany decommissioned its last reactors in 2023.<sup>1</sup> Meanwhile, Kazakhstan became the world’s largest producer of uranium oxide. The flood of its new product, along with improvements in recycling and less uranium-intensive enrichment processes, led to expanded inventories and low prices, disincentivizing new production.<sup>2</sup>

World uranium production and reactor requirements (tonnes U)



From the mid-1990s, the Megatons to Megawatts

<sup>1</sup> Associated Press, April 15, 2023, “Over and out: Germany switches off its last nuclear plants”

<sup>2</sup> Nuclear Innovation Alliance blog, Jan. 18, 2022, “Uranium supply is not a significant constraint to using nuclear energy for climate mitigation”

program decommissioned Russian warheads, providing uranium for reactors, but by 2013 this source dried up without a sufficient investment having been made to generate new supply.<sup>3</sup>

This set the stage for the 2021-to-present state of the uranium market, marked by sudden and radical changes as the discovery-to-production process, spanning 8-15 years, struggles to keep up with demand shocks.

We believe current uranium demand is driven by several key factors. First, the push for net zero carbon emissions is making nuclear power more attractive due to its carbon-free, reliable supply. Second, the emergence of small modular reactors (SMRs), cheaper and faster to build than traditional nuclear reactors, are expanding the universe of countries that can develop their own nuclear power. Third, increasing distrust in China is prompting re-shoring of manufacturing in the US and Europe, requiring substantial power. Further, we believe the rise of artificial intelligence, dependent on power-hungry data centers, is another serious driver in boosting nuclear power demand.

Since 2021, financial buyers like Sprott and Yellow Cake PLC have entered the market, removing physical inventories of uranium oxide from commercial circulation, which could further tighten supply if speculative interest grows.<sup>4</sup>

But we believe the most obvious and impactful catalyst has been the West's deteriorating relations with Russia following its 2022 invasion of Ukraine. Countries in Europe and Asia, recognizing their over-dependence on Russian natural gas, did a U-turn on nuclear energy. Japan restarted 11 reactors, with 16 more planned<sup>5</sup>, and South Korea reversed its nuclear phaseout.<sup>6</sup>

The Russia-Ukraine conflict not only boosted nuclear power demand but also jeopardized the supply of uranium. In response to the invasion, the West has imposed barriers on Russian imports, including a phased-in ban on Russian uranium passed by the U.S. in May.<sup>7</sup> Compounding this issue, Kazatomprom – the producer of more than half of Kazakhstan's 44% share of the world's uranium – relies on Russia for enriching its uranium before it is distributed globally.<sup>8</sup> Additionally, Kazatomprom sold a 49% stake in one of its major mines to Russia's state-owned uranium company.<sup>9</sup> So even as the West attempts to cut off Russia from supplying reactors in the U.S. and Europe, Russia can wield a lot of leverage on the world's largest uranium producer.

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<sup>3</sup> Cycles Edge, on Medium, Dec. 7, 2023, "Uranium's little-known history – commodity piece," Period 3: 1983-2010

<sup>4</sup> Ibid., Period 4: 2011-2020

<sup>5</sup> World Nuclear Association website, May 7, 2024, "Nuclear power in the world today," Asia

<sup>6</sup> World Nuclear Association website, May 3, 2024, "Nuclear power in South Korea"

<sup>7</sup> U.S. Department of Energy press release, May 14, 2024, "Biden-Harris administration enacts law banning importation of Russian uranium"

<sup>8</sup> Caspian Policy Center, May 11, 2024, "Kazakh uranium: A hot prospect as U.S. targets Russian nuclear fuel," p. 5

<sup>9</sup> Mining Technology, May 18, 2023, "Deal with Russia causes management walkout at Kazakh mining giant"

Kazatomprom, which said it will fall 14% short of its 2024 production goal due to a shortage of sulfuric acid used in extracting uranium from the ground, isn't the only producer facing production challenges. In June, the military junta now ruling Niger, the world's seventh largest uranium producer, withdrew permits from a French company operating one of the country's largest mines.<sup>10</sup> Meanwhile, Canada's Cameco, which together with Kazakh miners account for half of global supply, has fallen well behind schedule in re-starting mines idled in the aftermath of Fukushima due to widespread equipment problems.<sup>11</sup>



Source: Morgan Stanley

The result of all these dynamics has been a major increase in long-term purchasing contracts for uranium. For the decade prior to Russia's invasion of Ukraine, most purchases were on the spot market. Since then, utilities have grown anxious about their access to and price for uranium and have sought to guarantee future deliveries. Last year, U.S. civilian nuclear power companies made 85% of their purchases under long-term contracts, according to a U.S. Energy Information Administration report in June.<sup>12</sup> The increased contracting puts intense pressure on

the spot market, supporting higher uranium prices.

Both civilian and governmental operators are securing fuel for an increasing number of reactors. Globally, 437 reactors are operating, 61 are under construction, and 93 are planned.<sup>13</sup>

China, Russia and India have ambitious expansion plans. The World Nuclear Association forecasts that new reactors will nearly double uranium demand by 2040,<sup>14</sup> rising from 145 million pounds in 2023 to 287 million pounds.

*Nuclear power plant capacity under construction, planned and proposed as of April 2024 (U.S. pipeline capacity does not include efforts to meet COP28 pledge to triple nuclear power capacity by 2050)*

	Under Construction	Planned	Proposed	Total Capacity Growth	Current Capacity	Total Growth as a % of Current
China	29.8	44.7	186.5	260.9	57.0	457%
Russia	4.0	8.9	37.7	50.6	26.8	189%
India	7.2	7.0	32.0	46.3	8.2	565%
EU	2.1	13.6	28.4	44.1	101.7	43%
Japan	2.8	1.4	11.6	15.7	33.1	47%
USA	0.0	0.0	10.5	10.5	95.8	11%
Brazil	1.4	0.0	8.0	9.4	2.0	473%
United Kingdom	3.4	3.3	2.3	9.1	5.9	154%
Rest of world	17.7	9.4	47.2	74.3	64.1	116%
<b>Total</b>	<b>68.3</b>	<b>88.3</b>	<b>364.1</b>	<b>520.8</b>	<b>394.6</b>	<b>132%</b>

Source: Morgan Stanley

It should come as no surprise that this level of demand ensures years more of persistent supply deficits, which Alpine Macro projects

<sup>10</sup> BBC, June 21, 2024, "Niger pulls French firm's permit for big uranium mine"

<sup>11</sup> S&P Global, Feb. 9, 2024, "Uranium price spike spurs more mine restarts, expansion plans"

<sup>12</sup> U.S. Department of Energy, June 6, 2024, "Uranium marketing annual report"

<sup>13</sup> Sprott, Jan. 2024, "Unearthing Opportunity: Uranium Miners and the Global Clean Energy Transition," p. 11

<sup>14</sup> World Nuclear Association, May 21, 2024, "The Nuclear Fuel Report," summary

should continue at least through the mid-2030s.<sup>15</sup> Higher uranium prices are unlikely to deter reactor construction since fuel costs are only 5% of the capital budget. Once built, uranium demand is extremely inelastic — we think operators will pay significant prices for uranium to operate their plants and generate revenue.

As economics and geopolitics inject urgency to embrace atomic energy, sentiment polling shows much higher public acceptance of nuclear power across the globe.<sup>16</sup> Friendlier attitudes toward nuclear power, combined with mounting demand and uncertain supply of its fuel, we believe appear likely to provide years of support for a bull market in uranium.

*This report is part of an ongoing series from Titan Advisors that analyzes the opportunity set in the commodity sector.*

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<sup>15</sup> Alpine Macro, Feb. 7, 2024, "The uranium bull has legs," p. 4

<sup>16</sup> Cycles Edge on Substack, Nov. 9, 2023, "Uranium: The assets of this decade," 7. New Reactors Coming Online