# Let Them Eat (Yellow) Cake: Is Uranium Rebounding?

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*Between March and October 2021, the global price of uranium (traded as uranium concentrate) rapidly increased to levels not seen since 2012, rising around 75 percent to approximately $50/lb.[1] Given its importance in the energy (nuclear power) sector, this price increase merits further exploration. This Executive Briefing on Trade will provide a snapshot of recent developments in the uranium industry, looking at market characteristics and production by country and firm, noting the U.S. decline in uranium production. It will then explore why expectations of future uranium use have risen, contributing to the recent uranium price hike.*

## Uranium and Uses

Uranium (U) is a slightly radioactive, metallic element, naturally occurring as a measurable constituent in nearly 500 minerals. Use of uranium is heavily concentrated in a few key industries, namely nuclear fuel (other uses include industrial, medical, and military applications). Nuclear power plant capacity is heavily concentrated among six countries, which represent nearly 75 percent of world nuclear power—the United States (99 gigawatts (GW) of electric generation capacity in 2019), France (63.1 GW), China (42.9 GW), Japan (36.5 GW), Russia (27.3 GW), and South Korea (22.4 GW).[2] Although the United States is the world's largest producer of nuclear energy, only around 20 percent of U.S. electricity is generated from nuclear energy. In contrast, France is the most reliant on nuclear power, with nuclear energy supplying around 75 percent of its electricity.

## Market Characteristics

Although increased privatization of the U.S. domestic industry has been happening for decades, uranium production and, to a greater extent, nuclear energy generation remains under substantial government regulation, control, or influence in other parts of the world.[3] Much of the current demand for uranium is relatively easily met with existing global production, and uranium producers often attempt to calibrate uranium production in accordance with expectations of countries' nuclear energy production.

Production of uranium (i.e., mining and concentration) is clustered in a handful of countries with economically viable deposits of uranium. Five countries accounted for 80 percent of 2020 uranium production—Kazakhstan (41 percent), Australia (13 percent), Namibia (11 percent), Canada (8 percent), and Uzbekistan (7 percent).[4] In 2020, anticipation of decreased demand coupled with workforce disruptions related to COVID-19, particularly in Canada, led to a 13 percent decline in uranium production (9 of the top 10 uranium-producing firms had production declines). Three large firms made up nearly 80 percent of the decrease of uranium production in 2020— Canada-based Cameco (38 percent), French-headquartered Orano (23 percent), and Kazakh-owned Kazatomprom (19 percent).[5]

Despite known mineable deposits of uranium in at least 13 U.S. states, U.S. production of uranium is limited and has waned significantly over the last few years, mostly due to its sensitivity to pricing. Notably, U.S. production declined significantly in the 1970s and 1980s following price declines, and often does so when global prices fall. Between 2014 and 2019 (the last year for which production data are available), U.S. uranium production declined

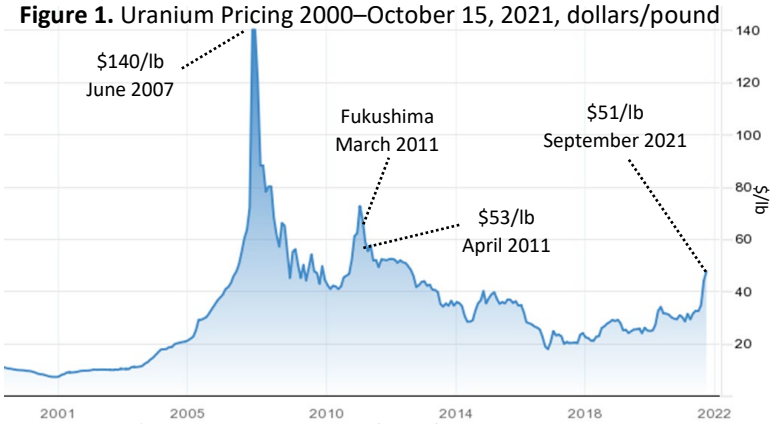
[1] Trading Economics, "Uranium," accessed October 14, 2021.
[2] NEA and IAEA, "Uranium 2020 Resources, Production, and Demand," December 2020, 75.
[3] World Nuclear Institute, "World Nuclear Performance Report," August 2020.
[4] The next largest producers in 2020: Niger, Russia, China, Ukraine, and India (together 19 percent of uranium production). Kitco, "World's Largest Uranium Producing Countries in 2020-Report," September 16, 2021.
[5] Kazatomprom is the largest uranium producer, and its production decline represented nearly 40 percent of the total reduction in global uranium production in 2020. Kitko, "Top 10 Largest Uranium Mining Companies in 2020," September 2021.

96 percent.[6] As a result, imports currently represent more than 90 percent of U.S. consumption. U.S. uranium imports typically come from Canada, which had historically been the world's largest uranium producer; between 2015 and 2020, Canada represented more than 90 percent of U.S. uranium oxide imports in all years except 2019.[7] In volume terms, total U.S. uranium oxide imports dropped 92 percent between 2019 and 2020, from 1,882 metric tons (MT) to 152 MT.[8]

**Why the spike in prices?**

This is not the first time that uranium prices have spiked over the past 20 years (figure 1). In 2007, prices reached a high of more than $140/lb before falling (historically prices had been below $20/lb). The rapid rise in price, while attributed to a number of market conditions (including general commodity price increases), was partially driven by an expected increase in demand for nuclear power in response to global warming.[9] Prices dipped after the spike, but elevated pricing persisted, averaging above $40/lb even after the Fukushima incident.

**Figure 1.** Uranium Pricing 2000–October 15, 2021, dollars/pound




Source: Trading Economics, accessed October 15, 2021.

The rise of uranium prices in 2021 (peaking at $51/lb in September) likely reflects optimism that nuclear energy will be used more in the years ahead—in part due to its low emissions capacity; this echoes the confidence that contributed to the rise in uranium prices in 2007. However, contemporary evidence has been mixed on the likelihood of increased nuclear power production globally; France announced in October 2021 it would invest €8 billion ($9.3 billion) in its nuclear sector and €1 billion ($1.2 billion) to build small nuclear reactors, while China plans to increase nuclear capacity from 52 gigawatts (GW) in 2020 to 70 GW by 2025. Additionally, optimism regarding the use of newer technologies such as advanced small modular reactors may have an impact on future pricing.[10] Conversely, Germany is expected to decommission the remainder of its nuclear power stations by 2022, and Belgium may decommission its nuclear power facilities (which provide nearly half the country's electricity) by 2025.[11] The policy and investment dichotomy across markets contributes to the variable market price of uranium, despite ample reserves and global production capacity.

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[6] Principally in the Mountain West, as well as Texas, Florida, and Virginia. The U.S. has recovered uranium from phosphoric acid, but only in years when high uranium prices make this method economically viable. U.S. Department of Energy is looking into the establishment of a Uranium Reserve Program. Squassoni, "Critical Minerals: Why is Uranium on the List?," June 25, 2019, 5; USGS, "Integrated Uranium Resource and Environmental Assessment," accessed October 2021; 86 FR 50878, September 21, 2021.

[7] Uranium-containing ores are concentrated to $U_3O_8$ ("yellowcake") and converted to uranium hexafluoride $UF_6$; $UF_6$ is what is "enriched." In 2019, Canada represented 38.2 percent of U.S. uranium oxide imports, while Kazakhstan represented 61.8 percent. In 2020, however, Canada accounted for 100 percent of U.S. imports. USITC DataWeb/USDOC HTS 2844.10.2010, accessed October 15, 2021.

[8] USITC DataWeb/USDOC HTS 2844.10.2010, accessed October 15, 2021.

[9] CRS, "Minerals Price Increases and Volatility," October 3, 2008, 39-41.

[10] Thomas, "Wales Advances its Plans for Small Nuclear Plants," August 24, 2021.

[11] Politico Europe, "Macron's €30B end-of-term bet to make France great again," October 12, 2021; GCR, "China approves $10b plan to build 4 nuclear reactors," July 2020; Deutsche Welle, "Germany shuts down autonomic plant as nuclear phase-out enters final stretch," December 2019; IAEA, "Belgium: Profile," 2021.