Global Uranium

Uranium Trader call key takeaways: supply not keeping up with strengthening demand

Industry Overview

20 August 2024

Equity
Global
Metals and Mining

Demand surprising up, and supply down; bullish uranium

Last week, we hosted a discussion on the state of the global uranium market with Bram Vanderelst, Director and Head of Uranium at Curzon Resources, a physical commodity trading firm. After a very quiet summer in the uranium market, Vanderelst expects demand to pick up in September and continue into 2025. Drivers of the expected pick-up are typical seasonality, and increased U.S. utility buying following waiver clarity. He sees signs of improving demand in the longer-term. Meanwhile, he thinks supply is likely to remain slow to respond. For example, while we think market participants have priced much higher year-over-year (yoy) Kazakh uranium (U_3O_8) production in 2025E, Vanderelst expects 2025 Kazakh production should be flat yoy. Further, as 2024 U_3O_8 production from the Somaïr mine in Niger sits unshipped, he sees a 10%-20% chance the mine is ultimately closed (we see it as likely that an eventual ramp-up in shipments experiences challenges). We remain bullish on U_3O_8 prices, calling for an average of $120 per pound in 2025E. In this report, we detail key takeaways from our call: see pages 2-6.

The case for nuclear: carbon-free, baseload, secure

While not the focus of the discussion on the call, the key underlying theme was the powerful use-case for nuclear energy. The case remains the same: **(1)** it's reliable, regardless of weather patterns; **(2)** it's secure in that fuel can be stored for long periods; and **(3)** it's the most robust option decarbonizing electricity generation. Vanderelst sees the growth outlook for nuclear energy continuing to surprise to the upside. Globally, there are 60 reactors under construction and a further 110 planned for the next decade. Shorter-term, with the opening of the waiver window around the U.S. ban on the import of Russian uranium (as of 11-Aug-24), Vanderelst thinks clarity around the quantities of Russian uranium that can be imported to the U.S. during the window will drive an increase in U.S. utility demand from September through year-end and into 2025. He also notes that the "back-end of the year" tends to be the seasonally strongest, each year.

Supply constraints in Kazakhstan and Niger present risks

Guidance for 2024 U_3O_8 production from Kazakhstan was recently revised higher by 5% on average. The equity market reaction was decidedly negative as it priced-in, in our view, much higher 2025 production on the back of the news. Curiously, the physical U_3O_8 market barely reacted. Vanderelst thinks that 2025 U_3O_8 production from Kazakhstan should be roughly flat yoy given shortages of sulfuric acid, a key raw material used in the production of U_3O_8 in Kazakhstan. We think this would come as a downside surprise to most equity market participants, and thus would be positive for the outlook for U_3O_8 prices and the uranium equities. Kazatomprom, the Kazakh uranium company, is to provide 2025 guidance this week. In Niger, already mined U_3O_8 material from Orano's Somaïr mine cannot be shipped due to the closed border with Benin. While he expects the border to reopen, the risk is far from non-zero it doesn't. Further, Vanderelst see a very material risk of delays at the Dasa uranium development project in Niger.

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Uranium market update from our expert

To kick-off our call, Director/head of uranium at Curzon Resources, Bram Vanderelst, provided an update on the state of the global uranium market. Below are key takeaways.

About our guest:

Bram Vanderelst runs his own uranium trading company, Curzon Uranium, and has been doing so since 2017. His background in the uranium market extends to 2013/2014, wen we began working aa large Japanese trading house. Curzon Uranium is a top 5 to top 10 independent global trader of physical uranium and is active in the spot market and in contracting markets out as far as 2030 and beyond. The firm is known for its in-depth in-house fundamental research on supply (and demand) in the uranium market.

Uranium Market Update:

- The uranium market is very quiet currently (one of the quietest Bram has experienced) owing to uncertainty surrounding the US ban on imports of Russian uranium and the associated waiver problem (the ban allows for the grant of waivers by the US Department of Energy (DoE) that permit the continued import of specified amounts of Russian uranium to the US through to year-end 2028.
- Vanderelst sees a general disinterest in uranium from market participants as a result of the recently soft uranium prices, combined with a risk-off environment for equities, generally (that has naturally, also impacted uranium equities).
- Supply and demand for uranium is still intact: demand is greater than supply, and there is a big risk to supply catching up in the next few years.
- A major current trend is a shift from global market to more regional markets, which has caused the market to seize-up to some extent, pressuring prices.
- Anticipation of heightened activity in September and for the rest of 2024, partly motivated by the World Nuclear Association (WNA) Conference in London, that typically drives new contracting discussions and new demand from the utility side of the market.
- Seasonally, deliveries are typically stronger at the back-end of the year, and thus producers that end-up short can sometimes end-up being more active on the buy-side at the back-end of the year.
- Increased certainty around the US Russian ban waiver process, which Vanderelst expects to resolve by the end of August 2024, should allow the market to trade with more complete information, thus leading to increased volumes.

Questions and Answers

The market update was followed by a fireside chat. We summarize the Q&A below.

Q: What will be the impact from the opening of the waiver window for the US - Russian ban, and how do the Tenex force majeure notices factor-in?

A: Tenex issued a “force majeure” notice to its clients, messaging that if those receiving the letters didn’t have a waiver in to them by August, then they would fall to the back of the queue for deliveries. Tenex was short material going into the year as a result of numerous requests form utility clients to frontload deliveries due to the impending ban and continuing Russian/Ukrainian war. These requests for front-loading fell away once the ban was made into law in May and Vanderelst believes that with the waiver window open and with waivers granted for at least some material, there is now pressure again on Tenex to meet deliveries. We sees some risk to their ability to meet deliveries.

Centrus and two or three utilities has received waivers from the DoE for the next couple years. Vanderelst thinks the DoE is administering waivers for 2024 and 2025 without too much scrutiny to ensure there are no near-term supply issues, while promising to be more stringent in the future from 2026 onwards.

Utilities are comfortable that they will receive their enriched uranium product (EUP) deliveries from Russia. Vanderelst believes that waivers have allowed for clarity for those expecting Russian uranium and allows them to start planning and we will see more activity in the spot market in September and October, as a result.

US utilities have seen a marked slowdown in activity since the spring. They have usually been more active in both the spot and RFP (request for proposal market) since they issue shorter tenders and contract cycles than in Europe and Asia. However, because they were focused on how the ban on Russian uranium imports would affect them, their activity in the spot and RFP market has been significantly reduced in 2024 year-to-date.

Q: When will the U.S. utilities that have not yet received clarity on waivers get that clarity, and will the US utilities make-up their significant under-buying in 2024 year-to-date in the remaining months of 2024?

A: Vanderelst suspects that US Utilities currently without waivers will potentially receive them by the end of August 2024. This remains unclear though. Vanderelst expects US utilities will not be able to completely make up for their “under-buying” by the end of the year, so there will be some “spill-over” of buying into 2025. A big factor of US utility demand is their approach with junior miners, where there is a lot of potential for getting contracts with junior miners with aspiring brownfield and greenfield production balanced out by the reliability risks of newer, smaller producers. Vanderelst expects US utility activity to pick up markedly in the remaining part of this year.

Q: What are your 2025 production expectations for Kazakhstan and what are the implications of Kazkhstan’s new mineral extraction tax framework?

A: There is a range of data telling different stories regarding Kazatomprom expected production, and very distinct discrepancies between different joint ventures and different projects regarding production results. The sulfuric acid shortage remains unsolved and continues to create production problems. Vanderelst expects negative results in majority or 100%-owned projects in Kazakhstan by Kazatomprom due to their tendency to be high-cost operations.

Development assets owned by Kazatomprom will be negatively impacted the most by the sulfuric acid shortage, as the acid is needed it to start production at these projects is elevated vs. run-rate production. Vanderelst expects Kazakh U_3O_8 production will be flatter going into the future. Increasing mineral extraction tax rates will allow Kazakhstan government to increase revenues and incentivize smaller production volumes, allowing Kazatomprom to benefit from increasing prices without being penalized for lower volumes (value over volume approach).

Q What are the risks to uranium supply from Africa?

A: Vanderelst believes it is unlikely (10-20% chance) that the Orano’s Somaïr mine in Niger will be shut down due to its importance for the government and the economy. Vanderelst has heard of possibilities that Benin and Niger are engaging in negotiations that might reopen the border they share. That said, the border staying closed and the Somaïr mine shutting down would be a positive catalyst since Orano might need to come to the spot market, especially if they cannot get their already mined material out of Niger. Orano and its trading entity have not been in the spot market, showing that they are comfortable in getting their supply. It is common for firms facing supply difficulties in the uranium market to look for short-term, temporary solutions, such as loans, rather than going to the spot market.

Q: Why is Benin important when considering transportation out of Niger? Is it the only option?

A: Benin is significant because of the port of Cotonou which has approval to handle radioactive material. Although Niger has multiple borders, Benin is the preferred route. Transporting uranium to the border with Burkina Faso is risky because of militant activity in that area. While it's theoretically possible to use routes through Nigeria or Togo, these are not straightforward options. Additionally, going north towards Algeria (or that region) is also "not advisable". Therefore, Benin currently remains the best option.

Q: The Dasa Mine, which Global Atomic is developing in Niger, is currently targeting start up sometime in 2026. What are the key risks?

A: The Dasa mine is currently marked as "amber" with a big question mark in Vanderelst's supply model. The primary risk is the approval of debt required for long lead-time items necessary for development. If the debt isn't approved by the banks' September credit committee, there's a high likelihood of a delay, potentially by three to six months or more. Additionally, Global Atomic is low on cash, which adds another layer of risk if they cannot secure further funding. The success of the project still largely depends on securing additional funding or alternatives like joint ventures or prepayments, which are not straightforward solutions. According to Vanderelst the risk of delay is considered more than 50%, making it a critical factor to watch.

Q: To what extent might Kazatomprom and China acquire assets in Africa?

A: It's unlikely that Kazatomprom will enter Africa because the continent has not been a significant focus for in-situ recovery (ISR) uranium projects, which is a method Kazatomprom specializes in. While there have been some projects in Africa that could develop as ISR, it's not where Kazatomprom's expertise would be most effectively applied. They are more likely to focus on regions closer to Kazakhstan, such as Uzbekistan and Mongolia, where the environment is more familiar and aligned with their operations. Expanding into Africa would be a significant leap and not necessary given their ability to sustain production into 2035 with existing resources.

Q: How likely is it that China will become more active in mergers and acquisitions (M&A) in Africa?

A: China is very likely to continue being active in M&A in Africa. China and Africa have a long-standing relationship, and China sees Africa as a region where they can leverage their political influence to secure valuable assets. However, China is selective about the quality of these assets. For instance, past experiences with cost overruns have made them cautious. While they are interested in expanding in Africa, particularly in regions like Namibia, the political complexity in countries like Niger, where French interests are strong, makes direct involvement more challenging.

Q: Do you expect the pickup in demand in the second half of 2024 to be in both the spot market and the long-term contracting market?

A: Vanderelst expects more of an increase in the long-term contracting market because of the waivers being granted. The big drivers for the spot market, especially towards the end of the year, includes the budget deployment of certain utilities of small volumes and the over-contracting by primary producers, large and small. Real activity increases will be seen in long-term contracts since that is where the squeeze and demand are. In the long-term contract space, it is currently a balancing act of pricing in production risk versus the benefit from the contracts, such as utilities having more interest in junior producers because they offer lower prices, but at the same time face more production risk than larger producers. The spot price continues to drift lower while long-term contract prices drift higher. Thus, Vanderelst sees carry-trade activity (i.e. buying spot market material and carrying that material into long-term markets) increasing.

Q: How much of global uranium supply is enriched by Centrus?
A: Centrus stopped enriching uranium and is now a conduit into the US market for other uranium enrichers partners such as Tenex (mostly) and Orano. Centrus's market share has dwindled significantly due to the risks from their major supplier, Tenex. Centrus is advancing a project to produce high-assay, low-enriched uranium (HALEU) for the SMR market: they are developing a pilot production plant with the US DoE.

Q: Why was the sulfuric acid shortage a surprise in Kazakhstan?
A: Sulfuric acid prices increased in Kazakhstan and nearby regions because of the war and higher demand for sulfuric acid in agriculture. Vanderelst understand that this caused sulfuric acid suppliers to attempt renegotiating prices with Kazatomprom, which refused. Subsequently, the suppliers went elsewhere and this impacted Kazatomprom since they were not able to meet their capacity. However, this has not affected the company overly negatively, as the lack of sulfuric acid has made them operate mines below capacity, which has pushed uranium prices up, and the positive price impact has outweighed the negative impact on decreased production.

Q: Is the lack of financial purchasing is temporary or a more permanent trend?
A: Vanderelst and his company do not treat financial buying as a secure source of buying because of its inconsistent nature. Financial buying is sentiment driven, and there is an increasingly higher correlation between spot prices and broader financial markets, such as equities. This means when the broader market is down, financial buyer share prices can also be down, limiting their ability to raise money to purchase uranium. Therefore, it is crucial to account for financial buying interest trending downwards. This means that financial buying may be done for vehicles without a redemption feature. A financial option that gives investors access to physical uranium will be needed for financial buying to pick up. Vanderelst sees such vehicles are on the horizon.

Q: Do you think the shift from underfeeding to overfeeding due to a regionally focused shift will occur?
A: Vanderelst see the market moving from a period of underfeeding to overfeeding due to enrichment contract structure. When an old contract tails off, and a new contract is started, and the tails assay is repriced upwards, meaning more physical uranium is needed to get the same outputs. Older contracts are sitting at low tails assays, and enrichers can optimize them by going into the spot market and buying UF_6 to feed more material through their plant to have more enriched uranium to sell to the market. Two things are needed to do this; UF_6 available in the spot market, and the ability to sell your excess enriched uranium into the market based on the difference in the purchasing price of UF_6 and the selling price of enriched uranium. There is a widespread, ongoing transition into an overfeeding model from an underfeeding model through this process.

Q: How bullish or bearish are you on uranium pricing for 2024 and 2025?
A: Vanderelst is very bullish for uranium because of the supply side of the market being very difficult and uncertain and the continued interest on the demand side, both creating higher uranium prices. The timing element is not as clear, as it is difficult to predict sentiment. Vanderelst is constructive for the rest of 2024, seeing prices going back to $90/lb, with $100/lb or greater, seen as less likely until 2025.. Vanderelst asserts he is moderately bullish uranium for the rest of 2024, and increasingly bullish for 2025 and 2026 as the market hasn't solved for the underlying fundamental supply gap, which is hidden by temporary measures that are unsustainable. The market needs primary supply to balance, which as of right now will not be available until 2027/2028.

Uranium market price performance

Uranium (U_3O_8) market prices

The spot price of uranium concentrate (U_3O_8) has been improving steadily since 2017 with particularly strong performance since the start of 2023.

Exhibit 1: Daily price of uranium (U_3O_8) in US$/lb
U_3O_8 prices have strengthened steadily since 2017.

Source: UxC, LLC

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Exhibit 2: Monthly price of uranium (U_3O_8) in US$/lb
U_3O_8 prices are still well below the long-term peak reached in 2007.

Source: UxC, LLC

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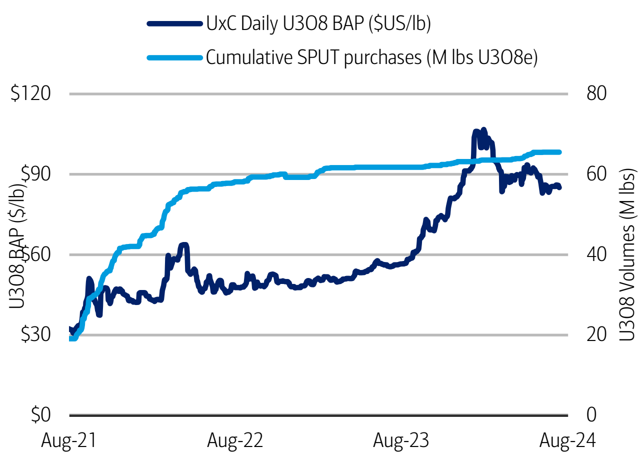
In our view, the rising U_3O_8 price has been driven by a range of factors, among which the key drivers are: **(1)** constrained supply that is the result of a seven year U_3O_8 bear market following from the 2011 Fukushima accident; **(2)** an increase in government regulatory and financial support of nuclear energy; **(3)** increased recognition by energy consuming entities and individuals that nuclear energy will be needed to decarbonize electrical energy generation; and **(4)** more recently, expectations that Artificial Intelligence (AI) will drive enormous growth in energy-intensive data centers to which nuclear energy is ideally suited given its ability to supply huge quantities of carbon-free baseload power.

Exhibit 3: UxC daily spot price vs. cumulative SPUT U_3O_8 purchases
When SPUT holdings rise rapidly the U_3O_8 spot price tend to rise.



Source: UxC, LLC; Sprott Physical Uranium Trust website

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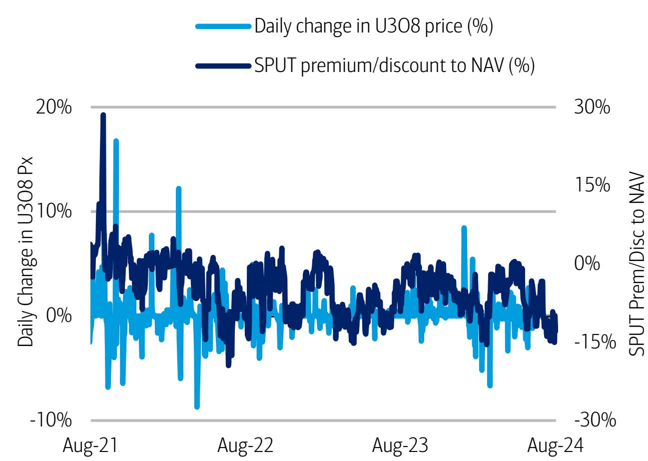
Exhibit 4: SPUT price premium to NAV vs. daily U_3O_8 price changes
When priced at a discount to NAV, SPUT U_3O_8 purchases slow.



Source: UxC, LLC; Sprott Physical Uranium Trust website

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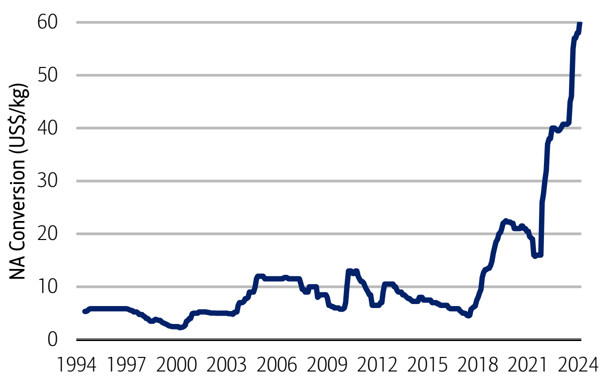
Another factor that has helped to pressure U_3O_8 prices higher has been the financial players like the Sprott Physical Uranium Trust (SPUT), SPUT is an investment trust that acquires U_3O_8 on the spot market and holds it indefinitely to offer investors a vehicle through which to gain exposure to the spot U_3O_8 price. We map the relationship between SPUT purchases and U_3O_8 spot prices in Exhibits 3 and 4 above.

Conversion market prices

Conversion pricing in North America and the European Union is at all-time highs and could continue appreciating given reports of still tight supply (i.e., existing assets in France and the U.S. that are not yet able to operate at design capacity, and the recent U.S. ban on Russian uranium products). See Exhibits 5 and 6 for a pricing history.

While two conversion facilities are now ramping-up in the West (i.e., Converdyn in the U.S. and Philippe Coste in France) which could provide some relief over the longer term, until these facilities are fully ramped, continued tightness seems likely. This implies that there may be increasing pent-up demand for U_3O_8, the feedstock of conversion.

Exhibit 5: North American (NA) conversion pricing (US$ / KgU)
Conversion pricing is at all-time highs of c. US$60 / KgU)



Source: UxC, LLC

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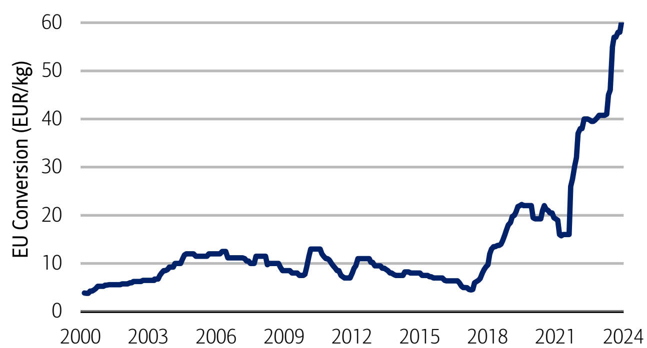
Exhibit 6: European Union (EU) conversion pricing (EUR / KgU)
Conversion pricing is at all-time highs of c .(EUR 60 / KgU)



Source: UxC, LLC

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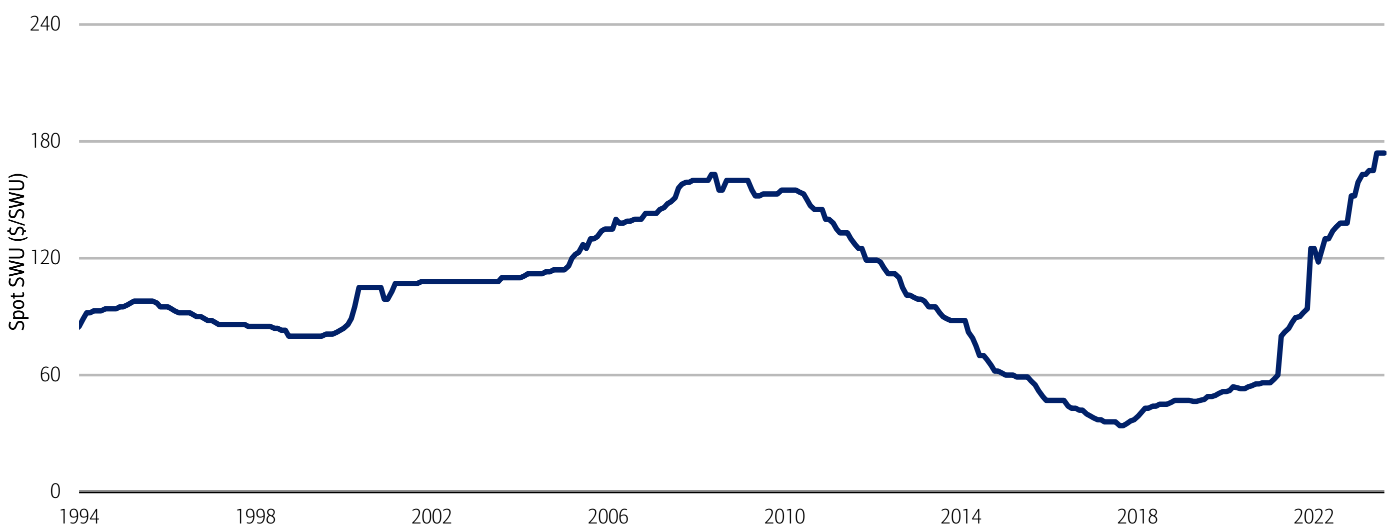
Enrichment market prices

Global enrichment markets are tightening rapidly, which should lead to increasing demand for U_3O_8 through a rising rate of overfeeding. We think it is feasible that the U_3O_8 price reaches a new all-time high.

Exhibit 7: Enrichment prices as measure in USD per separative work unit (SWU)
SWU pricing has strengthened substantially since Russia's invasion of Ukraine, to an all-time high of c. US$180/SWU)



Source: UxC, LLC

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BofA price forecasts

We outline our uranium price forecasts below.

Exhibit 8: Updated Uranium Price Forecasts

We see upward year-on-year (yoy) price pressure through 2025E but still strong, though easing prices from 2026E.

	US$/lb	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E(LT)
Old	U_3O_8	49.54	60.17	105.00	120.00	135.00	110.00	85.00	60.00
Current	U_3O_8	49.55	60.20	102.50	120.00	135.00	110.00	85.00	60.00
% change	U_3O_8	0.0%	0.1%	-2.4%	0.0%	0.0%	0.0%	0.0%	0.0%
yoy change	%	42%	21%	70%	17%	13%	-19%	-23%	-29%

Source: BofA Global Research

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Where we are in the cycle: price & volume

Below we summarize uranium market volume trends.

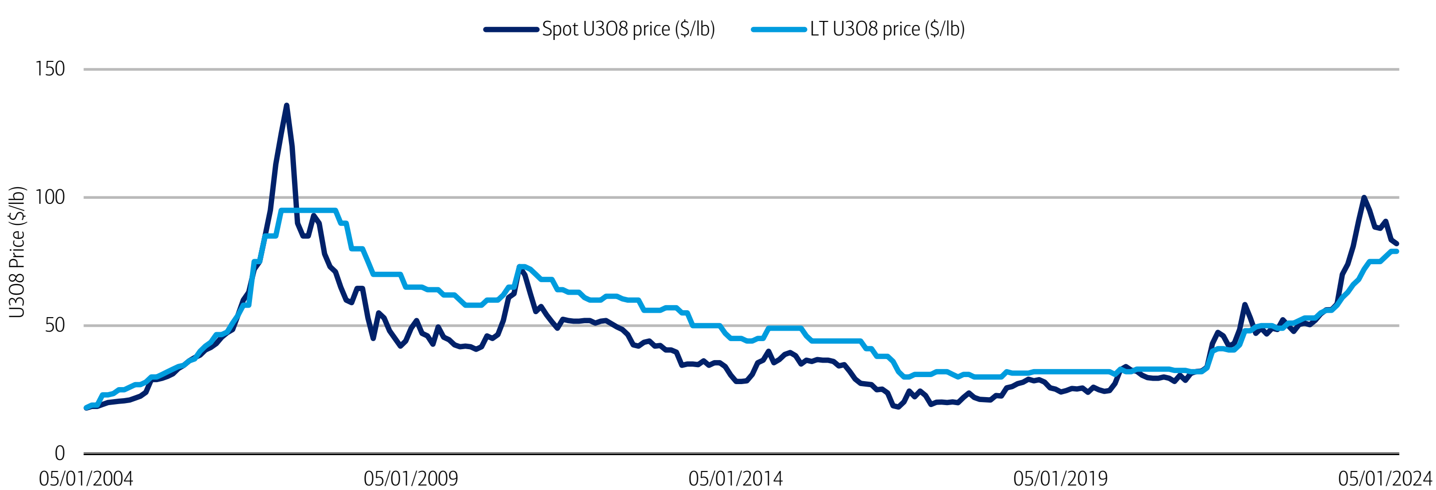
Spot vs. Term Market

Uranium (yellow cake, conversion, and/or SWU) is bought and sold in one of two markets, either the term or the spot. While the spot market is defined by any activity that calls for delivery within the next 12 months, spot price indicators are largely driven by activity that calls for "prompt" delivery over the next three months. Meanwhile, the term market covers product that will be delivered 12 months out (or longer).

The exhibit below maps the relationship between the spot and term prices for U_3O_8 (Yellowcake). Term prices generally tend to trade at a premium to spot. However, in late 2023, this trend flipped as spot began trading at a premium to term. This marked the start of another bullish period for uranium, similar to the period from 2004-07. While the 2004-07 period suggests that there may be a correction once supply and demand balance. Our view is that this will only occur when the uranium deficit levels out, no earlier than 2026, with risk to this being extended.

Exhibit 9: Monthly average spot and term prices of U_3O_8

Spot prices recently began trading at a premium to term prices, indicating the start of another bull-market for uranium.



Source: UxC, LLC

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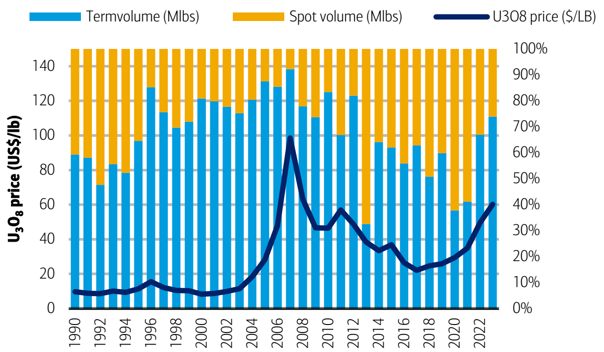
Spot and term market volumes

As you'd expect, trading volumes correlate positively with prices (i.e., when prices go up, volumes go up, and vice versa). This relationship is illustrated below: U_3O_8 prices tend to strengthen during periods where term contracting is a higher portion of total volumes.

Exhibit 10: Global U_3O_8 market volumes by % spot/term vs. price

U_3O_8 prices strengthen when term volumes are a higher portion of total volumes.



Source: UxC, LLC

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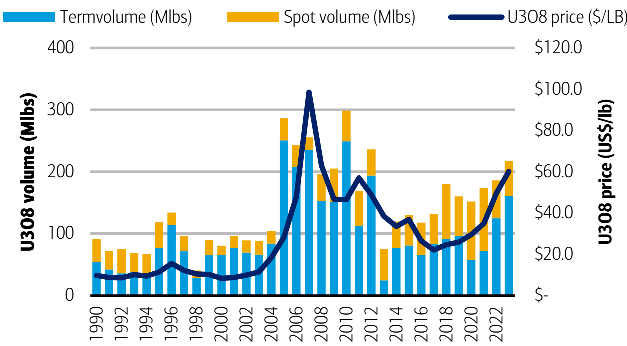
Exhibit 11: Global U_3O_8 market volumes by spot, term vs. price

U_3O_8 prices have risen 104% since 2020 while term and spot volumes have risen 180% and fallen 40%, respectively.



Source: UxC, LLC

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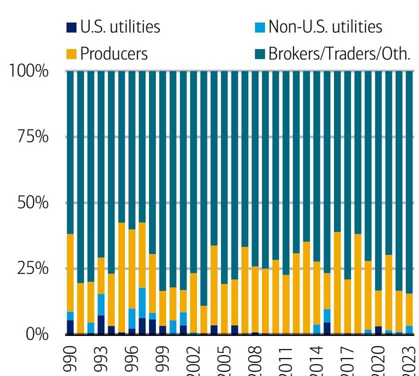
Historically, brokers, traders and other financial institutions have been the dominant group on the selling side of the spot market (see Exhibit 13). On the buying side, utilities were long the dominant group, but were dethroned in 2005 with the invention of the uranium carry trade, when brokers, traders, and other financial institutions used their balance sheets to help utilities offload inventory from their balance sheets. In 2005, brokers, traders, and other financial institutions accounted for 60% of annual spot purchase volumes (see Exhibit 14). In 2023, brokers, traders, and other financial institutions accounted for ~69% of annual spot purchase volumes.

In the term market, buyers are almost exclusively utilities while sellers are predominantly producers. Over the last three years, producers have consistently accounted for a larger share of annual term selling volumes, growing from 66% in 2021 to 88% in 2022 and 92% in 2023. Rising utility participation in the term market is a driver of higher U_3O_8 prices, as churn (when brokers, traders, and other financial institutions trade amongst themselves) is replaced by end-user consumptive demand.

Exhibit 12: U_3O_8 annual spot selling volumes by seller group

Brokers, traders, and others accounted for 84% of selling volumes in F23.



Source: UxC, LLC

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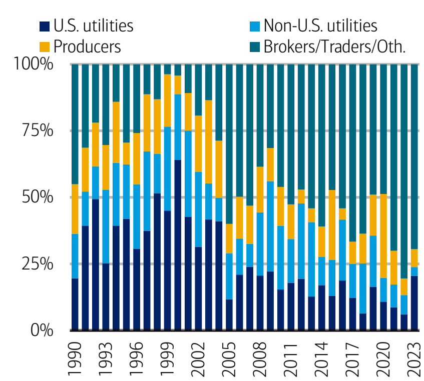
Exhibit 13: U_3O_8 annual spot purchase volumes by buyer group

U.S. utilities accounted for 20% of total spot purchase volumes, up 215% YoY.



Source: UxC, LLC

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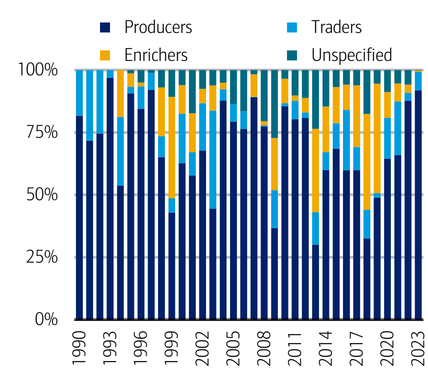
Exhibit 14: U_3O_8 annual term selling volumes by buyer group

Producers accounted for 92% of annual term selling volumes in F23.



Source: UxC, LLC

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Uranium supply and demand

Exhibit 15: Demand for uranium (thousands of pounds (klbs) of uranium / yellowcake / tri-uranium octoxide (U_3O_8))

The forecast 23% growth in power reactor consumption demand through to 2030E vs. 2023 is driven by China, plus South Korea and Japan

URANIUM DEMAND	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Country											
Canada	4,218	3,927	5,188	5,188	5,188	4,411	4,022	4,022	4,022	4,022	4,824
% y/y	*-7%*	*-7%*	*32%*	*0%*	*0%*	*-15%*	*-9%*	*0%*	*0%*	*0%*	*20%*
China	21,185	25,988	22,750	26,457	30,795	34,863	37,238	37,803	47,081	50,482	63,154
% y/y	*5%*	*23%*	*-12%*	*16%*	*16%*	*13%*	*7%*	*2%*	*25%*	*7%*	*25%*
France	15,574	22,849	23,119	24,371	23,465	23,465	23,465	23,465	23,465	17,420	25,915
% y/y	*0%*	*47%*	*1%*	*5%*	*-4%*	*0%*	*0%*	*0%*	*0%*	*-26%*	*49%*
Japan	3,134	3,342	6,891	6,373	8,000	7,992	8,272	12,931	11,292	11,068	11,647
% y/y	*46%*	*7%*	*106%*	*-8%*	*26%*	*0%*	*4%*	*56%*	*-13%*	*-2%*	*5%*
Russia	5,718	8,432	12,902	13,019	13,787	12,745	13,548	12,739	13,010	9,506	12,538
% y/y	*-33%*	*47%*	*53%*	*1%*	*6%*	*-8%*	*6%*	*-6%*	*2%*	*-27%*	*32%*
South Korea	11,690	12,315	11,928	12,358	12,863	12,371	12,196	12,196	12,196	13,554	14,667
% y/y	*23%*	*5%*	*-3%*	*4%*	*4%*	*-4%*	*-1%*	*0%*	*0%*	*11%*	*8%*
United States	43,477	45,567	49,167	49,821	49,135	49,298	49,298	49,298	49,298	50,032	44,107
% y/y	*-9%*	*5%*	*8%*	*1%*	*-1%*	*0%*	*0%*	*0%*	*0%*	*1%*	*-12%*
Other	55,805	31,265	44,429	41,483	39,965	40,447	37,964	43,203	41,738	40,628	42,720
% y/y	*-1%*	*-44%*	*42%*	*-7%*	*-4%*	*1%*	*-6%*	*14%*	*-3%*	*-3%*	*5%*
Power Requirements	**160,800**	**153,685**	**176,373**	**179,069**	**183,199**	**185,591**	**186,005**	**195,658**	**202,103**	**196,713**	**219,572**
% y/y	*-2.3%*	*-4.4%*	*14.8%*	*1.5%*	*2.3%*	*1.3%*	*0.2%*	*5.2%*	*3.3%*	*-2.7%*	*11.6%*
Total inventory build	**20,100**	**66,171**	**20,5% 00**	**15,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**
Total Underlying Demand	**180,900**	**219,856**	**196,873**	**194,069**	**193,199**	**195,591**	**196,005**	**205,658**	**212,103**	**206,713**	**229,572**

Source: BofA Global Research, UxC LLC

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Exhibit 16: Supply for uranium and market balances (thousand pounds (klbs) of uranium / yellowcake / triuranium octoxide (U_3O_8))

Before accounting for uranium inventory drawdowns, years 2024E-2028E are expected to experience deficits

URANIUM SUPPLY	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E
Mine Supply																
Africa	19,118	20,656	20,219	21,284	24,000	25,400	25,170	26,600	28,950	30,440	31,210	32,875	30,720	28,975	27,670	27,310
% y/y	*-3%*	*8%*	*-2%*	*5%*	*13%*	*6%*	*-1%*	*6%*	*9%*	*5%*	*3%*	*5%*	*-7%*	*-6%*	*-5%*	*-1%*
Australia	16,025	9,721	12,163	13,221	14,700	15,225	15,900	15,825	15,300	14,700	9,700	9,700	9,550	9,250	9,250	8,900
% y/y	*-6%*	*-39%*	*25%*	*9%*	*11%*	*4%*	*4%*	*0%*	*-3%*	*-4%*	*-34%*	*0%*	*-2%*	*-3%*	*0%*	*-4%*
Canada	10,070	12,200	19,160	28,499	36,000	36,000	37,300	38,000	41,000	46,000	63,000	63,000	63,000	72,000	72,000	47,200
% y/y	*-44%*	*21%*	*57%*	*49%*	*26%*	*0%*	*4%*	*2%*	*8%*	*12%*	*37%*	*0%*	*0%*	*14%*	*0%*	*-34%*
Kazakhstan	50,641	56,811	55,193	54,879	56,728	60,336	63,642	73,430	76,290	75,250	74,912	74,299	70,793	70,793	67,543	57,611
% y/y	*-15%*	*12%*	*-3%*	*-1%*	*3%*	*6%*	*5%*	*15%*	*4%*	*-1%*	*0%*	*-1%*	*-5%*	*0%*	*-5%*	*-15%*
Russia	7,400	7,360	6,521	6,973	6,760	6,760	7,160	7,760	8,360	8,960	9,360	9,360	9,360	9,360	9,360	9,360
% y/y	*-2%*	*-1%*	*-11%*	*7%*	*-3%*	*0%*	*6%*	*8%*	*8%*	*7%*	*4%*	*0%*	*0%*	*0%*	*0%*	*0%*
Ukraine	1,182	752	125	884	750	750	1,000	1,500	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
% y/y	*-43%*	*-36%*	*-83%*	*607%*	*-15%*	*0%*	*33%*	*50%*	*33%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
United States	213	0	194	26	1,400	3,485	4,240	4,600	4,350	4,000	4,000	3,900	3,060	2,010	1,250	800
% y/y	*22%*	*-100%*	*nm*	*-87%*	*5285%*	*149%*	*22%*	*8%*	*-5%*	*-8%*	*0%*	*-3%*	*-22%*	*-34%*	*-38%*	*-36%*
Uzbekistan	8,800	8,800	9,259	10,530	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400	10,400
% y/y	*-3%*	*0%*	*5%*	*14%*	*-1%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Other	5,837	6,330	6,323	7,270	7,457	8,172	9,055	9,501	10,080	10,870	10,870	10,870	10,870	10,870	10,870	10,870
% y/y	*3%*	*8%*	*0%*	*15%*	*3%*	*10%*	*11%*	*5%*	*6%*	*8%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Total mine production	119,286	122,630	129,157	143,566	158,195	166,529	173,867	187,616	196,730	202,620	215,452	216,404	209,753	215,658	210,343	174,451
% y/y	*-14%*	*3%*	*5%*	*11%*	*10%*	*5%*	*4%*	*8%*	*5%*	*3%*	*6%*	*0%*	*-3%*	*3%*	*-2%*	*-17%*
Secondary Supply																
Russian Govt Stocks	4,000	4,000	4,000	4,000	4,000	4,000	3,000	3,000	2,500	2,500	2,000	2,000	1,500	1,500	1,200	1,200
Russia Reenrichment/underfeed	12,000	11,200	7,500	8,500	7,500	5,000	4,500	4,500	4,500	4,000	3,000	3,000	2,500	2,000	1,500	1,500
Western enricher Sales	8,150	8,860	7,340	4,540	1,725	0	0	0	0	0	0	0	0	0	0	0
Commercial inventory	29,500	36,300	40,000	36,000	13,211	11,214	5,276	189	610	-9,446	1,096	-1,725	-8,120	4,719	13,831	56,318
US Gov't stocks (US DOE + TVA)	3,042	828	888	1,895	1,798	2,014	2,511	3,413	959	928	1,887	1,659	4,200	7,659	6,700	6,700
MOX + Reprocessed	8,371	7,392	6,969	6,633	6,770	6,834	6,850	6,940	6,804	6,111	6,042	5,769	5,650	5,736	4,196	4,751
Total secondary supply	65,063	68,580	66,697	61,568	35,004	29,062	22,137	18,042	15,373	4,093	14,025	10,703	5,730	21,614	27,427	70,469
Total Supply	184,349	191,210	195,854	205,134	193,199	195,591	196,005	205,658	212,103	206,713	229,478	227,107	215,483	237,272	237,770	244,920
% y/y	*-7%*	*4%*	*2%*	*5%*	*-6%*	*1%*	*0%*	*5%*	*3%*	*-3%*	*11%*	*-1%*	*-5%*	*10%*	*0%*	*3%*
Surplus (Deficit) bef. com. Inv.	-26,051	-64,946	-41,019	-24,935	-13,211	-11,214	-5,276	-189	-610	9,446	-1,096	1,725	8,120	-4,719	-13,831	-56,318
surplus/(deficit) % bef. inv.	*-14%*	*-30%*	*-21%*	*-13%*	*-7%*	*-6%*	*-3%*	*0%*	*0%*	*5%*	*0%*	*1%*	*4%*	*-2%*	*-6%*	*-23%*
Surplus (Deficit) bef Com. Inv.	-5,951	1,225	-20,519	-9,935	-3,211	-1,214	4,724	9,811	9,390	19,446	8,904	11,725	17,120	5,281	-4,831	-47,318
surplus/(deficit) % of rctr req.	*-4%*	*1%*	*-12%*	*-6%*	*-2%*	*-1%*	*3%*	*5%*	*5%*	*10%*	*4%*	*5%*	*8%*	*2%*	*-2%*	*-20%*
Surplus (Deficit) after inv.	3,449	-28,646	-1,019	11,065	0	0	0	0	0	0	0	0	0	0	0	0

Source: BofA Global Research estimates: UxC LLC

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster[R1]
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

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