

# IMPACTS OF RUSSIAN SANCTIONS ON THE NUCLEAR FUEL MARKETS

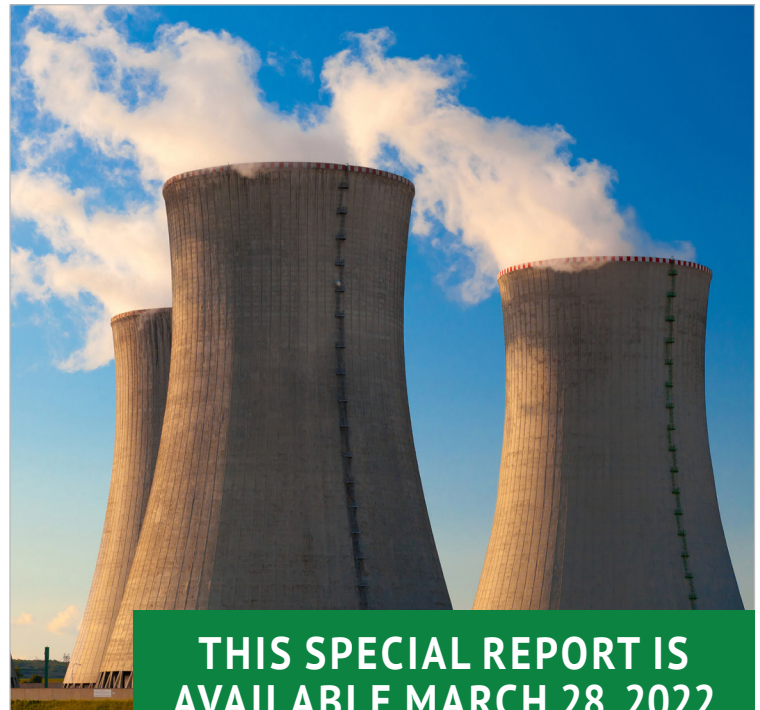
*Part of the 2022 Nuclear Fuel Market Issues & Insights Report*

The reaction by the international community to Russia's invasion of Ukraine has been swift and includes a wide array of sanctions against Russia targeting banks, oil refineries, military exports, and oil and gas exports. As the international community seeks to impose increasingly harsh measures to asphyxiate Russia's economy, there is a growing pressure to expand sanctions to include Russia's nuclear fuel exports. There is also a potential for Russia to impose a ban on its nuclear fuel exports. As Russia is a major supplier of nuclear fuel, any governmental actions to restrict Russia's nuclear fuel exports has the potential to significantly impact the nuclear fuel markets.

While the breadth and scale of any restrictions on Russia's nuclear fuel exports remains uncertain, it is nonetheless important for the industry to fully analyze the possibilities and implement necessary actions to mitigate potential impacts and ensure continuity of fuel supplies. Even without new restrictions on Russian fuel exports, many fuel buyers will undoubtedly remove Russia from the list of approved fuel suppliers for the foreseeable future.

This scenario raises important questions. Are there viable alternate suppliers capable of absorbing additional market share? If so, how much supply is available in the near term, either in existing inventories or in utilization of installed capacity? How much new supply capacity is possible, and how long will it take to ramp up? What are expected price implications?

This report analyzes effects on natural uranium, conversion, enrichment, and fuel fabrication. Owners of Russian-supplied reactors have few options among alternative



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fabricators, despite the fact Russia is not a major supplier of fabrication services. These limited choices could result in Russia's loss of market share in natural uranium, conversion, and enrichment.

## FABRICATION IMPLICATIONS

What, then, are the fabrication options for owners of Russian-supplied reactors? They must consider the availability of fuel designs from alternate suppliers, the licensing status of those designs (i.e., typically, each reactor must obtain approval from its licensing authority), and availability of fuel manufacturing capacity. Russia is the primary supplier of fuel for reactors designed there. Typically, the associated contracts include Russian supply of natural uranium, conversion to UF<sub>6</sub>, enrichment and

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fabrication services. Even if buyers wish to reduce their commitments to Russia, they have few options to do so. This section will identify:

- The quantities of enriched uranium in fabricated fuel supplied to various market segments. This includes internal Russian demand, together with external Russian demand that is unlikely to even consider other suppliers (Belarus, Bangladesh, maybe Turkey due to Russian ownership of the plants, Egypt, UAE, Hungary, etc.).
- The magnitude of demand that might consider changing supply to define how much of this supply could be absorbed by existing suppliers over the short- and mid-term.

## ENRICHMENT IMPLICATIONS

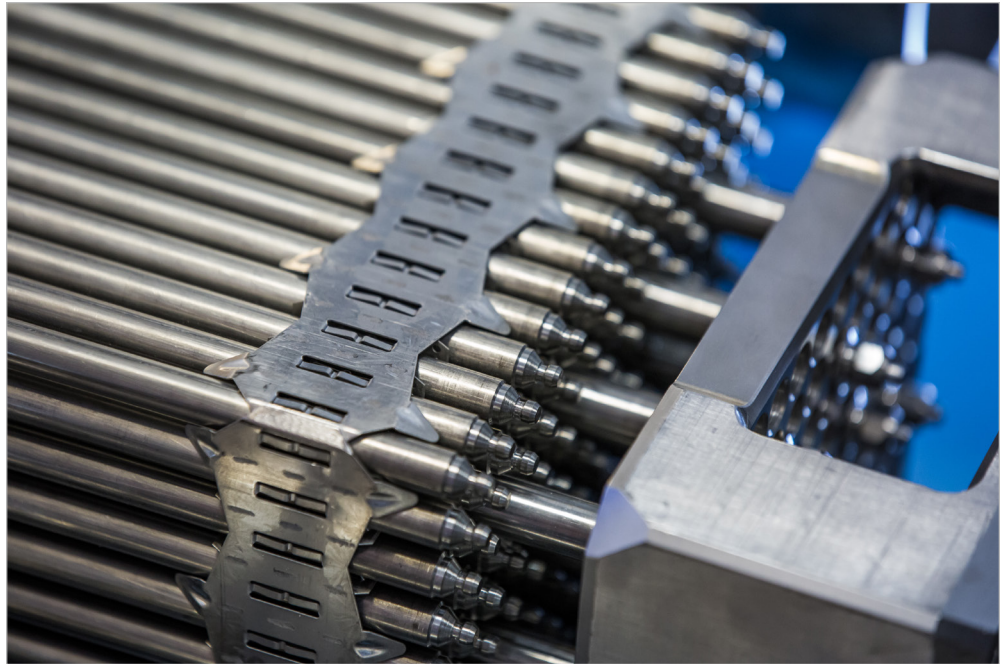
The key issue here is how much supply could be diverted to current, non-Russian suppliers over the short- and mid-term, and the implications for prices. This analysis will include:

- An estimate of Russian sales that would have likely occurred absent the Ukraine invasion.
- Analysis of the sales that will likely continue due to limited fabrication options, as well as other political or commercial considerations.
- Determination of the volumes of enrichment that could be at risk if new restrictions are imposed on Russian exports.
- Analyses of the at-risk demand compared to the available supply, along with a discussion of options to increase supply. These may include increased tails assays and additional capacity, including the impact of lead times for licensing, construction, and centrifuge manufacturing.
- Implications on enrichment prices.

## CONVERSION IMPLICATIONS

Most Russian conversion supply is tied to the sales of fabricated fuel or EUP deliveries. The report will:

- Identify the near- and mid-term demand expected that Russia market segment can be expected to fill (as part of fabricated fuel, EUP, etc.)
- Determine the potential shift in demand to other suppliers.
- Analyze the ability of other suppliers to meet the additional demand.
- Define implications on conversion prices.



## NATURAL URANIUM IMPLICATIONS

While Russia is not a very large miner of uranium, it does produce significant uranium through underfeeding. Russia also sells uranium produced in Kazakhstan. In the event energy sanctions are instituted, how much of this uranium is likely to be affected? The report will:

- Identify current sources of natural uranium available to Russia from in-country production, ownership in other country production, and underfeeding.
- Compare the available supply with the needs to fulfill Russian internal demand and to support expected delivery of fabricated fuel and EUP sales that are not expected to be terminated.
- Evaluate the results and identify options available to Russia to minimize any excess supply or demand.
- Determine the market and price impact of constraints on Russian supply.

## PRICING

This NAC International Special Report is \$9,500 and includes [a subscription to the 2022 Nuclear Fuel Market Issues & Insights Report](#) typically available in June 2022. For the Special Report alone, the price is \$4,950.



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