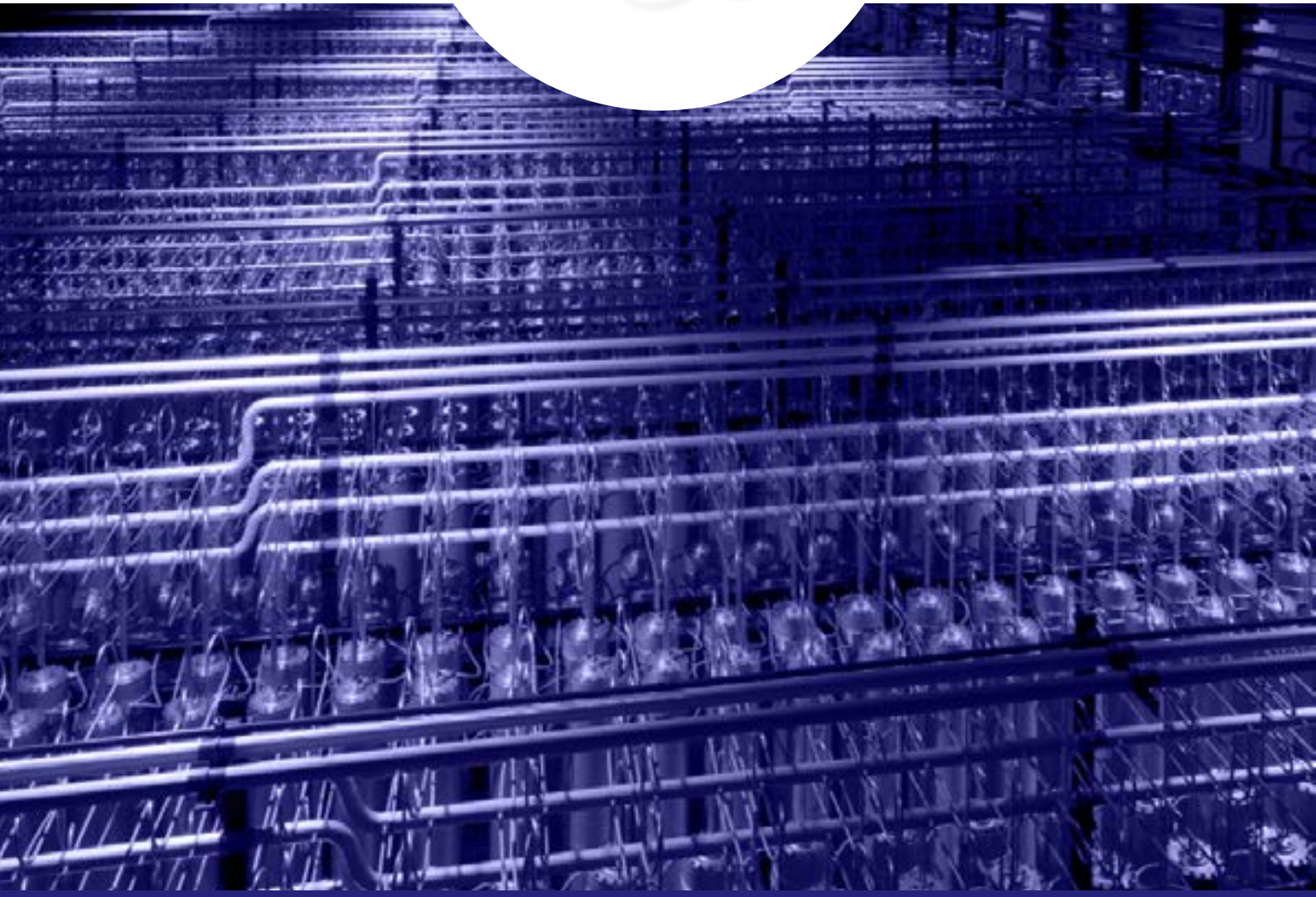

Quarterly Uranium Market Report

4th Quarter 2022

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Uranium Prices Analysis

During the fourth quarter of 2022, ESA processed 55 transactions, including contracts, amendments and notifications on the frontend activities. Between October and December, European utilities concluded 2 new spot natural uranium supply contracts (including purchases, sales, exchanges and loans) and 4 new long term contracts.

Table 1. ESA Quartely Spot Prices

Quarter	ESA Spot[1] EUR/kgU	ESA Spot USD/lb U_3O_8	ESA Spot All Users[2] EUR/kgU	ESA All Users USD/lb U_3O_8
2021 Q4	-	-	86.07[3]	37.95[4]
2022 Q1	-	-	-	-
2022 Q2	-	-	-	-
2022 Q3	-	-	-	-
2022 Q4	-	-	-	-

Table 2. Number of contracts processed by ESA

Quarter	Number of spot natural uranium contracts concluded by EU utilities[5]	Number of spot natural uranium contracts concluded by All parties[6]	Total number of contracts processed by ESA
2021 Q4	1	5	61
2022 Q1	0	3	68
2022 Q2	5	7	39
2022 Q3	4	4	55
2022 Q4	2	2	55

Securing the European Supply of HALEU

Research reactors are vital to a number of scientific disciplines, basic research, materials research, nuclear physics and life sciences. They are essential for production of key radioisotopes for industry and medicine. Today, the EU with its high-performance research reactors and diversity in nuclear technologies is leading in science with neutrons and medical radioisotope production.

Traditionally, fuels for the EU research reactors and radioisotope production targets have been manufactured using highly enriched uranium (HEU), supplied mainly from the USA and Russia. In order to reduce the risk of nuclear proliferation, EU Member States are strongly committed to the principle of HEU minimization. Research reactors fuels is being converted to high-assay low-enriched (19.75%) uranium (HALEU) and radioisotope production targets have already made the transition to such material. HALEU is currently exclusively supplied from the USA and Russia. In order to ensure the future operation of research reactors and radioisotope production, the long-term availability and accessibility of metallic HALEU is a key issue. No commercial facilities for HALEU are currently in operation in the EU, or in the US.

1 ESA Quarterly Spot Uranium Price is a simple average of natural uranium prices. It accounts for one transaction only or multiple transactions executed during the quarter and one of the parties is EU utility. It is calculated, only if, at least three transactions with reported prices were executed.
2 ESA All Users Quarterly Spot Uranium Price is a simple average of natural uranium prices. It accounts for one transaction only or multiple transactions executed during the quarter and one of the parties is EU utility or other user (intermediary, producer)
3 Price calculated for half year period
4 Price calculated for half year period
5 including purchases, sales, exchanges and loans
6 including contracts, amendments and notifications on the front-end activities

Maintaining sovereign know-how and rebuilding some strategic capabilities in the production of HALEU metal is essential for the EU for the decades to come, given the scale of the associated challenges in the geo-strategic, climatic and resource management fields. Therefore, the EU must examine alternatives to ensure the future availability of such HALEU for its needs. Without any new initiative, there is a risk for the security of supply of this critically important material after 2035.

In order to identify viable schemes for a sustainable EU supply of metallic HALEU with involvement of European industry and customers of such material, the Euratom Supply Agency's Advisory Committee set up an ad-hoc Working Group. An analysis of the necessary conditions required for the construction of HALEU production capacity in the EU was carried out. The work took also into account possible participation of both public and private sectors as well as specific industrial and commercial aspects. The Working Group presented its report in May 2022.

EU HALEU needs and opportunities

Based on the evaluation, it can be stated with high confidence that by 2035, EU strategic need will be 700 kg/y. If Hungary, Czechia and Poland are no longer supplied by Russia, the European strategic need will increase to 1000 kg/y.

The European nuclear fuel cycle industry– notably Urenco and ORANO - is world leading in enrichment technology for civil uses and enrichment up to 6% (and up to 10% by 2025). This same technology can be used to produce HALEU without major technical challenges. For reasons of safety (criticality) and security, this should be done in a separate and dedicated facility. The final product would be UF6, which then has to be chemically converted to metallic uranium either on the same site or on a different site. Conversion to uranium metal on an industrial scale has been suspended in Western Europe more than 10 years ago. Yet the industrial knowledge is still present, but risks to vanish in the near future.

Assuming a maximum price of 20 000 € per kg of HALEU, which may still be compatible with funding which is typically available to research reactors, and annual quantities as summarized above, it is estimated that a guaranteed demand of 3 to 8 t/year is necessary for an EU HALEU production facility to be commercially viable.

Options and recommendations

In view of the fact that no purely commercial production of HALEU metal in the EU is in sight for the estimated quantities, the following options can be considered:

Option 1 The European Union relies on timely delivery by the US and Russia.

This option would put the security of supply at risk as from 2035, with increasingly less certainty, due to the current geopolitical circumstances and to the growing uncertainties on the US delivery capacities beyond that date.

Option 2 A rolling reserve for 10 years of needs is maintained.

The Euratom Supply Agency would guarantee the permanent availability of 10 years requirements HALEU as stockpile.

Option 3 A EU production capability is built.

Once the decision is taken, installing a facility in the EU would require 6 to 7 years for designing, engineering, licensing, construction and commissioning, and the plant would be operated for decades.

Option 1 is clearly the least preferred, as it would not address the security of supply risks.

The recommendation of the Working Group Only is Option 3, the only one assuring the EU sovereignty and strategic autonomy in the supply of HALEU for its research reactors and medical radioisotope production. It provides an optimal long-term security of supply fully in EU control but requires integrating a complex setup of actions, commitments and/or financing from the relevant EU, Member States, industries and end users.

In view of the challenges and timeline for realisation for Option 3, Option 2 appears as a first intermediate step, while it requires deeper investigations in order to identify possible operational arrangements.

The full public version of the report can be downloaded from here.