



Uranium Report 2023

Everything you need to know about uranium!



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Vorwort

Dear Readers,

With this issue of the Uranium Report 2023, we are already in the seventh year of this special report series. We started thinking early on about how to charge all those electric cars. And lo and behold, you need low-emission, base-load electricity that is available 24 hours a day. Uranium and nuclear power are way out in front with that! The market and many countries have now understood this, unlike Germany. The price of uranium has also already risen nicely in the last 2 years and has developed a great launching pad. The imbalance of weak supply, combined with rising demand, will make the market very interesting already this year. Longer term, we see uranium prices well above US\$100 per pound but can also imagine US\$150 or US\$200 per pound in 2-3 years. Led by the uranium ETF Sprott Physical Uranium Trust, but also other market participants and even companies like UEC made sure that the uranium spot market was really emptied. They are all buying up real physical stocks, further tightening the market.

Just now, the U.S. government also continued to buy for its national uranium reserve. Uranium and nuclear power have never been as valuable as they are today. Russia is cutting off Europe's energy supply, and nuclear power is a way out of the dilemma, even if the German government has been very timid so far and believes that all it has to do is extend the operating time until April 2023, and then everything will be fine. Almost all countries that already operate nuclear power are building more new nuclear power plants. This is because they have realized that e-cars must actually be charged at favorable and predictable electricity prices. Otherwise, they will no longer be bought, no matter how much they promote.

We also see a bright future for what we call Small Modular Reactors (SMRs). These are nuclear fission reactors that are smaller than conventional reactors and can be manufactured in a factory and then moved to an assembly site. This would make it possible to produce more decentralized power and not have to move so many new power grids across the country.

Investors such as Buffett and Gates have long recognized that solar and wind power will not be able to meet baseload requirements until adequately large storage facilities for electricity from renewable energy sources are created, and they have made funds available for research and construction of SMRs.

This report is intended to provide interested investors with an overview of the uranium industry and the real facts.

Of course, we also present some interesting companies in the industry with facts and figures. This is to be understood as a suggestion and not as a recommendation to buy, as there are only very few listed companies left at all.

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Yours, Jochen Staiger



Jochen Staiger is founder and CEO of Swiss Resource Capital AG, located in Herisau, Switzerland. As chief-editor and founder of the first two resource IP-TV-channels Commodity-TV and its German counterpart Rohstoff-TV, he reports about companies, experts, fund managers and various themes around the international mining business and the correspondent metals.



Tim Rödel is Manager Newsletter, Threads & Special Reports at SRC AG. He has been active in the commodities sector for more than 15 years and accompanied several chief-editor positions, e.g. at Rohstoff-Spiegel, Rohstoff-Woche, Rohstofffraketen, the publications Wahrer Wohlstand and First Mover. He owns an enormous commodity expertise and a wide-spread network within the whole resource sector.

Uranium sector faces reassessment:

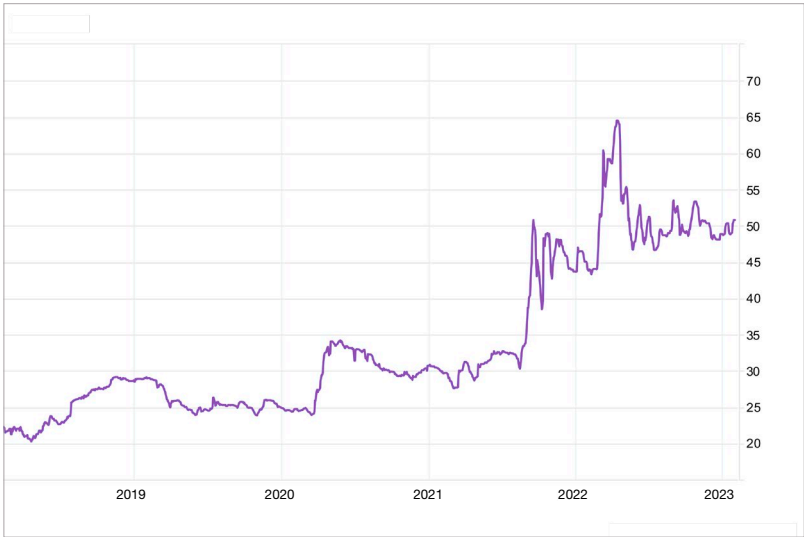
Huge supply deficit and rapid expansion of the nuclear power fleet make uranium the metal of the hour

Nuclear power is on the rise again worldwide. Not only the current energy crisis in Europe, including the prospect of possible blackouts, but above all the view of the future energy supply of many millions of electric vehicles from sources that are as CO₂-free as possible have recently brought energy generation by means of nuclear fission back into the focus of politics and society, and even made it downright respectable. Many established nuclear power nations such as China, India, Japan, Great Britain, France and the USA are working on restarting, extending the operating lives of or building new nuclear reactors, which are the only energy source that can continuously supply emission-free electricity at a consistently high level. Other nations that have not had nuclear power plants to date have begun building new ones. Although the focus is currently still on the well-known, large nuclear reactors, in the future it will be far smaller reactors – so-called „Small Modular Reactors“, or SMRs for short, which can be manufactured modularly in factories and installed at almost any desired location – that will ensure an explosion in demand for the raw material that is essential for generating energy by means of nuclear fission: uranium.

How the expected high demand (increase) for the important fuel uranium is to be met in the process is still written in the stars. Most recently, for example, a supply of about 140 million pounds of triuranium octoxide (U₃O₈) was matched by a demand for 190 million pounds of U₃O₈. While the uranium sector still has additional production capacity, it will take a lot of new mines to meet what the World Nuclear Association expects to be an additional 3 to 4% per year increase in demand. However, these take an average of at least 10 years from the discovery of a deposit through permitting and construction to the start of production. This glaring undersupply of uranium, plus other problems such as the fact that Russia enriches a good 45% of the world's uranium production and will now cease to

Base load capability – simply explained!

Base load capability is the ability of a power plant to provide continuous, reliable electrical power. This includes nuclear power plants, coal-fired power plants, gas-fired power plants, oil-fired power plants and steam power plants fired with substitute fuels. Combined heat and power plants, biomass and biogas power plants can also be base-load capable under certain conditions, although fossil or renewable raw materials must also be fired for this purpose. The only base-load-capable electricity generation from renewable energy is by means of hydroelectric power plants, but this often requires a major intervention in nature. Due to their often strongly fluctuating generation and thus feed-in, photovoltaic and wind power plants are not base-load capable, at least not until adequate storage media are available.



Uranium price development over the last 5 years (source: own presentation)

be a supplier for many countries, opens up excellent opportunities for interested shareholders to participate in the uranium market. Some interesting investment opportunities can be found in this report.

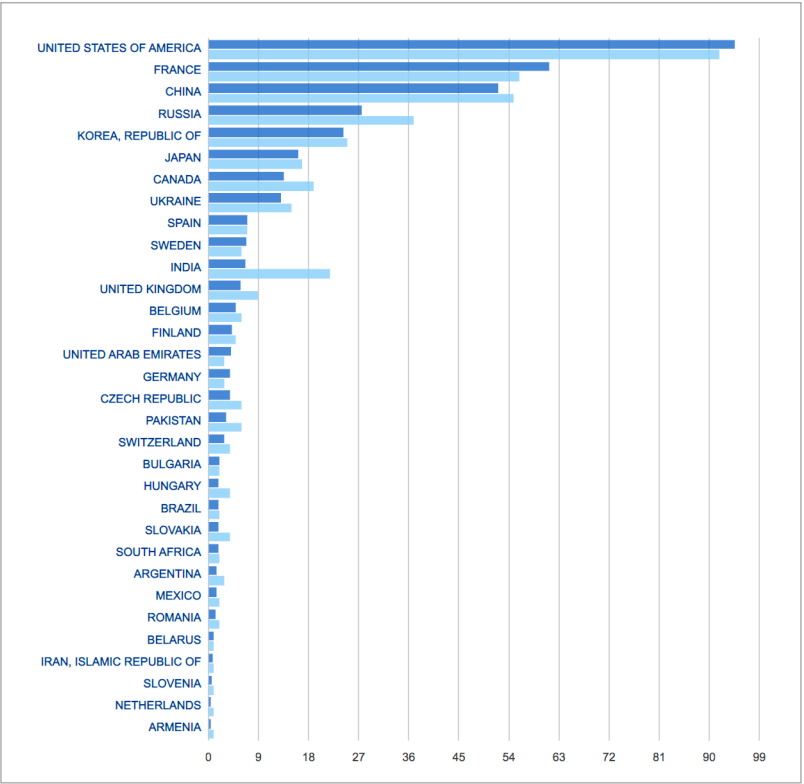
Nuclear power reactor fleet still on record course

Although the number of nuclear power reactors on the grid fell in 2022, mainly due to maintenance interruptions at numerous French power plants, the global nuclear power plant fleet is heading for a new record – both in terms of the number of reactors and net electrical output. Since the beginning of 2022, 6 new nuclear power reactors have been connected to the grid worldwide, while 5 smaller reactors have been permanently taken offline. At the same time, construction began on 7 new reactors. Thus, at the end of 2022, 33 nations operated 422 reactors with a total net electrical capacity of approximately 378.3 gigawatts. In the past 10 years alone, 68 new reactors have been connected to the grid worldwide.

The current leading nuclear power nation with 92 reactors in operation is the USA. However, emerging economies such as China, India, Turkey and several Arab nations are leading the way in terms of new construction, as they require more and more energy and have been focusing on a massive expansion of their nuclear power capacities for some time. For example, 57 additional nuclear reactors with a total net electrical capacity of around 58.8 gigawatts are currently under construction – 18 of them in China alone. Planning has already been completed for around 125 additional ones, and more than 300 others are in the pipeline worldwide.

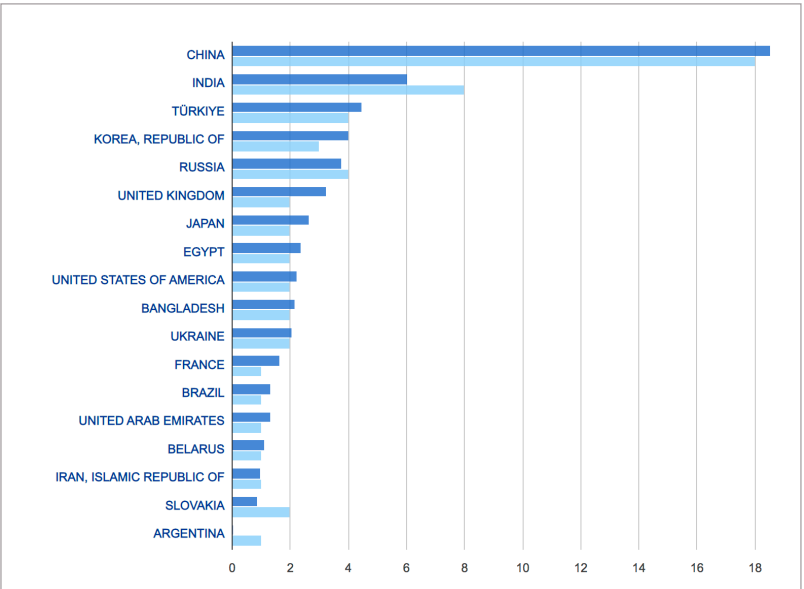
Overview of reactors currently under construction (light blue) and the corresponding net electrical output (blue) per country.

Source: www.iaea.org/PRIS



Overview of currently operating reactors (light blue) and net electrical power (blue).

Source: www.iaea.org/PRIS



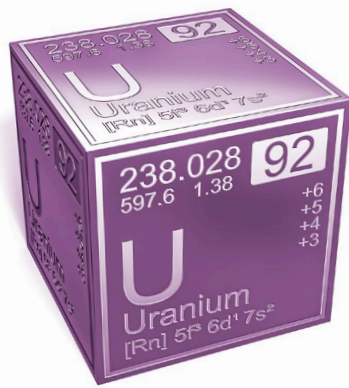
Overview of reactors currently under construction (light blue) and the corresponding net electrical output (blue) per country.

Source: www.iaea.org/PRIS

Uranium: Facts & Figures

Only with uranium are nuclear fission chain reactions commercially possible

Uranium is named after the planet Uranus and is a chemical element with the element symbol U and the atomic number 92. Uranium is a metal whose all isotopes are radioactive. Naturally occurring uranium in minerals consists of about 99.3% isotope ²³⁸U and 0.7% ²³⁵U.



The uranium isotope ²³⁵U is fissionable by thermal neutrons and thus, apart from the extremely rare plutonium isotope ²³⁹Pu, is the only known naturally occurring nuclide with which nuclear fission chain reactions are possible. For this reason, it is used as a primary energy source in nuclear power plants and nuclear weapons.

Occurrence

Uranium does not occur in pure form in nature, but always in oxygenated minerals. There are a total of about 230 uranium minerals that can be of local economic importance.

There is a wide range of uranium deposits from magmatic hydrothermal to sedimentary types.

The highest uranium grades are achieved in unconformity-bound deposits with average uranium grades of 0.3 to 20%. The highest grades are over 70% U_3O_8 !

According to the International Atomic Energy Agency (IAEA), the largest uranium ore reserves are located in the USA, Niger, Australia, Kazakhstan, Namibia, South Africa, Canada, Brazil, Russia, Ukraine and Uzbekistan.

Uranium mining

In uranium mining, a distinction is basically made between two processes: Conventional mining and recovery by in-situ leaching or in-situ recovery (ISR). The exact extraction method depends on the characteristics of the ore body, such as depth, shape, ore content, tectonics, type of surrounding rock and other factors.

Conventional mining

The majority of uranium is extracted by deep mining. The deposits are accessed via shafts, adits, ramps or spirals. Problems are often posed by the penetration of mine water and the so-called ventilation (technical measures to supply mines with fresh air). The exact mining method is chosen according to the characteristics of the deposit. Above all, the shape of the ore body and the distribution of the uranium in it are decisive. In deep mining, an ore body can be mined in a targeted manner, resulting in much less overburden than in open pit mining.

Near-surface or very large ore bodies are preferably extracted by open-pit mining. This allows the use of cost-effective large-scale technology. Modern open pits can be from a few meters to over 1,000 meters deep and several kilometers in diameter. Open pit mining often produces large quantities of overburden. As in deep mining, large quantities of water may have to be lifted for an open pit, but ventilation is less of a problem.

ISR Mining

In the ISR method, water and small amounts of CO_2 and oxygen are injected into the sandstone layers with the help of so-called injection wells, the uranium is extracted and pumped back to the surface for further processing with the help of so-called recovery wells. The entire process therefore takes place completely underground. The advantages of this process are therefore obvious: there is no need for major earthmoving as in open-pit operations, and there are no tailings piles or discharge ponds for heavy metals and cyanides.

Only the wells are visible on the surface, and the land around the wells can continue to be farmed without restrictions. The ISR process also makes low-grade deposits economically mineable, and capital costs for mine development are greatly reduced. Moreover, the entire process can be carried out with a minimum of labor, which also drastically reduces operational costs. According to a study by the World Nuclear Association, 25% of uranium mined outside Kazakhstan recently came from ISR mines.

The current demand situation: 190 million pounds of U_3O_8 per year.

U.S. extends power plant lifetimes and plans to add more in the future

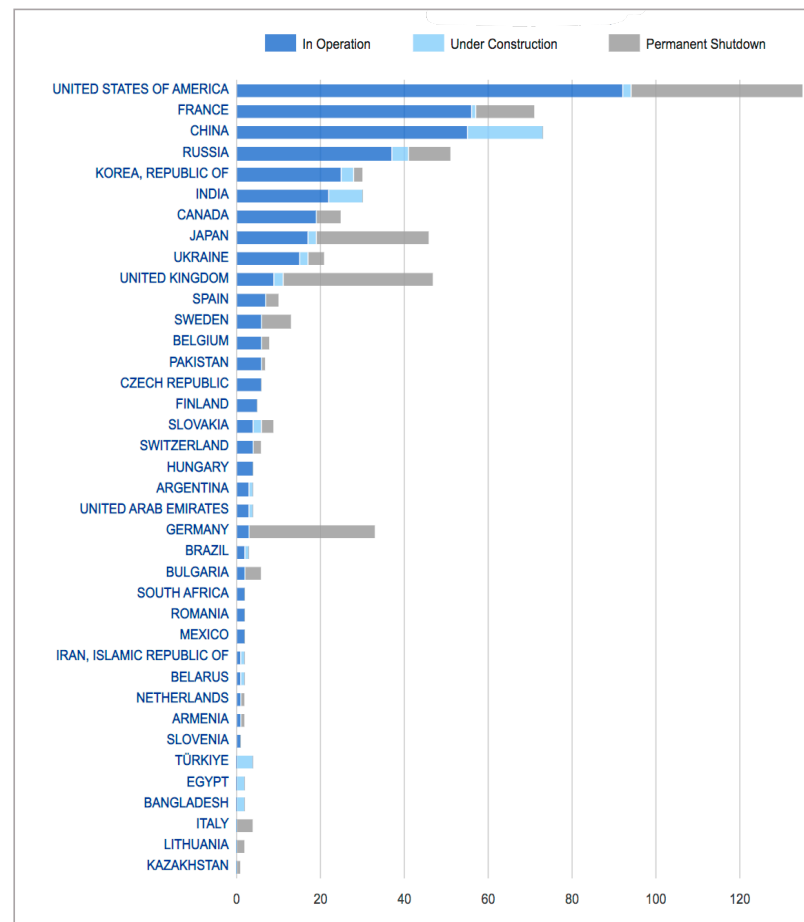
With 92 reactors, the USA has by far the largest active nuclear power plant fleet in the world. Nevertheless, the USA is threatened with a collapse in energy supply. The United States is still the country with the highest per capita consumption of electricity in the world. Thus, the U.S. has no choice but to increase the number of its nuclear reactors in the coming years. Accordingly, the expansion of the nuclear power plant fleet is also part of the „Green New Deal“ initiated by President Biden, which is intended to lead the country toward CO_2 neutrality. Alongside the expansion of wind and solar energy, nuclear power is the top priority.

In recent years, more than 60 U.S. nuclear reactors have applied for lifetime extensions to 60 years of total operation. In addition, there are about 40 applications for the

construction of new nuclear power plants. Currently, 2 plants are under construction, and another 20 are in the concrete planning phase.

China soon second largest nuclear power nation

For several years now, it has been China that has been setting the pace in the construction of nuclear power plants. 55 reactors with a total net electrical capacity of 52.2 gigawatts are operated by the Middle Kingdom, which until now has primarily used coal to generate electricity. Of these, 17 new reactors alone have been commissioned since the beginning of 2018. Nuclear power expansion in China is therefore enormous and taking place at breathtaking speed! It is expected that China will soon replace France (56 reactors) as the current number two in nuclear power.



Overview of reactors currently in operation (blue), reactors currently shut down (gray) and reactors under construction (light blue).

Source: www.iaea.org/PRIS

The Chinese government plans to build more than 80 new nuclear reactors in the next 15 years and over 220 new nuclear reactors by 2050. By 2030, a total of 110 reactors are to be connected to the grid, which will mean that the USA will have been replaced as the current leader. A total of 18 nuclear reactors are currently under construction.

India accelerates expansion

India, soon to be the world's most populous nation, plans to expand its nuclear energy capacity by 70 gigawatts. Currently, a total of 22 Indian nuclear reactors are running at full load (6.8 gigawatts). One of these was newly connected to the grid in 2022. India mainly has small reactors with only 202 megawatts but will increa-

singly rely on large reactors with more than 1,000 megawatts in the future. Currently, 8 nuclear reactors are under construction in India, with 40 more to follow by 2050.

Russia wants to increase nuclear capacity

Russia has also announced a massive expansion of its nuclear power plants. The country currently operates 37 nuclear reactors with about 27.7 gigawatts. 4 plants are in the construction phase. In addition, Russia plans to build more than 40 additional nuclear power plants, which will increase the share of nuclear energy in Russia's energy mix from the current 15% to more than 25%.

Japan makes a U-turn and returns to power plant construction

Once the world's second-largest nuclear power producer, Japan is already operating 17 of its former 50 reactors again eleven years after the Fukushima disaster. These have undergone a strict safety protocol and are already running at full capacity again. At least 16 more reactors could follow in the coming months. These are currently being brought up to the latest technical standard and put through their paces. 2 reactors are under construction. Japan is also planning to extend the operating lives of existing nuclear power plants to over 60 years. The goal is to generate around 22 percent of electricity from nuclear power by 2030. Before Fukushima, the share was 30 percent, but in 2020 it was only five percent.

Many more nations are increasing their nuclear power capacity

In addition to the 33 nations (including Taiwan) that already have nuclear reactors on the grid, nuclear power plants are under

construction in 18 countries. These include Argentina, Bangladesh, Slovakia, Egypt and Turkey. Other countries, such as Jordan and Indonesia, are planning to build several reactors in the coming years.

In the future, modular small power plants will play first fiddle

Although large reactors with rated outputs of well over 1,000 megawatts currently dominate and expansion is also being pushed further, a huge future growth market for uranium is already emerging. This is what are known as „Small Modular Reactors“ – SMRs for short, small 5–300-megawatt units that can be built modularly in a factory and shipped to their eventual site of operation. These scalable units can provide carbon-free benefits while competing on cost with cheap natural gas or diesel and can coexist with grid-intensive renewables because of their load-sensing characteristics and zero-emission operation. Individual SMR units are mostly under 300 megawatts and can operate for 3 to 5 years without fuel reloads – without interruption. They are very similar to the compact reactors that have safely powered aircraft carriers and submarines since the 1950s, and can be ideally marketed for smaller grids, island states, or remote locations (including mining and military bases). Very significant progress has already been made in government financial support for these innovative, carbon-free energy sources in the United Kingdom, Canada, and the United States. Microsoft founder Bill Gates, for example, is also working with one of his companies on the development of such small reactors and is pushing the construction of a corresponding plant in Wyoming, which is to replace a coal-fired power plant there. Gates' company, TerraPower, is to have a sodium-cooled fast reactor with a capacity of 345 megawatts. Using molten salt storage technology, the plant's output can be increased to 500 MW for more than five and a half hours if needed, supplying power to about 400,000 homes.

An existing example of such a power plant is the Akademik Lomonosov, which Russia commissioned in 2019 as a floating power plant in northern Siberia. A huge market that could cause uranium demand to skyrocket in the future.

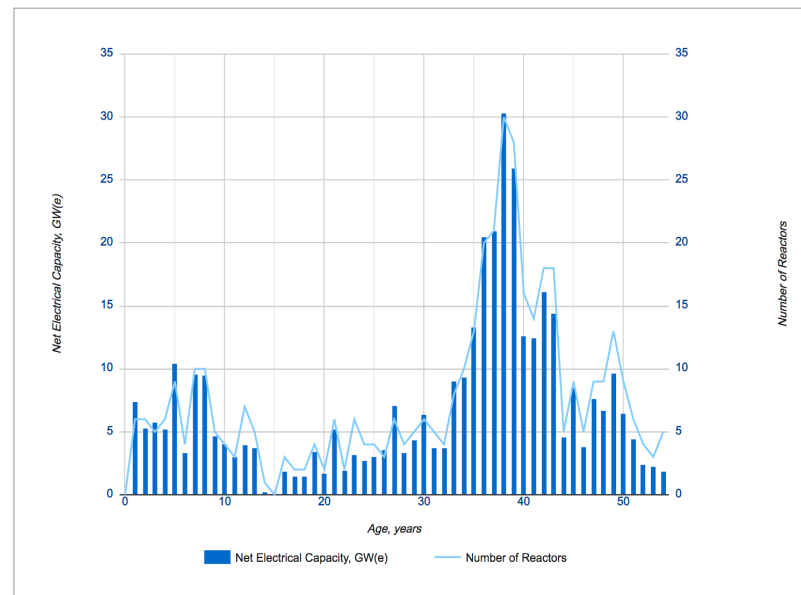


Demonstration model of a NuScale power supply module/small reactor. (Source: Oregon State University/Wikimedia Commons)

A total of 5 such small reactors are currently under construction worldwide, 3 of them in China. One reactor was connected to the grid by China in December 2021. 6 are in the licensing phase, and around 50 more are in the planning or design phase. Belgium has already earmarked 100 million euros in funding for research into the development of smaller modular nuclear reactors in 2021. Furthermore, Poland, Romania, Estonia, the Czech Republic, Sweden and the Netherlands have released corresponding subsidies or started research work. The use of SMRs also appears to be particularly interesting for heavy container freighters, which until now have run on expensive diesel oil.

Nuclear power operators conclude new long-term supply contracts

The previous cycle of contracting, dominated by the uranium price spikes of 2007 and 2010, has led plant operators to enter into contracts with higher price levels and very long terms of around 8 to 10 years. On the one hand, these old contracts are expiring, but on the other hand, plant operators have not yet looked for replacements for these supply volumes. As a result, the forward contracts of the plant operators are declining sharply, and thus the demand volumes



for which there is not yet a contractual obligation, but which will have to be contractually secured in the future, are also increasing. Unmet demand is expected to exceed one billion pounds of U_3O_8 over the next 10 years. At the same time, more than 75% of expected reactor demand through 2025 is not contractually secured. For a commodity as thinly traded as uranium, this return to more „normal“ long-term contracts is likely to put tremendous pressure on both long-term and spot prices. There are therefore now increasing signals among international plant operators towards increased buying activity.

Overview to the age of the reactors currently in operation. Many will (have to) be replaced by more powerful ones in the coming years.

Source: www.iaea.org/PRIS

The current supply situation: 140 million pounds of U_3O_8 per year

Uranium production declines sharply

In 2022, around 130 million pounds of U_3O_8 were produced from mines worldwide. This was significantly less than at the peak in 2016, when more than 160 million pounds of U_3O_8 were produced. For 2023, leading uranium experts expect production of around 140 million pounds of U_3O_8 .

Kazakhstan is the undisputed leader in uranium production

While nearly all established uranium producers are struggling to expand their uranium production, one region has now moved past all other countries to become the leader in uranium production: Central Asia. There, Kazakhstan in particular has been able to multiply its uranium production in recent years. From 2000 to 2019, uranium production in the former Soviet republic rose from 1,870 to over 22,808 metric tons.

As a result, Kazakhstan also passed the previous leader Canada in 2009 and is now responsible for around 45% of total global uranium production. In 2020, production fell to 19,477 metric tons due to production cuts caused by low prices and the effects of the Corona pandemic. In 2021, Kazakhstan produced about 21,800 tons of uranium.

Former producing nations struggle with weak uranium prices

The established uranium-producing nations of Australia, Canada, Russia and Niger were already having problems expanding their production before the Corona crisis. All four countries together produced just under 13,768 tons of uranium in 2021. In 2009, the figure was 28,000 tons of uranium. In some cases, mines were shut down due to the weak uranium spot price or lack of further reserve availability.

U.S. uranium production was recently nonexistent

Although the U.S. remains the largest consumer of uranium on the globe, the U.S. uranium industry has virtually ground to a halt. Since 1980, virtually nothing has been invested in the development of new deposits, and nearly 95% of the uranium needed has come from the disarmament programs. U.S. nuclear reactors consume about 21,000 tons of uranium annually. Accordingly, an increase in capacity would require an increase in the amount of uranium needed. The World Nuclear Association (WNA) projects that by 2035, about 35,000 metric tons of uranium will be needed annually in the U.S. alone. U.S. uranium production peaked in 1980, when about 29,000 metric tons of uranium were extracted from the ground. After the end of the Cold War, disarmed nuclear weapons in particular became the most important source of U.S. uranium requirements. This led to a decline in U.S. uranium production to, most recently, less than 5 tons of U_3O_8 in the second quarter of 2022. As a direct result, much of the infrastructure and licensed production facilities were simply closed or completely dismantled. Currently, only a few mining licenses remain in Texas, Arizona and Wyoming. Recently, however, several companies have been working on new licenses for their processing plants. Overall, the U.S. has a production capacity of about 30 million pounds of U_3O_8 per year, about half of which has a production permit.

Massive production cuts lead to stabilization of uranium price

Although Kazakhstan is one of the nations that can currently mine uranium at the lowest cost, the country is no longer prepared to sell off its uranium deposits at rock-bottom prices. In early 2017, the state-owned Kazatomprom announced that it would cut its own uranium production by at least 20% in 2017. In May 2018, Kazatomprom announced further production cuts. In

addition, production had to be further reduced due to Corona.

But Kazatomprom is not the only uranium producer to cut production in light of the weak uranium price. Uranium major Cameco also announced production cuts and closed its McArthur River mine and Key Lake facilities in January 2018, initially indefinitely. The Rabbit Lake mine was also closed, both of which are among the ten largest uranium mines in the world. McArthur River was the mine with the second highest uranium production and grades in the world. With the temporary closure, 10% of the world's total production was taken off the market in one fell swoop. Production has since restarted, although full capacity will not be reached again until 2024. In addition, Cameco has itself been acting as a uranium buyer for some time to service long-term, higher-grade supply contracts with corresponding uranium volumes at spot prices. From 2017 to 2022, Kazatomprom reduced its uranium production by about 15% and Canada by about 45%. In addition, there are closures at Moab Khotse in South Africa and at the Chinese-owned Husab and Rössing mines in Namibia, to name only the most important. The spot market, whose supply is mainly composed of uranium mined as a by-product in other mines, has also recently seen a decline in supply due to various mine closures.

Huge gap in supply has already existed for years

Even before the Corona pandemic, the supply deficit was about 40 million pounds of uranium per year. In 2020, the supply deficit was about 57 million pounds of U_3O_8 , which was about one-quarter of global annual demand. In 2021, the International Atomic Energy Agency (IAEA) recorded a supply deficit of 50 million pounds of U_3O_8 , and in 2022, 40 million pounds of U_3O_8 . Most of the current demand is being met from stockpiles, which are thus rapidly running out. A de facto supply shortfall has already existed since 2017, with consumption at

the current level of 422 nuclear reactors worldwide at about 190 million pounds of U_3O_8 , of which only about 140 million pounds are expected to be covered by global uranium production in the current year. Over the past five years, global production has lagged behind global uranium consumption by about 40-60 million pounds per year.

Deposits are stable – There is an acceptable range at higher uranium prices

At a market price of US\$40 per pound of uranium, experts estimate that there are just under 715,000 metric tons of economically recoverable uranium. With annual

consumption currently at around 70,000 metric tons of uranium, these deposits would therefore be sufficient for just 10 years, provided the market price remained constant at at least US\$40 during this period and demand also remained constant. However, demand will inevitably increase.

If the market price for uranium were to rise and justify extraction costs of US\$80 per pound of uranium, about 1.28 million tons of uranium could be mined economically. Range at current consumption: 18 years.

If the uranium price were US\$130 per pound, about 3.79 million tons of uranium could be economically mined. The known reserves would then last for about 54 years at current consumption levels.

Summary: The existing supply deficit will lead to an upward price adjustment

A future supply deficit at the current spot price is almost inevitable.

The IAEA estimates that new nuclear power plant construction will increase global uranium demand to as much as 300 million pounds of U_3O_8 per year in 2030. Over the past 5 years, there has already been a de facto supply shortfall of between 40 to 60 million pounds per year. In its most recent Nuclear Fuel Report, the World Nuclear Association projected a 3.1% annual increase in demand through 2040.

It is thus clear that the apparently cheapest and only base-load-capable CO_2 -free way of generating electricity can only continue to be used if the market price for the initial product uranium continues to rise. In the case of uranium, too, demand and supply regulate the market price. However, if the market price no longer permits economic extraction, it must and will inevitably rise. In the case of uranium, there is also the fact

that demand will also rise sharply due to the construction of several hundred new nuclear reactors, so that the market price will benefit twice over, so to speak. And with it, of course, those investors who have recognized this trend early enough.

A high proportion of demand is currently unmet

Unmet demand is expected to exceed one billion pounds of U_3O_8 over the next decade. In this context, more than 75% of the expected reactor demand will not be contracted by 2025. For a commodity as thinly traded as uranium, this return to more „normal“ long-term contracts is likely to put tremendous pressure on both long-term and spot prices. Therefore, there are already increasing signals among international plant operators in the direction of increased buying activity.

U.S. and EU increasingly rely on nuclear power as a green, baseload energy source

As early as 2021, U.S. President Joe Biden announced with his „Green New Deal“ a strong promotion of nuclear power in the U.S. and thus also of uranium mining in his own country. At the beginning of 2022, the European Commission also declared that nuclear power would be given a „climate seal of approval“. This clears the way for billions to be invested in nuclear power.

USA want to reduce dependence and relies on uranium from its own mines

The U.S. is working to implement SMR technology, as are many private companies. To date, the U.S. Department of Energy has funded over \$160 million in projects under its new Advanced Reactor Demonstration Program.

Furthermore, the country is trying to become less dependent on the immensely high uranium imports, mainly from successor states of the former Soviet Union. To this end, the U.S. Congress approved a budget that will provide \$150 million annually over the next 10 years to create a strategic uranium reserve. This reserve is to come entirely from uranium from U.S. mines. A first bidding phase by U.S. companies started recently. The Biden administration even wants to increase this part up to \$4.3 billion for the next 10 years.

Uranium investors buy spot market empty

Only recently, several other strong market players have joined in and are now securing U_3O_8 on the spot market at a small price, mostly from mines where uranium is a by-product. In addition to Cameco, which is now a buyer, the Sprott Physical Uranium Trust and Yellow Cake Plc. have also been



*U.S. and EU increasingly look to nuclear power as green, baseload energy source
(Source: shutterstock.com)*

able to purchase larger quantities of uranium. All these players took about 90 million pounds of U_3O_8 from the spot market since the beginning of 2021. Furthermore, uranium companies such as Uranium Energy, Denison Mines and Boss Energy also purchased physical uranium in order to be able to act flexibly and fulfill supply contracts in the event of an early production start-up.

The best uranium stocks promise multiplication potential!

The current situation of a uranium spot price that continues to be too low and does not reflect reality plus the still existing, massive supply deficit, we have taken the opportunity to summarize promising uranium stocks for you in a compact way. In doing so, we focus primarily on development companies with extremely promising projects, as these also offer a high takeover opportunity in addition to the actual appreciation due to a higher uranium spot price in this context.

The two expert interviews, which provide additional information and investment ideas, should also be noted.

Interview with Dr. Christian Schärer – Manager of the Uranium Resources Fund and Partner of Incrementum



Dr. Christian Schärer is a partner at Incrementum AG, responsible for special mandates. During his studies he started to search for the strategic success factors of successful business models. A topic that still fascinates him today and inspires him in the selection of promising investment opportunities. He studied business administration at the University of Zurich and earned his doctorate while working at the Banking Institute Zurich with an analytical study on the investment strategy of Swiss pension funds in the real estate sector. He has acquired comprehensive financial market knowledge in various functions as investment advisor, broker and portfolio manager. Since the summer of 2004, Schärer has been focusing on various investment themes with a tangible asset character as an entrepreneur, consultant and portfolio manager. He also brings his practice-oriented financial market knowledge to companies as a member of the board of directors. He is married and father of a son. In his free time, he enjoys cooking for friends and family, hiking in the Ticino mountains or reading the biography of a fascinating personality.

Mr. Schärer, nuclear power is currently regarded as an environmentally friendly, i.e., CO₂-free, energy generation method that should at least serve as a bridging technology to a possible future 100% energy generation from regenerative energy sources. To what extent can the uranium sector benefit from this?

Against the backdrop of the global climate debate, governments are looking for answers to the question of what their country's optimal energy mix should look like in the future. Geopolitical concerns, economic interests, national egoisms and the laws of nature (physics) must all be taken into account. This is an extremely complex issue, because ultimately policymakers must ensure that the energy and power supply for their national economies is clean, secure and affordable.

According to the goals of the Paris Climate Agreement, energy supply in the future should be based less on fossil fuels. It is undisputed that the intended electrification of industry and mobility will lead to a disproportionately growing demand for electricity. Accordingly, alternative energies (wind, solar, hydropower) are to be strongly expanded.

In recent years, a great deal of time and commitment has been devoted to defining globally binding climate targets that are as ambitious as possible. Ideological and moral arguments often had a high priority in the context of these discussions. This has changed considerably against the backdrop of the war in Ukraine and the energy crisis it has triggered. Questions about the availability and cost of energy supply are suddenly at the center of political debate. The dependence on fossil energy imports from Russia is to be reduced as quickly as possible and the energy supply is to be secured in the coming winters. This means that the time has come for concrete energy policy implementation. In this context, the limiting factors of time and money are beginning to take effect. Accordingly, realpolitik is increasingly

taking the reins in the search for feasible energy policy compromises.

Underlying all these policy approaches is the recognition that the unavoidable fluctuations in the production of alternative energy sources must be balanced out in order to maintain a stable power grid at all times. This requires reliable power generation from non-fossil sources that is available around the clock, seven days a week. Because nuclear power is produced with low CO₂ emissions, nuclear power plants are a possible solution for many governments to provide this base load in the power grid. Against this background, alternative energy sources and nuclear power can form a „green“ symbiosis.

Thanks to this green stamp, nuclear power plants will probably also benefit from economic stimulus programs and government subsidies in the future. A notable example of this is the Inflation Reduction Act in the USA. Investor funds can also be tapped more easily. For Europe, the USA and Japan, we expect that this will make it easier to modernize existing nuclear power plants with the aim of extending their operating lives. By contrast, we do not expect numerous new projects for the construction of current-generation reactors. Japan is a special case in this context. In the coming years, the country will bring many of the reactors decommissioned after the Fukushima nuclear accident back online. We see more potential for new reactor concepts that are safer, more flexible and less expensive than the current generation of nuclear power plants. The research funds required for this can now be mobilized more easily in the context described.

Whereas in the established industrialized countries the short- and medium-term aim is to extend the operating life of existing nuclear power plants, in the emerging economies in the Middle East and Asia the focus is on the accelerated expansion of reactor fleets. China is particularly ambitious in this respect. The country plans to build around 150 new reactors in the next 15 years!

More than the rest of the world has built in the past 35 years. India is also pursuing very ambitious growth targets for the nuclear industry. Are these plans realistic? That remains to be seen. The example of the United Arab Emirates gives cause for optimism in this respect. There, under Korean project management, it has been possible to realize ambitious construction projects for new reactors while adhering to schedules and cost budgets.

Overall, the prospects for nuclear energy have brightened considerably in the last two years. Particularly for power plant operators in the western industrialized countries, visibility has improved significantly. Against the background of political support and increased acceptance by the general public, planning certainty for operators has increased significantly. This will also be reflected in stockpiling. More nuclear fuel will again be stored to safeguard the future operation of the nuclear power plants. With the start of this new storage cycle, the opportunity-risk profile for the uranium sector will improve sustainably.

Who are the current drivers of supply and demand in the uranium sector and why is the uranium spot price (still) not making it above US\$50 per pound?

The operation of nuclear power plants requires an extensive infrastructure to ensure the supply of fuel. Provision must be made for the mining of uranium ores, the extraction of uranium from the ores, conversion and enrichment, and the production of fuel elements. Anyone who wants to understand the price development of uranium must keep an eye on the entire value chain (fuel cycle) and be aware that we are dealing with a very long-term business. Changes in the supply and demand constellation take time to manifest themselves in corresponding price changes.

After a long bear market, the uranium price has been able to complete its bottoming

out against the backdrop of significant production cuts and increased demand. The multi-year high of April 2022 has confirmed this development. As part of this process, the uranium price has already traveled an impressive distance, recovering from a price low well below US\$20 per pound to over US\$50. This rise was consolidated in 2022 as part of a protracted sideways movement.

On the uranium market, too, the price reflects the current supply/demand situation. Because demand for uranium has already been higher than mine production for some time, the ongoing consolidation has disappointed many investors. The existing supply gap has so far apparently been covered by the reduction of existing stockpiles as well as with supply from secondary sources.

For the current year, demand is expected to be around 190 million pounds and mine production around 145 million pounds. However, because destocking (overhang from the 10-year bear market) is already well advanced and supply from secondary sources will be significantly reduced, the recovery in the uranium price should continue soon. The significant year-on-year increase in transaction volumes also supports this assessment.

In addition, a distinction must be made with regard to the price development of uranium. Uranium is traded both on the spot market and under long-term supply contracts between producers and buyers. In the historical context, the long-term supply contracts are more significant in terms of volume. On the spot market, typically only the „short-term peaks“ are traded. However, under the impression of the good availability of uranium, the picture has been somewhat distorted in recent years. The spot market enjoyed more attention than usual. Here, too, the picture seems to be changing. In view of the continuing supply shortfall, the demand side is increasingly trying to secure uranium under long-term supply contracts. The transaction volumes of the past year confirm this development (spot:

58 million pounds; LT: 114 million pounds). Against this background, the spot price of around US\$50 is only of limited significance. However, the consolidation that has been underway since April 2022 is also due to the „risk-off“ environment on the global financial markets. Since August 2021, financial investors have had a vehicle for participation in the uranium spot market in the form of the „Sprott Physical Uranium Trust“. The trust invests its funds exclusively in the spot market. Because it can only purchase physical uranium, but not sell it, inflows of funds by financial investors have an immediate effect on increasing demand. However, due to unfavorable market conditions, inflows have failed to materialize since last April, relegating the Trust to a passive role on the sidelines of the spot market. A change in sentiment among financial investors could therefore provide additional demand and give the spot market additional impetus.

More relevant for uranium producers, however, is the price development for long-term supply contracts. These prices are reported by the consulting firm UxC and are currently around US\$51 per pound. However, the informative value of the reported prices is controversial because the conditions of these contracts are usually subject to confidentiality and the prices are also often set dynamically (X% fixed, Y% variable, plus „floor“ and „cap“). In each case, UxC reports only the lowest price offered. It should also be noted that the price component is only one component of the agreed terms and conditions. In addition, options to extend the contract term and/or to adjust the delivery volumes are usually also agreed. From this point of view, a higher price is usually the last negotiating option in the contract drafting process. In confidential discussions, involved contracting parties confirm the impression that negotiating power is increasingly shifting in the direction of the suppliers. The market is evolving from a „buyer's“ to a „seller's“ market. Transaction volumes have also increased significantly year-on-year to

around 114 million pounds. It is to be expected that this trend will become established and that transaction volumes will continue to rise. An indication of the potential in this respect is provided by the current replacement ratio. Assuming an annual consumer demand of 190 million pounds, the value is currently around 0.6. A value of 1 (complete replacement of the uranium consumed in the current period by newly acquired material) probably represents a reasonable medium-term target.

Does Russia's isolation have any impact on the world's supply of uranium to nuclear power plants, and thus on the world's energy supply?

Security of supply is a key issue for nuclear power plant operators. This is explained, among other things, by the cost structure of these power plants. Unlike fossil-fueled power plants, in the case of a nuclear power plant the capital costs are the dominant factor in the total cost calculation for electricity production. With a share in the high single-digit percentage range, fuel costs (uranium) are of secondary importance. Accordingly, the industry usually shows little price sensitivity to rising uranium prices. However, when an operator invests billions in the construction of a nuclear power plant, he also wants to operate it around the clock, seven days a week. A possible bottleneck in the fuel supply must be prevented accordingly.

Russia is not only a uranium producer, but with „Rosatom“ also a major player in the conversion and enrichment of uranium as well as in fuel production. The country holds significant market shares in these areas. However, because about 70% of the global reactor fleet is located in the Western industrialized countries, but they hold only about half of the capacities in conversion and enrichment as well as fuel production, there is a strong dependence on Russia from the Western perspective.

„As the latest quarterly statements of the Canadian uranium producer ‘Cameco’ have already shown, power plant operators indicate an increased willingness to stockpile uranium. This is likely to mark the start of a new inventory cycle on the demand side. In our opinion, this is the last missing piece of the mosaic in the picture of a multi-year and sustainable uranium bull market.“

Accordingly, Western power plant operators are currently focused on securing a share of these scarce capacities in the Western world on a contractual basis. The price development to be observed in this area of the fuel cycle clearly shows how tight the „downstream“ market currently is. However, this scarcity and the associated price increases will not remain a phenomenon at the back end of the fuel cycle. Due to various feedback effects, this demand and price pressure will also show up in the market for U_3O_8 (uranium) sooner rather than later. One such feedback effect is driven by tight enrichment capacity. In times of low demand, suppliers of this service can run their centrifuges longer and thus extract correspondingly more enriched uranium from the delivered feedstock (UF6) (this is referred to as „underfeeding“). The process can be compared to squeezing an orange. If you have more time available, you can squeeze more juice from the same fruit. The situation is different in times of high demand and scarce available capacity. There is less time available for the enrichment of the starting material. The yield is correspondingly lower (this is referred to as „overfeeding“). If one wants to produce the same amount of enriched uranium as before, one needs correspondingly more of the starting material as input for the enrichment process. Currently, this swing from underfeeding to overfeeding in the uranium enrichment process results in an estimated addi-

tional annual demand of about 20 million pounds of uranium (U_3O_8). This in an already very tight market environment.

In the medium term, against the background outlined above, we expect massive structural shifts on the uranium market: On the one hand, Western power plant operators will seek to diversify their supply sources and conclude long-term supply contracts with suppliers from politically reliable jurisdictions. A willingness to self-sanction can already be observed today. Western power plant operators are refraining from purchasing enriched uranium and nuclear fuel from Russian sources wherever possible. Thus, a geopolitically driven division of the uranium market is emerging (bifurcation).

On the other hand, power plant operators will also address the issue of strategic supply security with more comprehensive stockpiling. As the latest quarterly statements of the Canadian uranium producer „Cameco“ have already shown, power plant operators are indicating an increased willingness to stockpile uranium. This is likely to mark the start of a new inventory cycle on the demand side. In our opinion, this is the last missing piece of the mosaic in the picture of a multi-year and sustainable uranium bull market.

The structural deficits in the fuel cycle described above are likely to keep the uranium market busy for years. This starting position differs significantly from that at the

start of the last major uranium bull market (2004-2010). Despite this promising starting position, it should be noted once again at this point that the adjustment processes in this long-term business are sluggish and take time.

What advice would you currently give to investors who want to invest in the uranium market?

We have tried to show that the fundamentals for the uranium sector and the risk-reward profile of the companies involved have continued to improve. Well-managed companies have strengthened their balance sheets and consistently advanced their projects. Some of these companies are also making the transition from project developer to uranium producer in the next 18 to 36 months. This makes them attractive from an investor perspective. Notwithstanding this, both the market for physical uranium and the shares from this sector have been in a volatile consolidation phase since November 2021. The price corrections from the highs previously reached have been significant on balance and frustration has already spread among some investors. In addition, it is noticeable that the price performance of uranium shares has been significantly less good than the uranium price. From a relative perspective, the shares are correspondingly more attractively valued today.

On the other hand, the volatility of these shares is extraordinarily high due to their low market liquidity and implicit project risks. Anyone who puts all their eggs in one basket in this speculative constellation is therefore betting big – possibly even too big. The use of a fund or ETF that invests diversified within the investment theme seems reasonable to us. In addition, we recommend a staggered build-up of positions. The volume of an investment (position size) should also be tailored to the risk capacity and risk tolerance of the investor.

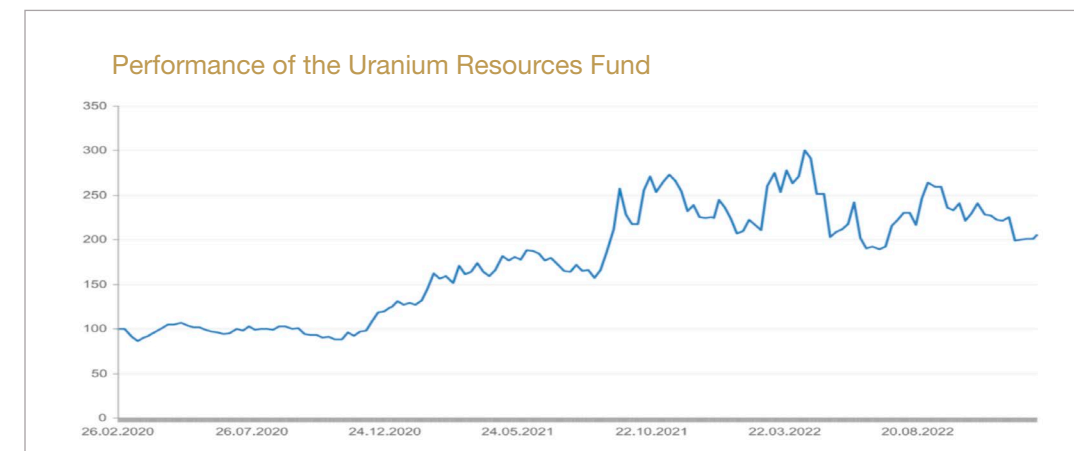
You manage a uranium fund, what is important to you in selecting the appropriate positions and what position do you currently hold?

The investment strategy of the Uranium Resources Fund is based on the investment hypothesis that the existing supply gap in the uranium market will be closed over the next three to five years. This will only succeed if a significantly higher uranium price provides the incentives for new production capacities or those temporarily shut down for economic reasons to find their way onto the market.

The Fund typically holds 20 to 25 positions in the portfolio and is suitable for the long-term investor who wishes to participate in the interesting prospects of the uranium sector. The assets are invested globally in companies that have a direct link to the uranium sector, in accordance with the principle of risk diversification. The investment strategy aims at absolute value growth. Due to its risk profile, the Uranium Resources Fund is suitable as a supplementary component in a diversified portfolio and not as a basic investment. The Fund is licensed for public distribution in Liechtenstein, Germany and Austria and is tax transparent. In Switzerland, it is open for subscription to professional investors.

After a long bear market, the uranium market has bottomed out and made a sustained upward turn. In view of the growing supply gap and the further improving fundamental data, there are good prospects for a continuation of the bull market despite the price gains to date. However, interim setbacks and high volatility remain a feature of this tight market. We intend to consistently exploit the profit opportunities that present themselves, while accepting controlled risks!

Against this background, our portfolio stands on four pillars. As our first pillar, we maintain a strategic liquidity ratio of around 5% in a normal market environment. This



Performance of the Uranium Resources Fund in Euro (Source: www.uraniumresourcesfund.li)

ensures our ability to act at all times. In this way, we take advantage of attractive entry points that regularly open up due to the volatile price performance of many uranium shares.

With the second pillar, we want to participate directly in an improvement in the uranium spot price. Without higher uranium prices, a sustainable recovery of uranium producers is difficult to imagine. That is why two investment companies, which have invested their funds mainly in physical uranium, form the core of the portfolio. If our view is correct, the supply gap in the uranium market will be filled via a rising uranium price. Sprott Physical Uranium Trust and Yellow Cake Plc. should therefore be the first and most immediate beneficiaries of this price recovery.

The third pillar focuses on the shares of the uranium producers as well as on the group of „standby“ producers with approved and/or realized projects, but which are currently not yet in production. When uranium prices start to rise, the producers who can place significant uranium production on the market will benefit. Only those who produce can also deliver. To be on the safe side, we focus on companies that have low production costs on the one hand and a good order book of long-term supply contracts on the other. Significantly represented in the portfolio are the two industry leaders „Cameco“ and „Kazatomprom“. Both compa-

nies have a broad portfolio of first-class production sites. This group is supplemented by investments in companies to which we would give the status of „standby producer“. These are companies that have a portfolio of approved production sites and processing capacities. Production could be launched within a foreseeable period of time as soon as the economic conditions (i.e., a higher uranium price) are met. We include, for example, „Paladin Energy“, „Global Atomic“, „Uranium Energy“, „enCore Energy“ or „Energy Fuels“ in this group. Under the fourth pillar, we focus on explorers and developers who are advancing world-class development and mining projects. These are particularly interesting if they can significantly advance their projects in the time window of the expected supply gap. They will then be able to benefit from a correspondingly attractive performance of their projects. In addition, these assets should have the necessary size to also qualify as takeover targets. After all, we assume that a wave of consolidation will take place on the uranium market once the price turnaround has occurred and that mining companies from outside the sector may also want to position themselves in the uranium business. This would make sense not least because of the low cyclical sensitivity and the comparatively high visibility of uranium demand. For example, the companies „NexGen Energy“, „ISO Energy“ or „Denison Mines“ can be assigned to this group.

Interview with Scott Melbye – CEO of Uranium Royalty, Executive Vice President of Uranium Energy and Ex-Advisor to the CEO of Kazatomprom



Scott Melbye is a 37-year veteran of the nuclear energy industry having held leadership positions in major uranium mining companies as well as industry-wide organizations. Through to June 2014, Melbye was Executive Vice President, Marketing, for Uranium One, responsible for global uranium sales activities. Prior to this, Melbye spent 22 years with the Cameco Group of companies, both in the Saskatoon head office and with their U.S. subsidiaries. He had last served as President of Cameco Inc., the subsidiary responsible for marketing and trading activities with annual sales exceeding 30 million pounds U₃O₈. Melbye was formerly the Chair of the Board of Governors of the World Nuclear Fuel Market and President of the Uranium Producers of America. He also currently serves as Executive Vice President of Uranium Energy, was VP-Commercial for Uranium Participation Corporation and was Advisor to the CEO of Kazatomprom, the world's largest uranium producer in Kazakhstan. Melbye received a Bachelor of Science in Business Administration with specialization in International Business from Arizona State University in 1984.

Mr. Melbye, nuclear power is experiencing a true rebirth. Many nations are planning to build new reactors to generate environmentally friendly, CO₂-free energy. To what extent is nuclear energy CO₂-free and how can nuclear energy contribute to improving the world's climate and energy supply?

As the global economy struggles with the triple challenge of securing energy supplies that are clean, economic and reliable, Nuclear Energy has a key role to play in addressing all of these, and as such, we have seen an unprecedented embrace of nuclear power for its abundant, affordable and carbon-free attributes. For the first time in the modern history of nuclear energy, we are seeing broad support for nuclear power from the political Right and Left, the investment community, and both environmentalists and industrialists. Whether one values the clean energy benefits of this leading green-energy technology, or prioritizes the reliability and affordability of 24/7, baseload power, nuclear energy delivers on all accounts. It is as carbon-free and safe as wind and solar yet runs 95% of the time versus 30% for intermittent renewables. Moreover, its energy-dense uranium fuel serves as a price hedge against volatile fuel costs compared to fossil-fired generation. It is not surprising then that in the past 9 years the world has seen 65 large, modern nuclear power plants connected to the global electric grid and 60 more commence construction.

There are currently around 437 nuclear reactors worldwide. To what extent will the reactor landscape change over the next two decades and will we see small modular reactors experience growing acceptance, deployment and market share?

Large traditional, nuclear reactors continue to be fuelling a robust 3-4% annual growth rate in nuclear generation. This comes from

both new builds in countries that seek to add substantial, sources of baseload electric power to their grids, and from the uprating and extension of existing units in the established nuclear markets. Given the growth and modernization in the emerging markets, and the further electrification of the developed world, particularly in transportation and advanced technologies, nuclear will continue to grow in helping to meet those needs. Furthermore, we are now seeing very exciting developments in the deployment of small modular, or advanced, reactors (SMR's). These are not the 1500-megawatt massive power stations that we have become accustomed to, but rather smaller 50–300-megawatt units that can be constructed in a factory with lower up-front capital, shipped on site and built in a scalable, modular manner. Once these innovative plants can get past the first-build hurdles in the latter half of this decade, they promise to be affordable and flexible clean energy sources that can adapt well to large grids already burdened with substantial intermittent renewables, present viable alternatives to retiring coal fired power plants, or serve as a main source of power to remote communities, or for uses in industrial or mining applications. Whether it is GE Hitachi in Canada, Rolls Royce in the United Kingdom, or X-Energy, TerraPower or NuScale in the United States, these SMR's and advanced designs are receiving substantial commercial interest and boosted by strong government support in terms of their initial deployment. In a significant 2021 announcement, the U.S. State of Wyoming will see a Bill Gates, TerraPower, Natrium reactor constructed on the site of a retiring coal-fired power station (Warren Buffett's Pacific Corp. utility being the buyer). Not only can this advanced reactor make a clean energy transition, but it can also connect into existing grid infrastructure, and jobs can be preserved in the impacted fossil fuel sector. Central Europe is proving to be a promising market for this technology as these countries are facing a

„Over the past six years, global production has lagged behind global uranium consumption by about 40-60 million pounds per year.“

number of energy challenges. While historically dependent on coal-fired power generation, they are being pushed towards lower carbon alternatives by the European Commission. At the same time, they want to avoid the dangerous reliance on Russian natural gas. Large western reactors and SMR's are proving to be the desired fit under those constraints and challenges.

Uranium Prices have recently been trading around \$48-\$50 per pound but reached as high as \$63 early last year. This is up significantly from the bear cycle lows of \$17.70 per pound in November 2017, but still not at the incentive price for new mines. What is behind this bull market move in uranium prices and when can we expect the next upward shift?

Uranium prices have indeed been on a dramatic recovery which can be attributed to a number of basic supply and demand fundamentals, in combination with a mix of global mega-trends and geopolitical developments.

Firstly, we have been talking about the rebalancing of supply and demand factors for some time, and recent events have only accelerated that development. Following a period of uranium over-supply brought on by the impacts of Fukushima, global uranium producers began to take steps to rationalize their production plans around the time long term contract hedges were beginning to roll out of supplier portfolios.

Despite falling prices throughout the decade, global production had increased and peaked in 2016. From 2017 onward, however, we finally began to see supplier discipline translate into reduced production levels and the shut-in of mines around the world. In fact, over the past 6 years, global production has lagged global uranium consumption by roughly 40-60 million pounds per year. This has had the impact of drawing down global secondary supplies to help bring the market more into balance. Some producers, like Cameco, not only shut-in production, but entered the market as buyers to backfill their substantial long term contract commitments.

A couple of major developments came along to throw gasoline on the fire. The COVID-19 pandemic, for one, impacted roughly 50% of global uranium production at its peak, yet fortunately spared the nuclear power plant, uranium-consumers who operated reliably as essential services throughout this time. As such, uranium demand was unimpacted while major mining operations, like those in Kazakhstan and Cigar Lake in Saskatchewan, Canada, saw their output decreased, even beyond the discretionary mine cutbacks. Additionally on the production side, the uranium market is experiencing the end-of-mine-life of a number of key operations including the Ranger mine in Australia (which ceased operations in 2021), the Akdala mine in Kazakhstan, and the Cominak mine in Niger. Additionally, the decade of low uranium prices did very little to incentivize the pipe-

line of new projects or encourage the restart of idled mines. This will dramatically impact the production response in this emerging supply squeeze as mines are not permitted, licensed or developed overnight, and in fact, can take 6-10 years to accomplish (with no guarantee of success). Market observers should also not ignore the impacts of global inflation on the price thresholds of mine restarts and development. There may be a general misperception of the level at which uranium prices will incentivize new mines.

With this sort of production/consumption gap prevailing for so long, have we finally made a dent towards drawing down the over-hang of global inventories?

Yes, most definitely, and more than just a little. These voluntary and involuntary reductions in global mine production provided the opportunity for the market to fully draw on, and deplete, the over-hang of inventories which built up from the effects of Fukushima and, frankly, overproduction throughout the first half of the decade. This has been dramatically accelerated through the purchasing activities of non-traditional uranium buyers. Such category of buyers would include producers, like Cameco, backfilling contract commitments from the open market, junior producers, like UEC and others, opportunistically establishing low-cost inventories at near the bottom of the cycle, and pure speculative purchasers. These speculative, or financial, buyers have included Uranium Royalty Corp., Yellow Cake Plc., and Sprott Physical Uranium Trust (SPUT) who are accumulating holdings of physical uranium on behalf of their shareholders who are seeking price exposure to the underlying commodity. Similarly, we have seen hedge funds make direct purchases of spot uranium in which they hold to realize capital appreciation of the assets. Collectively, these categories of buyers have had a profound impact on the

rebalancing of the uranium market having purchased almost 90 million pounds in the past two years. SPUT has been the major player in all this having raised \$1.7 billion from its at-the-market financing vehicle since August 2021. While I am reluctant to describe these developments as “catalysts”, preferring to reserve that term to the major underlying supply and demand fundamentals, I would clearly describe these events as a major tipping point in the market re-balancing. Our rather thinly traded and inefficient uranium market was already heading from over to under-supply from both traditional supply and demand trends, however, the magnitude of spot buying has perhaps accelerated forward the market recovery by a couple years. The significance being that the uranium market has now transitioned (past tense) from being inventory-driven, to one more reliant on the cost and timing of production from new and restarted mines. Many market observers, both suppliers and consumers, see this translating into a classic supply squeeze in the 2024-26 time frame as demand and purchasing have returned to robust levels at the same time inventories have been depleted and new mine production cannot respond quickly enough.

Given Russia’s role as a major global nuclear fuel cycle supplier, and the invasion of Ukraine going on one year, how has their isolation and sanctioning impacted the uranium market?

If the supply and demand rebalancing, COVID-19 impacts, and non-traditional uranium buying was not enough, the appalling and unprovoked invasion of sovereign Ukraine by Russia may prove to permanently reshape the uranium market in a number of ways going forward. The Rosatom uranium enrichment complex represents 45% of global installed capacity, and closely aligned Kazakhstan has become the world’s largest uranium producer. In the United

„For the first time in the modern history of nuclear energy there is broad support for nuclear energy from the political right and the left, from the investment community, from environmentalists and industrialists.“

States for example, 20-25% of the enriched uranium comes from Russia and close to 50% of natural uranium supplies are sourced from Russia, Kazakhstan, and Uzbekistan. These Russian fuel purchases amount to close to US\$1.3 billion in hard currency per year towards Putin’s war efforts. Western Europe would have similar levels of reliance. We would be correct in pointing out the risk management folly of

putting that many eggs in Putin’s basket, but the reality faced today is not whether to move away from Russian fuel reliance, but how quickly can this be achieved without harm to the nuclear power plant consumers. Not only are these supplies potentially subject to sanctions (the U.S. Congress have proposed a complete ban on varying timelines), they could also be subject to a Kremlin export embargo knowing how strategic these energy supplies are to the West. Yet other companies have remained true to their moral and ethical values and have voluntarily ceased Russian purchases (Swedish Vattenfall having made this decision on the first day of the invasion). Other utilities are facing mounting pressure to act from shareholders and customers, as this hardly reflects leading social responsibilities and ESG best practices. Central European utilities face a more daunting task in refueling their Russian designed VVER reactors with western fuel, including the fabricated fuel designs now being manufactured by Westinghouse for the Ukrainians and Czechs. Having said that they, and other neighboring countries, are fully committed to the transition given the first-hand perspective of Russia’s carnage and the exodus of refugees. From a supply and demand perspective, we have to assume perhaps a permanent shift away from Russian uranium fuel reliance. While this may have dramatic impact on uranium prices in the near term, it should signal a strategic shift towards more geopolitically stable suppliers that are not under the influence of Russia or China.

One such country at a crossroads is Kazakhstan, the world’s largest uranium producer. While they do not fall under Russian sanctions, the export of their uranium to the West through the Port of St. Petersburg has grown increasingly difficult. Much of 2022 was spent trying to develop an alternative logistic route through the Caspian Sea, through Armenia and Azerbaijan to a Turkish Black Sea port. While proven fea-

sible, it brings its own unique complexities and increased costs. It can also be reasonably speculated that a globally sanctioned Russia will exert its influence in the region to retain more of these supplies for their own use. The same can be said of China, the world's fastest growing nuclear market, with whom Kazakhstan shares a geographic border. Both of these countries already have significant uranium production assets in Kazakhstan that footprint could be expanded, reducing the need for western partners or exports.

How has this Russia/Ukraine conflict impacted nuclear power in global national energy policies?

The humanitarian catastrophe that is the Russian invasion of Ukraine will impact society in many ways for years to come. Perhaps the most lasting impact on global energy will be the renewed and keen awareness towards energy independence and security. Energy Ministers from around the world are reassessing how their energy is produced and from where it is coming from. No longer will it be acceptable to outsource strategic energy supplies (and other critical minerals, goods and services) to countries that do not have shared values and interests. Multinational cooperation will still exist, but a much greater emphasis will be placed on domestic control of strategic resources. Nuclear energy has a very important role to play in this societal shift. Nowhere has this become more evident than with the failed energy policies of Germany over the past 15 years. The Merkel approach of "Energiewende" promised abundant clean and affordable electricity though billions of Euros invested in green energy renewables, and a very deliberate and unequivocal phase out of nuclear energy. The result has been quite the opposite. Germany has instead "succeeded" in achieving electricity prices over 60% higher than neighboring nuclear France, while

making very little progress in its carbon reduction goals, losing their largest source of carbon-free energy (nuclear) and instead increasing reliance on dirty lignite coal. However, the most disturbing result of this policy has been the overwhelming reliance on Russian natural gas from the Nord-Stream pipelines. The latter causing not only supply shocks to the German economy but conflicting the German Government in taking stronger ethical geopolitical positions during this profound humanitarian crisis. Last year's acts of sabotage in the Baltic Sea further escalate the stakes in this "energy war". Germany has even resorted to extending the operations of three reactors slated for closure and expanding coal mining activities.

In Europe alone, we are seeing the reversal of phaseouts of nuclear power in countries like Belgium, the Netherlands, and Sweden, and a renewed commitment to nuclear energy like we are seeing in the United Kingdom and France. The European Commission's taxonomy debate conclusions yielded to the pronuclear member arguments and deemed nuclear energy a green and sustainable energy source for the Community's energy needs (albeit transitional and with conditions). Nowhere is this more abundantly clear than in Central Europe where the threat of Russian aggression and energy weaponization is not a new concept. Countries such as Poland, Romania, Czech Republic, Slovenia, and Slovakia are not only placing increased value on their existing fleet (switching fabricated fuel suppliers from Russia's Rosatom to Westinghouse) but are engaging in new build of large western reactor designs and fully embracing the benefits of small modular and advanced reactors. Put simply, the EU (and society at-large) is encouraging their shift away from the current heavy reliance on coal, and Russian gas is not an option. Renewables can contribute up to point but cannot be a baseload 24/7 source of uninterrupted electricity.

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What does this all mean for uranium investors?

As we have been saying for some time, the market fundamentals have been ripe for a significant and sustained recovery in uranium prices. We are now seeing this come together in a very big way assisted by the mega-trend towards energy decarbonization and supply shocks that have been brought on by a global pandemic and an apocalyptic invasion in Central Europe. We should remember that the last bull market in uranium began from a place of moribund demand for uranium, little to no investment in uranium exploration and development, and flat uranium prices below global costs of production. The resumption of new reactor builds in the nuclear renaissance combined with supply shocks at major production centers (floods and fires in Canada and Australia), resulted in a period of uranium prices trading in the \$70 to \$137 per pound range. I can't help but draw the comparisons to today where even stronger, broad-based support of nuclear energy has

emerged, fuel buyer complacency is again being met with supply shocks and uranium speculators have entered into the game in historic proportions.

Early investors in this cycle are now being rewarded for their patience and foresight, and new investors are finding the nuclear energy and uranium story to be an extremely compelling sector in which to focus their capital for growth in the coming years. Given that we have only recently emerged from a period where the name of the game for uranium producers was to simply "leave it in the ground", to one of needed uranium expansion and growth, we are still in the very early stages of this cycle. Investors will be wise to focus on the companies that have positioned themselves through an extremely challenging time of survival to be ready to seize on these significant opportunities going forward. Indeed, very exciting times for uranium as the promise of clean, reliable, and resilient nuclear energy becomes more widely appreciated in a lower-carbon world.

Blue Sky Uranium

Taking big steps towards low-cost production in Argentina

Blue Sky Uranium is a Canadian uranium development company that owns several large uranium projects in the Argentine provinces of Rio Negro and Chubut, which are expected to be relatively easy to exploit in low-cost surface operations. This gives the company an enormous cost advantage, promising not only faster mining but also high margins. The goal is to supply Argentina's nuclear power plants with uranium from within the country. Blue Sky Uranium has already demonstrated a large resource for one of three subprojects and has presented a positive economic analysis.

Amarillo Grande Uranium-Vanadium Project: Location and Resources

Blue Sky Uranium's flagship project is called Amarillo Grande and consists of the three sub-projects Anit, Ivana and Santa Barbara. The three license areas cover a total of approximately 261,000 hectares and are located in Argentina's Rio Negro province. Anit, Ivana and Santa Barbara lie within a 145-kilometer trend that hosts several known uranium occurrences. In addition to near-surface uranium mineralization, Amarillo Grande also hosts significant vanadium resources. The uranium and vanadium-bearing rocks range in depth from 0 to 25 meters, and the deposits can extend for several kilometers. The overburden consists of only slightly compacted sand, which results in not only favorable mining costs, but also extremely favorable drilling costs. Mining is usually carried out by means of a so-called scraper, which removes the rock layers and loads them directly onto a truck driving alongside by means of a conveyor belt. There is no need for drilling or blasting, which drastically reduces mining costs. In addition, most of the excavators normally required are not needed. The rock material can be processed in a plant centrally located between the three subprojects using leaching, which is also cost-effective. All these advantages make it possible to exploit even low-grade deposits. The additional presence of vanadium as a by-product

strongly contributes to an improvement of the economic efficiency.

Amarillo Grande Uranium-Vanadium Project: Ivana

The largest subproject by area and the southernmost is Ivana. It covers about 118,000 hectares and hosts an anomaly more than 25 kilometers long. Sampling and drilling there encountered high-grade mineralization that was consistent with previous radiometric surveys. Up to 1.81% U_3O_8 was detected over 0.75 meters. This sample was only 2 meters below surface. The majority of the known resource is very near surface to a maximum depth of 25 meters.

Drilling has intersected several high-grade intervals including 3,136ppm U_3O_8 over 1 metre, 2,182ppm U_3O_8 and 1,285ppm V_2O_5 over 2 metres and 2,087ppm U_3O_8 and 1,892ppm V_2O_5 over 1 metre, all within significant uranium and vanadium mineralization up to 20 metres thick. All of these drill results were from depths up to 23 meters. Additional drilling also returned additional high-grade results including 10,517ppm U_3O_8 over 1 metre and 8,618ppm U_3O_8 also over 1 metre, each within 8 metre intervals of over 2,200 and 2,800ppm U_3O_8 respectively. In 2018, the Company encountered over 20,000ppm U_3O_8 (equivalent to over 2% U_3O_8) over 1 meter, among others. This successfully confirmed the initial grades of over 1% U_3O_8 . In September 2022, Blue Sky Uranium launched another exploration program focused on the Cateo Cuatro Sector. In addition, a drilling program is planned for both Cateo Cuatro and Ivana East.

Ivana: Resource estimation and positive economic analysis.

A 2019 resource estimate returned an inferred resource of 22.7 million pounds of U_3O_8 and 11.5 million pounds of V_2O_5 for Ivana. Based on the exploration work and resour-

ce estimate presented, a preliminary economic assessment (PEA) for Ivana was prepared in 2019. Based on a uranium price of US\$50 per pound U_3O_8 and a vanadium price of US\$15 per pound V_2O_5 , the PEA calculated a net present value (NPV, discounted at 8%) of US\$135.2 million and an internal rate of return (IRR) of a very good 29.3% after tax. Based on a daily mining volume of 13,000 tonnes (including overburden) and a daily processing volume of 6,400 tonnes, this results in an annual production of 1.35 million pounds of U_3O_8 and a total production of 17.5 million pounds of U_3O_8 over a life of 13 years. The initial capital cost was estimated at US\$128 million and the all-in sustaining cost at US\$18.27 per pound of U_3O_8 . This results in a pay-back period of 2.4 years. This would place Ivana in the lower quartile globally for operating costs.

Amarillo Grande uranium-vanadium project: Anit

The second subproject, Anit, covers approximately 24,000 hectares and is centered between Ivana and Santa Barbara. Anit lies on a 15-kilometer trend of near surface uranium mineralization. Historical exploration work has averaged grades of 0.03% U_3O_8 and 0.075% V_2O_5 over 2.6 meters for 81 drill holes. In the western and central zones, 103 pits with uranium grades greater than 50ppm were encountered, averaging 1.97 meters of 0.04% U_3O_8 and 0.11% V_2O_5 . One drilling campaign detected uranium grades up to 1,114ppm U_3O_8 and up to 3,411ppm V_2O_5 . In particular, the very high-grade vanadium resource encountered attracted management interest.

Test work also showed that a large part of the existing uranium and vanadium resources can be significantly improved by so-called wet screening, since coarse gravels in particular have hardly any uranium content. This would reduce transportation and processing costs and allow simultaneous extraction from several satellite projects.

Amarillo Grande Uranium-Vanadium Project: Santa Barbara

The third subproject, Santa Barbara, is located northwest of Anit and is still in its infancy. Blue Sky Uranium has already identified several anomalies there and intends to make a new discovery soon.

Grosso Group as an important back-up

Blue Sky Uranium is part of the Grosso Group of companies. The Grosso Group is a management company that has been in business since 1993, specializing in South America, particularly Argentina, and has made 3 multi-million-ounce precious metal discoveries in Argentina alone. In addition, partnerships with commodity giants such as Barrick, Areva, Rio Tinto, Teck and Yamana have been established. Company CEO Joe Grosso was named Argentina's Mining Man of the Year in 2005. Grosso Group has an extensive network of industry and political contacts in Argentina. Grosso has been a director and chairman of Blue Sky Uranium since October 2017.

Summary: Well financed with big steps forward

Blue Sky Uranium has a real production opportunity in Argentina, as the Chinese state-owned company China National Nuclear Corporation (CNNC) and the Argentine state-owned company Nucleoeléctrica Argentina have just signed an EPC (Engineering Purchase and Construction) contract in February 2022 for the supply of a Chinese HPR-1000 turnkey nuclear power plant, with construction starting in 2022. The Company has already made significant exploration and development progress on its three advanced projects within Amarillo Grande. In addition to uranium, the rocks at Ivana and Anit also host significant vanadium resources that are expected to be exploitable via surface mining. Both together

also promise a very good chance of early production due to several existing high-grade intersections and, above all, low-cost production that also requires only a fraction of the capital costs of similar conventional mines. The Company's goal is to supply its own uranium to Argentina's current 3 operating nuclear reactors, the reactor under

construction and the planned reactor. With two oversubscribed financings of CA\$2.1 million (instead of the planned CA\$1.05 million) in mid-2022 and CA\$1.8 million (instead of the planned CA\$1 million) in late 2022, the upcoming activities are adequately funded.



Nikolaos Cacos, CEO

Exclusive interview with Nikolaos Cacos, CEO of Blue Sky Uranium

What have you and your company achieved in the past 12 months?

2022 was a great year for Blue Sky Uranium.

We are embarked upon a major uranium resource expansion at the company's large, 100%-controlled Amarillo Grande project in uranium-savvy Rio Negro province in nuclear-savvy Argentina.

At the start of the year, we had an inferred resource of 22.7 million pounds U_3O_8 and 11.5 mm lbs vanadium (V_2O_5), as reported in the company's news release dated February 27, 2019. The resource was based on 848 RC drill holes covering the near-surface, sandstone-type Ivana deposit at the far south end of Amarillo Grande.

In 2022, we drilled 350 holes, approximately 3,346 meters, from an overall budget for 8,000 meters. The deposit – and the next six uraniumiferous zones for expansion – are all near-surface. So, drilling holes of 10 – 40 meters can get a lot done at a smaller cost, and less time.

We performed in-fill drilling at Ivana, and to the west of the known mineralization, in an effort to bring a good portion of the resource up to the measured and indicated level, and to increase the resource at Ivana.

And we put in initial holes at two of the six additional zones that demand drilling for expansion of the entire Amarillo Grande

project area, the Ivana Central and Ivana North zones. Both of these areas had complete geophysical and geochemical workups prior to 2022, and drill targets were set.

As of today, the results from many of these holes have not been received yet. And many have been announced, with a plan to provide an updating resource estimate at Ivana and the overall Amarillo Grande project late in the first quarter this year.

What are the most important catalysts for the next 6 to 12 months?

Blue Sky Uranium and our Amarillo Grande project in Argentina are packed with catalysts for the coming months.

First, we have assays coming in from drilling at Ivana, Ivana Central and Ivana North. Where is the best expansion potential? In 2022, we budgeted for 8,000 meters of drilling, with more than half of the drilling still to be completed this year.

Second, we anticipate putting out an updated resource estimate for Ivana in the first/second quarter. Coming from an already large 22.7 mm lbs, expansion of the resource could start to get exciting. Can we get the resource at Ivana, or for all of Amarillo Grande, above 50 million pounds this year? That would be a truly world-class, se-

rious uranium project at a superb time in the market.

Third, we have been performing advanced process design test works at the Saskatchewan Resource Council, as supervised by our Technical Independent Advisor, Chuck Edwards.

We had completed a Preliminary Economic Assessment, as reported on February 27, 2019, which demonstrated that Amarillo Grande holds one of the lowest-cost deposits, certainly within the lowest quartile of projects globally. At the time, assuming today's price of \$50/lb, all-in sustaining costs were estimated at US\$18.27/lb U_3O_8 , with a capital expenditure of \$128 million.

We could well improve even on those low-cost estimates with a larger resource, and technological advances. We intend to advance the Ivana deposit towards the pre-production stage by demonstrating that a prefeasibility study is imperative.

In addition, we have advanced geochemical and geophysical studies at an additional two zones that could, in 2023, be ready for first drilling, the Ivana East and Cateo Cuarto zones. So, in 2023, we will make advances at Ivana, and potentially also the Ivana North, Ivana Central, Ivana East and Cateo Cuarto zones, each very large, near-surface uraniumiferous prospects.

How do you see the current situation on the market for uranium?

The price of uranium is likely to rise this year, and for many reasons.

- The number of nuclear power plants in operation globally is rising every year. So, more uranium is getting used every year. Stockpiles are running thin.
- Concurrently, Russia's uranium production and enriched uranium or nuclear fuel, in now off-limits for Western countries. As utilities and governments make new contracts for uranium and nuclear fuel for their power plants, they are NOT

renewing contracts with Russia, and for obvious reasons.

- Concurrently, as is clear from the price chart of uranium, when the price has fallen below \$50/lb. over the last year, buyers of several types are acquiring the uranium: physical uranium trusts, uranium funds, uranium developers with cash.
- In addition, the U.S. – the world's largest user of uranium and nuclear fuel – initiated its Strategic Uranium Reserve in December 2022 and has contracted to purchase US-produced uranium for \$59.50 to \$64.50/lb, a clear signal.

In fact, the Western world badly needs large new supplies of uranium to replace Russia's weaponized supplies. Blue Sky Uranium, with our Amarillo Grande uranium project, is working overtime to help to fill that demand.

