Uranium Report 2022

Everything you need to know about uranium!

SRC swiss resource capital ag

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Dear Readers,

With this edition of the Uranium Report 2022, we are already in the sixth year of this special report series. And we are now right on target, because uranium has recently shown a lot of relative strength, which can be seen in the great imbalance of falling supply and rising demand at the same time. First and foremost, the uranium ETF Sprott Physical Uranium Trust, but also other market players ensured that the uranium spot market was literally swept dry, the spot price rose to over US$ 60 per pound and the shares of many uranium stocks also shot up. The purpose of these new types of uranium ETFs is very simple: in addition to creating an opportunity for investors to profit directly from the price of uranium, the main aim is to take uranium off the spot market and to force demand-side utilities into negotiations on new long-term contracts.
Uranium and nuclear energy 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 so far shown a total inability to act. Because without emission-free and at the same time base-load capable nuclear power, which is based on the „fuel" uranium, many countries will not only have a huge problem in the stable basic energy supply and, due to the electromobility revolution, a real power supply problem in itself, but will completely lose sight of the goal of a world that is as CO_2-free as possible.
In the future, so-called Small Modular Reactors (SMRs) will play an increasingly important role. These are nuclear fission reactors that are smaller than conventional reactors and can be manufactured in a factory and then transported to an assembly site.
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 provided the corresponding funds 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.

Raw materials are the basis of our entire economic life. Without raw materials, there are no products, no technical innovations and no real economic life. We need a reliable and constant basic energy supply for our highly industrialized world.

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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.

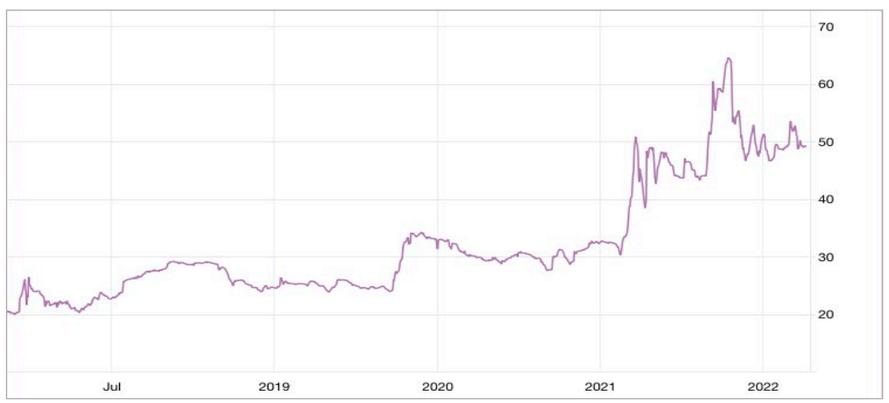
Tim Rödel is Manager Newsletter, Threads & Special Reports at SRC AG. He has been active in the commodities sector for more than 15 years and accompanied several chief-editor positions, e.g. at Rohstoff-Spiegel, Rohstoff-Woche, Rohstoffraketen, the publications Wahrer Wohlstand and First Mover. He owns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

Uranium is unstoppable:
The renaissance of nuclear power as the most important base-load energy source has already started

Nuclear power is currently on everyone‘s lips. And this not only in Germany, which tends to be a nuclear power-phobe, but also worldwide. In view of numerous unsolved problems regarding the current and future energy supply from sources that are as CO_2-free as possible, as well as unsolved dependency scenarios – above all Europe‘s dependency on non-European gas – the almost emission-free generation of electricity by means of nuclear fission is experiencing a true renaissance. China is once again one step ahead here and is planning to build 10 nuclear power reactors per year. But India, soon to be the country with the largest population, as well as established nuclear power nations such as Japan, Great Britain, France and the USA are also working on recommissioning, extending the operating lives of or building new nuclear reactors which, as the only regenerative energy source, can constantly supply emission-free electricity at the same high level (see the box „Base load capability, what is it? „). In the future, the focus will no longer be on the familiar, large nuclear reactors, but on far smaller reactors that can be manufactured in factories on a modular basis and installed at almost any desired location. Several of these so-called „Small Modular Reactors“ – SMRs for short – are already in the construction phase. Two of them are already in operation. It is precisely this flexibility that should ensure an explosion in demand in the future for the raw material that is essential for nuclear fission: uranium.

Nuclear power has already received an additional boost from the European Commission‘s decision at the beginning of 2022 to give nuclear energy a „climate label“ and to include it in the so-called Taxonomy Regulation, which is intended to stimulate billions of euros of investment in green energies. In addition, Russia enriches a good 45% of the world‘s uranium production and will now be out of business as a supplier for many countries. On the other hand, many uranium producers have sharply reduced their production in recent years and even acted as buyers themselves – alongside ETFs, funds and countries such as the USA. This has recently created a supply deficit of more than 50 million pounds of U_3O_8 per year. Accordingly, the inventories of many energy suppliers (utilities) have been exhausted, so that they now have to come back to the negotiating table and conclude new long-term supply contracts.

This naturally opens up excellent opportunities for interested shareholders to participate in the uranium market. Some interesting investment opportunities can be found in this report.



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

Base load capability, what is it?

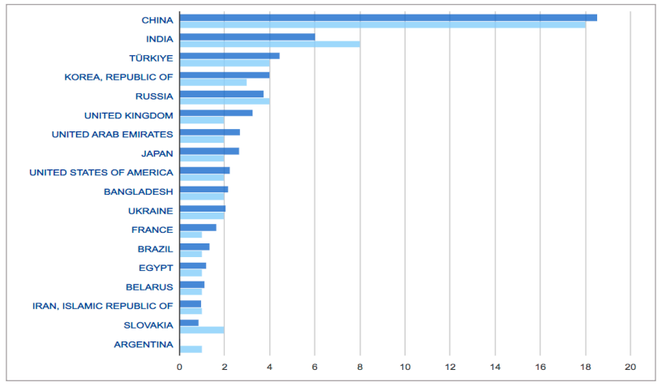
Base load capability is the ability of a power plant to provide continuous, reliable electrical power. This includes nuclear power plants, coal-fired power plants, gas-fired power plants, oil-fired power plants and steam power plants fired with substitute fuels. Combined heat and power plants, biomass 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.

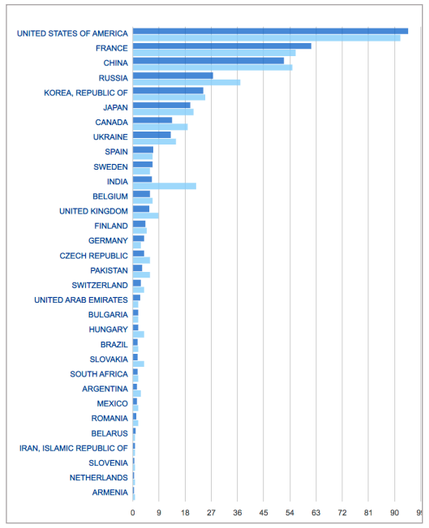
The number of nuclear power reactors worldwide continues to increase

Since the beginning of 2022, 5 new nuclear power reactors have been connected to the grid worldwide, while 4 smaller reactors have been permanently taken offline. At the same time, construction began on 6 new reactors. At the end of September 2022, 33 nations were operating 426 reactors with a total net electrical capacity of approximately 381.4 gigawatts. In the past 10 years alone, 67 new reactors have been connected to the grid worldwide.

The USA is currently the leading nuclear power nation with 92 reactors in operation. However, emerging countries such as China and India are in particular need of more and more energy and have been focusing on a massive expansion of their nuclear power capacities for some time now. It is therefore not surprising that 57 additional nuclear reactors with a total net electrical output of around 59 gigawatts are currently under construction – 18 of them in China alone. Planning has already been completed for around 120 additional ones, and more than 300 others are in the pipeline.



Overview of reactors currently under construction (blue) and the corresponding net electrical output (light blue) per country. (Source: www.iaea.org/PRIS)

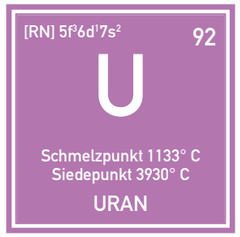


Overview of currently operating reactors (blue) and net electrical power (light blue). (Source: www.iaea.org/PRIS)

Uranium facts

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 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 extraction and extraction 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 production

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 Production

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 – 180 million pounds of U_3O_8 per year.

The USA extends power plant lifetimes

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 continues to ignite the turbo

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.
The Chinese government plans to build more than 80 new nuclear reactors in the next 15 years and over 230 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 16 nuclear reactors are currently under construction.

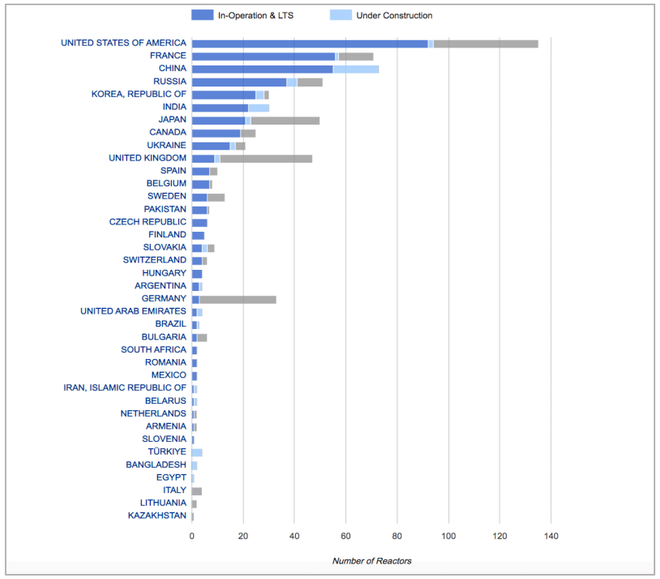
India second in expansion

India, the world's second 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 them was newly connected to the grid in 2022.
Currently, 6 nuclear reactors are under construction in India, with 40 more to follow by 2050.

Russia with increasing 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 20%.

Overview of reactors currently in operation (blue), reactors currently shut down (gray) and reactors under construction (light blue). Source: www.iaea.org/PRIS



Japan wants to return to full capacity utilization

Once the world's second-largest nuclear power producer, Japan is already operating 21 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 12 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.

Increasing global expansion of nuclear energy

In addition to the 33 nations (including Taiwan) that already have nuclear reactors on the grid, 17 countries have nuclear power plants under construction. These include Argentina, Bangladesh, Slovakia and Turkey. Other countries, such as Egypt, Jordan and Indonesia, are planning to build several reactors in the coming years.

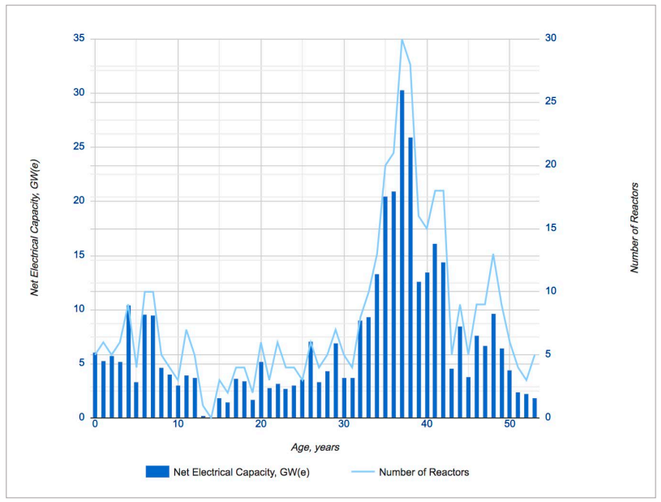
Modular small power plants to dominate in the future

A huge future growth market for uranium is currently emerging. It involves so-called „Small Modular Reactors" – SMRs for short. These are small 5–300-megawatt units that can be built in a modular fashion in a factory and moved to the eventual deployment site. 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 due to their load-sensing characteristics and zero-emission operation. The individual SMR units have a capacity of less than 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 support for these innovative, carbon-free energy sources in the United Kingdom, Canada, and the United States.
Among others, Microsoft founder Bill Gates 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.
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.
At present, France and the Czech Republic in particular are pushing ahead with the expansion of an SMR fleet.

Nuclear power operators are forced to conclude new 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 thinly traded commodity such 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 more buying activity.

Overview of the age of currently operating reactors. Many will (have to) be replaced by more powerful ones in the coming years. Source: www.iaea.org/PRIS



The current supply situation – 130 million pounds of U_3O_8 per year.

Uranium production in sharp decline

In 2021, 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.

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 extracted. The known reserves would then last for about 54 years at current consumption levels.

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 the lack of further reserve availability (as was recently the case at the Cominak and Ranger mines).

U.S. uranium production at zero

The uranium industry in the USA has come to a virtual standstill recently. Since 1980, virtually nothing has been invested in the development of new deposits, and nearly 95% of the uranium required has been obtained 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. In total, the USA has a production capacity of around 30 million pounds of U_3O_8 per year, about half of which has a production license.

Kazakhstan is by far the largest producer

While nearly all established uranium producers are struggling to expand their uranium production, one region has now moved past all others to the top of 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.

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 indefinitely in January 2018. 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. The temporary closure removed 10% of the world‘s total production from the market in one fell swoop. 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.
Since 2017, Kazatomprom reduced its uranium production by about 15% and Canada by about 45%. In addition, there are closures at Moab Khotseng 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 been opening up for some time now

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 a quarter of global annual demand. Thus, 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 426 nuclear reactors worldwide at about 180 million pounds of U_3O_8, of which only about 124 million pounds could be met by global uranium production in 2021.
Over the past five years, global production has lagged behind global uranium consumption by about 40-60 million pounds per year.

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 International Atomic Energy Agency (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 25% increase in demand by 2030.

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 rise sharply due to the construction of several hundred new nuclear reactors, so that the market price will benefit twice over. And thus, of course, also those investors who have recognized this trend in time.

A high proportion of demand is currently unmet

Unmet demand is expected to exceed one billion pounds of U_3O_8 over the next ten years. 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.

Governments 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 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 US companies started recently.

Uranium funds and uranium companies 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 able to purchase larger quantities of uranium. All these players took about 80 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 shares 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.

Hobson Production Facility
(Source: Uranium Energy)

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 has increasingly become the focus of investors because it has been classified as a „green technology“ by many governments worldwide. What does this mean for the uranium sector?

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 for the coming winter is to be secured. 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. This is reflected in the formulation of the „New Green Deal“ by the Biden administration, the shaping of the EU taxonomy by the Commission or the objectives of the Japanese government, which is working on a forced comeback of nuclear energy a good ten years after Fukushima. Underlying all these political approaches is the recognition that the unavoidable fluctuations in the production of alternative energy sources must be balanced out within the framework of a stable power grid. 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 CO_2 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. It will also be easier to tap investor funds. 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. 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 necessary research funds 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. 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.

To what extent does the conflict between Russia and Ukraine affect the global supply of uranium?

Security of supply is a key issue for nuclear power plant operators. This is explained by the cost structure of these power plants. In contrast to fossil-fueled (gas or coal) 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.

In terms of the supply situation, the period since the Fukushima reactor accident has been mostly comfortable for power plant operators. For the most part, supply was greater than demand and the availability of uranium on the spot market was good. During this time, uranium producers from Kazakhstan, Uzbekistan or Russia have steadily gained market share due to their attractive positioning on the aggregate cost curve. As a group, these producer countries now hold a good 50% share of the uranium market. With a weight of 40%, Kazakhstan plays a dominant role.

Accordingly, the social unrest in Kazakhstan at the beginning of the current year and the associated military intervention by Russia were already an initial wake-up call for the global nuclear industry. Even then, it became clear that the long-term supply contracts concluded with producers from Kazakhstan were probably riskier than had been thought a short time before. The issue of strategic supply security was launched.

Since Russia‘s attack on Ukraine, it has dominated the agenda. Russia is not only a uranium producer, but with „Rosatom“ also a weighty player in uranium enrichment and fuel production. This dependence can be expressed in figures: Western industrialized countries have about 70% of the global reactor fleet, but only 40% of the „downstream capacity“ („conversion“ / „enrichment“ / fuel production). Accordingly, Western power plant operators are currently focused on securing part of this scarce capacity on a contractual basis. The price development observed at the back end 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 uranium 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 (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 ura-

nium 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 additional annual demand of about 20 million pounds of uranium (U_3O_8). This in a market environment that is already very tight.

In the current sanctions discussion, there are voices on both sides. Aware of Western dependencies, Russian voices are calling for an export ban on uranium and nuclear fuel. On the other hand, bills are pending in both chambers of the U.S. Parliament that aim to ban imports of Russian uranium.
As of today, the outcome of these discussions is open. Due to the existing stocks at the power plant operators, the smooth continued operation of the nuclear power plants is ensured for the next 12 to 18 months, irrespective of the outcome of these discussions. However, against the background outlined above, we expect massive structural shifts on the uranium market in the medium term:

1. Western power plant operators will want to diversify their supply sources and enter into 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 uranium and nuclear fuel from Russian sources wherever possible. A geopolitically driven division of the uranium market is emerging (bifurcation).

2. Power plant operators are also addressing the issue of strategic security of supply with more extensive stockpiling. As the latest quarterly statement of the Canadian uranium producer „Cameco“ has 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.

3. The outlook for existing and prospective uranium producers has thus improved significantly. On the one hand, they benefit from the willingness of demanders to conclude new long-term supply contracts (see „Cameco“). On the other hand, the recent significant increase in the uranium price provides incentives to bring existing production capacities, which have been shut down for economic reasons, back into production and to push ahead more consistently with the realization of projects which have already been approved. These are the first tentative steps towards reducing the still growing supply gap on the uranium market.

In summary, despite the current political and military uncertainties, from a fundamental perspective the medium-term outlook for producers on the uranium market has further improved.

Since 2018, uranium producers worldwide have been trying to find a balance between production and demand. What has actually happened since then, and is it really sustainable?

In this context, it is important to distinguish between strategic and cyclical market developments. The Corona-related production cuts have relieved the market in the short term as part of a cyclical fluctuation and supported the spot price. This was because, due to interruptions in production, renowned producers were no longer able to cover their delivery obligations from their own uranium production, but only with purchases on the spot market. This was a welcome contribution to the desired stabilization of the market. However, these capacities will sooner or later find their way back into the market. Accordingly, the resulting support for the uranium price was also only of a temporary nature. This process will continue in the case of the recent production outages due to supply chain delays.
More important for the further development of the uranium price, however, are the changes at the strategic level. Under the leadership of the two heavyweights „Kazatomprom“ and „Cameco“, the supply side has attempted to lead the uranium market back to a new equilibrium over the past four years with significant production cuts. We are seeing previously unknown supply side discipline in the market today. As a result, global mine production is likely to have reduced by around a quarter compared to 2016.

These production cuts reflect nothing more than the recognition of economic realities by uranium producers. From the point of view of the mine operators, the ratio of the production costs of their existing capacities (ASIC – All In Sustaining Costs) to the spot price is relevant. If these costs are higher than the selling price realized on the spot and forward markets, then uranium production makes no sense from an economic point of view. If the uranium price rises sustainably above the level of production costs, capacities that have been temporarily shut down for economic reasons (mines in „care and maintenance“ status) will find their way back to the market. This is the background to the recent announcements by „Cameco“ to bring their „McArthur River“ and „Cigar Lake“ mines (partially) back into production from 2024.

„In summary, despite the current political and military uncertainties, from a fundamental perspective, the medium-term outlook for producers in the uranium market has continued to improve.“

In retrospect, it can be stated that this strategy to discipline the supply side has worked. The uranium price has now completed its bottoming out and recently reached its highest level since 2012. Given the improvements on the demand side discussed earlier (extension of operating lives, construction of new reactors, desire to diversify supply sources), we see price risks on the demand side of the market in the current environment. Over the past 12 to 18 months, the uranium market has changed from a buyer‘s market to a seller‘s market.

As the „Cameco“ example shows, a significant expansion of production volumes is not to be expected in the short term, even in an environment with stronger increases in uranium prices. For technical reasons, this is not feasible even for established producers in the short term (within 12 to 18 months). At most, a question mark could be placed behind the production discipline of „Kazatomprom“. In view of Russia‘s increased influence on the government of Kazakhstan, one can indeed question the adherence of the 75% state controlled „Kazatomprom“ to its self-imposed production restrictions. So far, however, we have not heard any signals from management regarding such a change in strategy. Here too, for technical reasons (supply chain problems, time-to-market of new in-situ production capacities), a short-term expansion of production seems unlikely to us. On the contrary, in the current (sanctions) environment, the risk of limited availability of Kazatomprom production due to delivery difficulties (shipping via St. Petersburg) seems more likely than an unexpected production expansion.

You manage the Uranium Resources Fund (ISIN LI0224072749) of LLB Fundservices AG in Liechtenstein. What strategy are you pursuing and what does the fund actually represent?

The investment strategy of the Uranium Resources Fund is based on our 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 to the market.

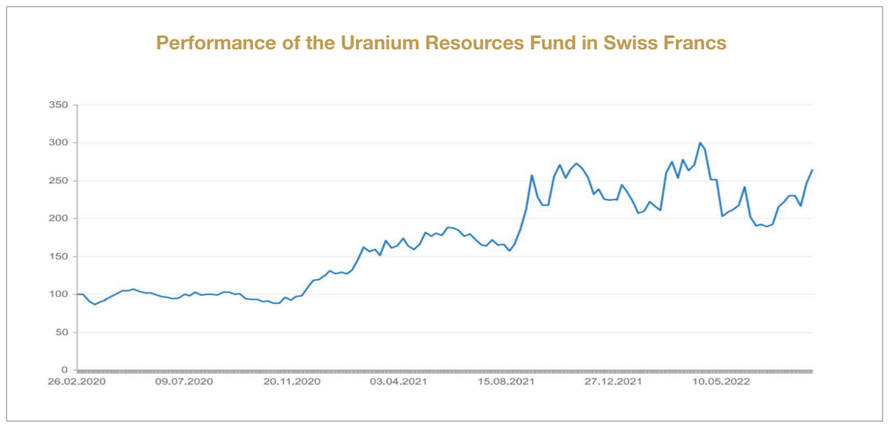
The Fund holds 25 to 30 positions in the portfolio and is suitable for the long-term oriented investor who wishes to participate in the interesting prospects of the uranium sector. The assets are invested worldwide in companies that have a direct link to the uranium sector, in accordance with the principle 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.

What selection criteria do you use when choosing fund stocks, and what are your current top performers?

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. The first pillar is our strategic liquidity ratio. This ensures our ability to act at any time. 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.



Performance of the Uranium Resources Fund in Swiss Francs (Source: incrementum.li)

„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.“

The third pillar focuses on the shares of uranium producers or „standby“ producers with approved and/or realized projects that are not currently 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, due to the current environment, with some restrictions „Kazatomprom“. Both companies 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.

What advice do you have for investors interested in investing in the uranium sector?

As discussed, the prospects of promising uranium stocks are promising. On the other hand, the volatility of these shares is extraordinarily high due to their low market liquidity and implicit project risks. Those who put all their eggs in one basket in this speculative constellation are therefore playing high poker – possibly even too high. 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.

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 U_3O_8. 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.

You have been in the uranium and nuclear energy business for 38 years now. Can you share with our readers your path to get here and observations on how this time compares with other periods in the uranium market history?

It has truly been a pleasure to be engaged in this incredible industry throughout all these years. The mid-1980's had me trading uranium commodities with the German company, Nukem Inc. in New York, followed by my time as a nuclear fuel buyer for the Palo Verde Nuclear Power Station in Arizona. The next two decades were devoted to Cameco, from the time of their merger out of Canadian Federal and Provincial Crown corporations, to becoming the largest publicly listed uranium miner, operating the world's leading operations in Saskatchewan and selling over 34 million pounds of uranium annually to all of the world's nuclear utilities. Among many amazing experiences at Cameco, important new markets in China and India were opened up during this time. The early part of the last decade had me leading the marketing efforts of Uranium One, the global uranium production subsidiary of Russia's Rosatom with extensive experience in Kazakhstan, the United Arab Emirates, and China. Finally, I embarked on my current leadership positions at Uranium Energy Corp. and Uranium Royalty Corp. Mixed in there were consulting roles with the management of uranium activities at Sprott Physical Uranium Trust-forerunner, Uranium Participation Corp. and as Advisor to the CEO of Kazatomprom, assisting in their transition from state-owned-entity to publicly traded company.

With all these experiences behind me, including all the highs, and some very challenging times for our industry, I can say that I have never been more optimistic about the prospects for nuclear energy and uranium in the coming months and years.

Uranium Prices have recently been trading around $50 per pound but reaching as high as $63 earlier this year. This is up significantly from the bear cycle lows of $17.70 per pound in November 2017. What is behind this bull market move in uranium prices?

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 pipeline 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. 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 is transitioning from being inventory-driven, to one more reliant on the cost and timing of production from new and restarted mines.

What impact has society's desire to decarbonize our economy had in terms of nuclear growth on the demand side for uranium?

Just as the global uranium industry was focusing on the rationalization of production in light of low market prices that were below global extraction costs, we have seen an unprecedented embrace of nuclear power for the role it can play in a lower-carbon future. 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 it is a prioritization of the reliability and affordability of 24/7, baseload power, nuclear energy delivers both. 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 64 large, modern nuclear power plants connected to the global electric grid and 54 more commence construction. 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, 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 announcement last year, 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 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 between these competing objectives.

In that regard, how is the Russian invasion of the Ukraine impacting the global 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 worlds largest uranium producer. In the United 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

„The humanitarian catastrophe caused by the Russian invasion in Ukraine will affect society in many ways in the years ahead. Perhaps the most lasting impact on global energy supply will be the renewed and pronounced awareness of energy independence and security.“

are these supplies potentially subject to sanctions (the U.S. Congress has 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 will face mounting pressure to act from shareholders and customers, like the protests we have seen at EDF's headquarters in Paris. 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 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.

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

„As we have been saying for some time, the market fundamentals were ripe for a significant and sustained recovery in uranium prices. We are now seeing this is coming together in a big way, supported by the megatrend towards decarbonization of energy supplies and by supply shocks triggered by a global pandemic and an apocalyptic invasion of Central Europe.“

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 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. The recent acts of sabotage in the Baltic Sea further escalate the stakes in this "energy war".

In Europe alone, we are seeing the reversal of phaseouts of nuclear power in countries like Belgium 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 uninterruptable electricity.

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

Profitable Surface Mining in Argentina with Low Capital Expenditure

Blue Sky Uranium is a Canadian uranium development company and owns several large uranium licenses in the Argentine provinces of Rio Negro and Chubut, which can be exploited relatively easily in 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 the country. Blue Sky Uranium has already been able to present a large resource and a positive economic analysis for one of three subprojects.

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.

(Source: Blue Sky Uranium)

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 located 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 which will focus 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 resource 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 payback 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 existence since 1993, specializing in South America, particularly Argentina, and during

this time 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: Widely oversubscribed financing shows leap of faith

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, the construction of which is scheduled to start this year. 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 contain 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 objective is to supply its own uranium to Argentina's currently 3 operating nuclear reactors, the reactor under construction and the planned reactor. Using an oversubscribed financing of CA$2.1 million (instead of a planned CA$1.05 million) in mid-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?

Blue Sky Uranium announced assay results from the third and last tranche of the recently completed reverse circulation drilling program at the Ivana Deposit within its wholly owned Amarillo Grande Uranium-Vanadium Project in Rio Negro Province, Argentina. This tranche of drilling returned 2,042 samples from 209 holes averaging 9.3m depth that tested areas of lower drill hole density at the margins of, and within, the western portion of the Ivana deposit, as well as testing the potential expansion of the deposit to the west. These results will be included in a future mineral resource estimate update for the Ivana deposit.

These results complete a very successful program, once again hitting significant uranium and vanadium mineralization both at our infill and expansion targets. We look forward to updating our resource estimate and moving the Ivana deposit closer to a prefeasibility stage in the future."

The assay results from drilling in the step-out zone, to the west of the current Ivana mineral resource, have confirmed the presence of uranium and vanadium mineralization near surface.

The entire program collected 3,136 samples from 350 new holes, totaling 3,346 metres drilled. This new data set will be included in a future mineral resource estimate. The new database includes samples from 838 RC holes sampled every metre. The aim of a new resource estimation is to upgrade a portion of the current inferred mineral resources into indicated mineral resources for the purposes of supporting a future prefeasibility study (PFS).

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

The Company's 100% owned Amarillo Grande Uranium-Vanadium Project in Rio Negro Province, Argentina is a new uranium district controlled by Blue Sky. The Ivana deposit is the cornerstone of the Project and the first part of the district for which both a Mineral Resource Estimate and a Preliminary Economic Assessment have been completed. Mineralization at the Ivana deposit has characteristics of sandstone-type and surficial-type uranium-vanadium deposits. The sandstone-type mineralization is related to a braided fluvial system and indicates the potential for a district-size system. In the surficial-type deposits, mineralization coats loosely consolidated pebbles, and is amenable to leaching and simple upgrading.

The Project includes several other target areas over a regional trend, at or near surface. The area is flat-lying, semi-arid and accessible year-round, with nearby rail, power and port access. The Company's strategy includes delineating resources at multiple areas and advancing the entire project to prefeasibility level in the coming year

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

The uranium market is looking very strong in the coming years with a new recognition that uranium has to be part of the green agenda and governments around the world understand this and are re-rating nuclear power as a green energy.

Once reactors are built, it is very cost-effective to keep them running, and for utilities to make any adjustments energy sources by cutting back on fossil fuel use. Demand forecasts for uranium depend mostly on operable capacity, regardless of economic fluctuations. Looking ten years ahead, the market is expected to grow. The Reference Scenario of the 2021 edition of the World Nuclear Association's Nuclear Fuel Report shows a 27% increase in uranium demand over 2021-30. Demand thereafter will depend on new plants being built and the rate at which older plant is retired – the Reference Scenario of the 2021 Nuclear Fuel Report has a 38% increase in uranium demand for the decade 2031-2040. However, with electricity demand by 2040 increasing by about 50% from that of 2019 (based on the International Energy Agency's World Energy Outlook 2020 report), there is plenty of growth in nuclear capacity in a world concerned with limiting carbon emissions.

Blue Sky Uranium Corp.

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WKN: A12GAR
FRA: MAL2
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