TB AMATI STRATEGIC METALS FUND

Uranium - why we should care right now

By Georges Lequime, Fund Manager

Accelerated decarbonisation initiatives and the emergence of financial players in the uranium spot market has fueled a sharp rise in spot (120%) and term (60%) prices over the past three years, following years of underinvestment in the primary supply of uranium and supply cutbacks. A supply deficit is forecast to continue for a few years, which is being exploited by financial players trying to soak up as much supply on the spot market, in an attempt to establish a more realistic incentive price for new supply coming onto the market. In addition, the West is facing a real threat of a bifurcated world, where the continued source of cheap uranium is no longer guaranteed.

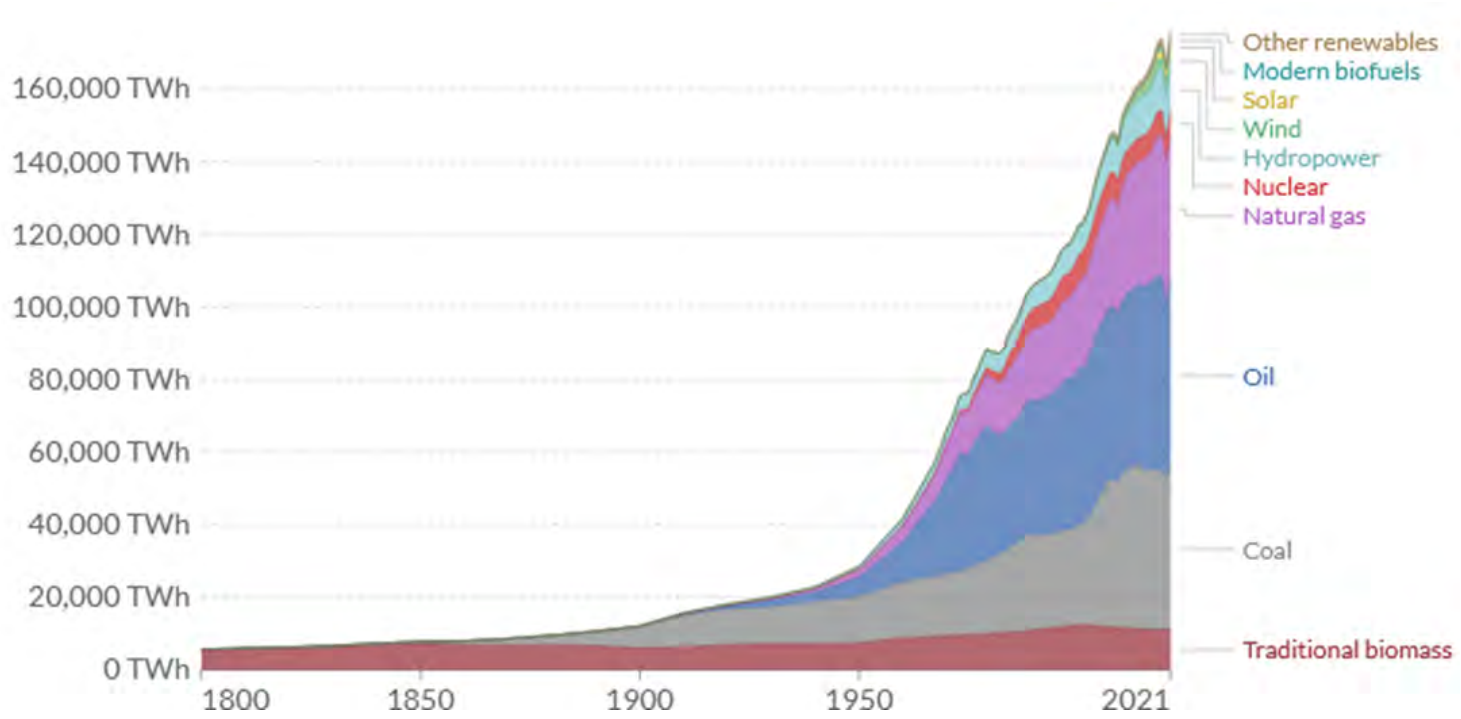
Figure 1 - Uranium Price 1988 - October 2022

Source: Cameco

According to the World Nuclear Association, nuclear energy generation accounted for 10.3% of the world's electricity generation in 2021. This equates to 2,653 TWh of energy from 427 active nuclear reactors. Another 56 reactors are currently under construction (mainly in China, India and South Korea), with a further 434 reactors either planned or proposed.

Western Europe and the USA account for almost 65% of world's current nuclear energy generation, while Kazakhstan, Russia, Uzbekistan and China account for 60% of the world's primary U_3O_8 supply.

Figure 2 - Global primary energy consumption by source



Source: Our World in Data

The shift away from the burning of fossil fuels and biomass, coupled with the clear geopolitical issues surrounding the dependency of the sourcing of natural gas is putting greater and greater focus on nuclear power and renewable technologies. The difficulty in the scalability of hydropower, solar and wind power in a reasonable time frame suggests that nuclear power will assume a more prominent role in the energy mix going forward. Uranium is seen to be at a critical turning point where there is no path to zero that does not involve uranium.

China, which still sources only 5% of its energy needs from nuclear, has been the initiator of the nuclear revolution in recent years with 22 reactors currently under construction and a further 194 reactors planned or proposed. The United States is deeply committed to nuclear energy, which currently provides 20% of its energy needs and enjoys bipartisan support for expanding its nuclear capabilities. The US Department of Energy (DOE) is currently requesting US$3.5 billion to rebuild America's nuclear fuel supply chain, including uranium mining, in order to eliminate US dependence on Russian nuclear fuel imports. A further US$2.6 billion has been requested to stimulate the small modular reactor (SMR) industry. The recently announced Inflation Reduction Act included a $15/kwh investment tax credits from 2023, US$700m grant to build an enrichment facility and further loan guarantees of up to $40 billion to the uranium fuel supply chain.

In October 2022, Cameco, the world's largest global supplier of uranium fuel for nuclear energy, and the private equity firm, Brookfields, acquired Westinghouse Electric Company, which services about half the nuclear power generation sector and is the original equipment manufacturer to more than half the global nuclear fleet. Again, an endorsement from the world's leading player in the uranium industry that the shape and size of the global uranium market is about to undergo major changes.

We believe that the move by Cameco to vertically integrate its business is motivated by a desire to counter Russia's dominance in the conversion and enrichment side of the industry and influence in the nuclear reactor industry in Eastern Europe. At present, nuclear fuel from Russia has escaped sanctions due to the West's dependence on the fuel. The US still sources 20% of its enriched uranium from Russia, while Europe sources 40% of its needs from Russia. Capacity in Western Europe and the US can be expanded but will be maxed out in 2027-2029 without building new enrichment plants, which takes time. The conversion capacity can also be expanded in the West but will also be maxed out by 2027-2029.

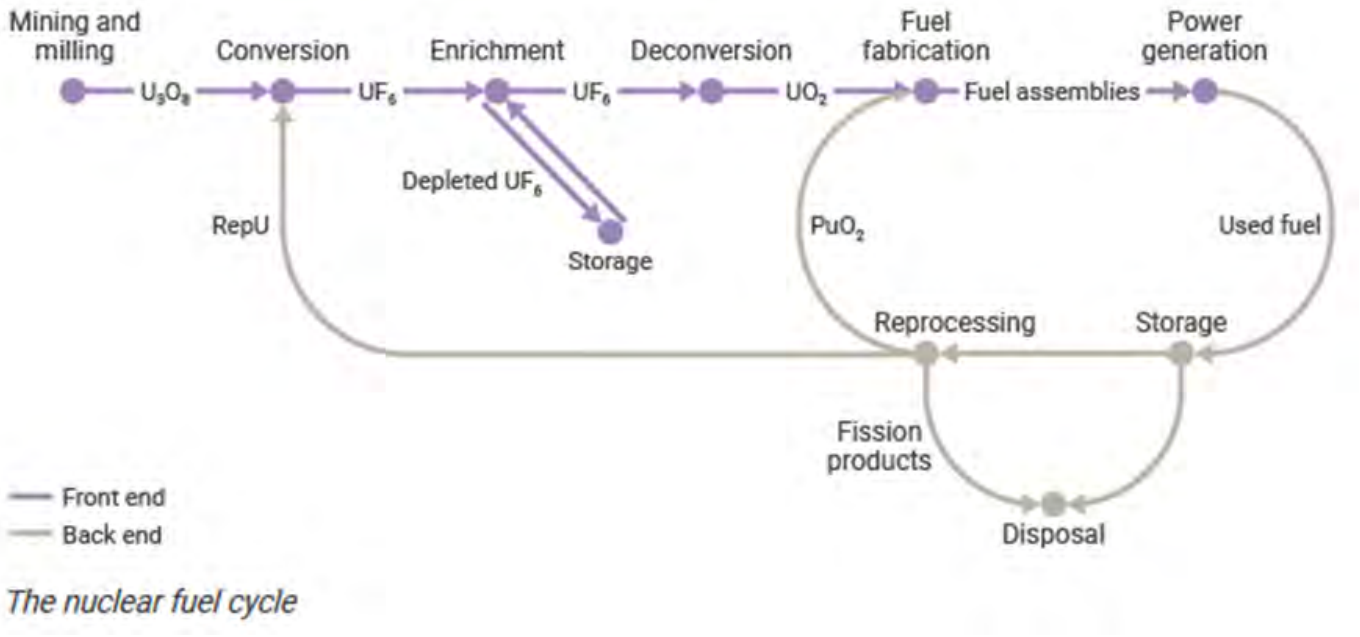
Introduction to Uranium

The various activities associated with the production of electricity from nuclear reactions are referred to collectively as the nuclear fuel cycle. The nuclear fuel cycle starts with the mining of uranium and ends with the disposal of nuclear waste. With the reprocessing of used fuel as an option for nuclear energy, the stages form a true cycle.

To prepare uranium for use in a nuclear reactor, it undergoes the steps of mining and milling, conversion, enrichment and fuel fabrication. These steps make up the 'front end' of the nuclear fuel cycle.

After uranium has spent about three years in a reactor to produce electricity, the used fuel may undergo a further series of steps including temporary storage, reprocessing, and recycling before the waste produced is disposed. Collectively these steps are known as the 'back end' of the fuel cycle.

Figure 3 - The nuclear fuel cycle



The nuclear fuel cycle

Source: World Nuclear Association

Uranium is a slightly radioactive metal that occurs throughout the Earth's crust. It is about 500 times more abundant than gold and about as common as tin. It is present in most rocks and soils as well as in many rivers and in sea water. It is, for example, found in concentrations of about four parts per million (ppm) in granite, which makes up 60% of the Earth's crust.

There are a number of areas around the world where the concentration of uranium in the ground is sufficiently high that extraction of it for use as nuclear fuel is economically feasible. Such concentrations of minerals – including uranium – that can be extracted economically are referred to as ore.

Both surface (generally open pit) and underground mining techniques are used to recover uranium ore. In general, open pit mining is used where deposits are close to the surface, and underground mining is typically used for deposits at depths greater than 120 m.

An increasing proportion of the world's uranium now comes from in situ leach (ISL) mining, where oxygenated groundwater is circulated through a very porous orebody to dissolve the uranium oxide and bring it to the surface. ISL may use either weak acid or alkaline solutions to keep the uranium in solution. The leached uranium oxide is then recovered from the solution as in a conventional mill.

The uranium oxide product (U_3O_8) of a uranium mill is not directly usable as fuel for a nuclear reactor – additional processing is required. Only 0.7% of natural uranium is 'fissile', or capable of undergoing fission, the process by which energy is produced in a nuclear reactor. The form (or isotope) of uranium which is fissile is uranium-235 (U-235). The remainder is uranium-238 (U-238).

For most kinds of reactor, the concentration of the fissile U-235 isotope needs to be increased – typically to between 3.5% and 5% U-235b. Isotope separation, the physical process to concentrate (or 'enrich') one isotope relative to others, requires the uranium to be in a gaseous form. The uranium oxide is first refined to uranium dioxide, which can be used as the fuel for those types of reactors that do not require enriched uranium. The balance – most of the uranium oxide – is then converted into uranium hexafluoride, which is a gas at relatively low temperatures. The uranium hexafluoride is then drained into 14-tonne cylinders where it solidifies. These strong metal containers are shipped to the enrichment plant.

The enrichment process separates gaseous uranium hexafluoride into two streams: one being enriched to the required level and known as low-enriched uranium; the other stream is progressively depleted in U-235 and is called 'tails', or simply depleted uranium.

The product of this stage of the nuclear fuel cycle is enriched uranium hexafluoride, which is reconverted to produce enriched uranium oxide. Up to this point in the cycle the fuel material can be considered fungible (though enrichment levels vary), but fuel fabrication involves very specific design.

Figure 4 - World Nuclear Operating Capacity

World Nucleur Operating Capacity	2019A	2020A	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Reactor Capacity (Gwe)												
Western Europe	134	132	129	124	124	124	120	125	128	128	129	127
United States	98	97	96	98	98	98	98	98	98	98	98	98
China	46	47	50	54	55	59	64	69	77	87	96	108
Russia	29	29	28	29	30	30	30	30	33	36	37	42
South Korea	23	23	23	25	27	29	29	29	29	29	29	29
Canada	14	14	14	14	14	14	14	14	14	14	14	14
Japan	9	9	9	11	12	12	12	13	13	15	15	15
India	6	6	7	8	11	11	11	13	13	15	17	18
Rest of the World	9	11	13	14	18	23	25	28	33	37	42	42
Total Demand	368	368	369	377	389	400	403	419	438	459	477	493
Translated Reactor demand (U3O8)	179	179	179	183	189	194	196	203	213	223	232	239
North America/Western Europe	67%	66%	65%	63%	61%	59%	58%	57%	55%	52%	51%	48%

Source: Canaccord Genuity

Nuclear energy generation is expected to increase by 30% over next eight years, requiring an additional 56 million lbs per annum of Uranium oxide.

The table above excludes a probable increase in uranium demand for use in small modular reactors (SMRs). SMRs are seen as playing a part in the future of energy generation due to their proven safety, lower capital intensity and funding and policy support. While still unproven, already 83 different designs exist, involving a number of companies committing capacity to its development.

SMRs have the potential to increase overall uranium oxide demand by 3-5% by 2030, further tightening an undersupplied market.

Supply and Demand Balance

Figure 5 - Global Uranium Oxide Balance

Global Market Balance												
(in million lbs U3O8)	2019A	2020A	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Mine Supply												
Kazakhstan	60	51	57	56	58	59	61	62	64	63	62	62
Canada	18	10	12	19	26	29	29	36	65	71	72	72
Australia	16	16	9	12	13	15	15	15	15	15	15	15
Africa (various)	23	24	20	19	20	22	30	29	25	25	20	19
China	4	4	5	5	5	5	5	5	5	5	5	5
Russia	8	7	8	8	8	8	8	8	8	8	8	8
Uzbekistan	9	9	9	9	9	9	9	9	9	9	9	9
Eastern Europe	3	4	4	4	4	4	4	4	4	4	4	4
United States	0	0	0	0	0	2	4	5	6	8	9	9
Total Supply	141	125	124	132	143	153	165	173	201	208	204	203
Mine Supply as a % of demand	80%	70%	69%	72%	73%	75%	79%	78%	88%	88%	83%	80%
YoY % Change		-10%	-1%	3%	0%	2%	4%	0%	3%	0%	-5%	-3%
Potential additional supply												
Underfeeding/Tails re-enrichment	18	17	18	15	13	12	12	12	11	10	9	5
US Government (DOE material inflows)	3	2	1	1	1							
Global reprocessed uranium / MOX	6	6	5	5	7	8	8	8	8	9	9	10
Other/Mobilisation of inventory	5	5	6	5	5	5	5	5	5	5	5	5
Total Secondary Supply	32	30	30	26	26	25	25	25	24	24	23	20
Secondary Supply as a % of demand	18%	19%	19%	16%	15%	14%	13%	13%	11%	10%	10%	9%
Total Supply	173	155	154	158	169	178	190	198	225	232	227	223
Reactor Demand												
China	22	23	24	26	26	28	31	34	37	42	46	52
Russia	14	14	13	14	15	15	15	15	16	17	18	20
Uzbekistan										1	1	1
Japan	4	4	5	5	6	6	6	6	6	7	7	7
South Korea	11	11	11	12	13	14	14	14	14	14	14	14
India	3	3	3	4	5	5	5	6	6	7	8	9
Other Asia	1	1	1	2	2	3	3	3	3	3	3	3
Middle East	0	1	2	2	3	5	5	7	9	9	11	11
Canada	6	7	7	7	7	7	7	7	7	7	7	7
South Africa	1	1	1	1	1	1	1	1	1	1	1	1
United States	47	47	46	47	47	47	47	47	47	47	47	47
Western Europe	53	51	50	46	46	46	44	45	46	44	44	43
Mexico	1	1	1	1	1	1	1	1	1	1	1	1
Argentina	1	1	1	1	1	1	1	1	1	1	1	1
Brazil	1	1	1	1	1	1	2	2	2	2	2	2
Eastern Europe	12	13	13	14	14	14	14	15	16	17	18	19
Demand from Change in Tails Assay					9	11	14	17	17	17	18	17
Total Demand	177	179	179	183	197	205	210	221	229	237	247	255
YoY % Change		1%	0%	2%	8%	4%	2%	5%	4%	3%	4%	3%
Market Balance	-4	-24	-25	-25	-28	-27	-20	-23	-4	-5	-20	-32

Source: Canaccord Genuity, TradeTech

At present, 16% of supply is sourced from secondary supply (civil stockpiles, recycled uranium and underfeeding at enrichment plants). This supply is expected to taper off over the next few years leaving a greater need to increase primary supply. While the supply-demand balance shows a shortfall of around 25 mlbs per annum, this can be deceptive due to the confidentiality of additional secondary supply and sales from stockpiles in Japan that were built up pre the Fukushima disaster in 2011.

Before the Fukushima disaster, Japan had planned to build 40-42 reactors and the Japanese industry kept a forward inventory of at least six years of U_3O_8. It is believed that the inventory today stands at 3-5 years. However, Japan has announced government funding to revitalise the industry. Japan's Prime Minister Kishida pledged to have up to 17 reactors restarted by the summer of 2023 and has asked the government to study the possibility of adding new advanced reactors. In addition, Japan's nuclear regulator recently confirmed plans to remove regulations that limit the operating life of nuclear power plants to a maximum of 60 years. No wholesale selling has been witnessed from Japan in recent years and it is expected that Japan will become buyers again after 2026.

The supply-demand balance also assumes that enrichment underfeeding (effectively uranium oxide inventory at the enrichment facilities) will change to overfeeding from 2023, increasing uranium demand. On the supply side, Cameco are in the process of restarting one of the world's highest grade uranium mines, the McArthur River/Key Lake operations in Canada, with production expected to reach 15 million lbs per annum in 2024. Production from Cigar Lake, the world's highest grade mine, however, will be cut from 18 million lbs in 2022 t0 13.5 million lbs in 2023 to "align with market conditions". Cameco have a further two mines on care and maintenance; US ISR operations (curtailed in 2016) and Rabbit Lake (also in 2016).

In Kazakhstan, Kazatomprom also has idled capacity which it plans to slowly start bringing back on stream in 2024. They have a stated objective to increase production to 65 million lbs in 2024.

Bifurcation

Russia's invasion of Ukraine and growing geopolitical tensions between the West and China suggests a split in the supply-demand balance between the "West" and the "East". We have tried to imagine a bifurcated world in the future and the implications for the uranium industry.

Figure 6 - Eastern Markets - Supply and Demand

EAST												
(in million lbs U3O8)												
Mine Supply												
Kazakhstan	60	51	57	56	58	59	61	62	64	63	62	62
China	4	4	5	5	5	5	5	5	5	5	5	5
Russia	8	7	8	8	8	8	8	8	8	8	8	8
Uzbekistan	9	9	9	9	9	9	9	9	9	9	9	9
Total Supply	81	71	79	78	80	81	83	84	86	85	84	84
Reactor Demand												
China	22	23	24	26	26	28	31	34	37	42	46	52
Russia	14	14	13	14	15	15	15	15	16	17	18	20
Uzbekistan										1	1	1
Japan	4	4	5	5	6	6	6	6	6	7	7	7
South Korea	11	11	11	12	13	14	14	14	14	14	14	14
India	3	3	3	4	5	5	5	6	6	7	8	9
Other Asia	1	1	1	2	2	3	3	3	3	3	3	3
Middle East	0	1	2	2	3	5	5	7	9	9	11	11
Total Demand	55	57	59	65	70	76	79	85	91	100	108	117
Eastern Market Balance	26	14	20	13	10	5	4	-1	-5	-15	-24	-33

Source: Amati

The above table simplistically assumes that Kazakh supply will ultimately be dedicated 100% to the reactors that are currently operating and are being constructed at present in the East. The highest growth in demand for uranium is coming from China, India, South Korea and the Middle East. On this basis, the market is adequately supplied in the near term, with growth in supply likely to come from Kazakhstan and Russia. Given China's influence in Africa, one could add Africa as a longer-term supply source for this region.

Figure 7 - Eastern Markets - Supply and Demand

WEST												
(in million lbs U3O8)	2019A	2020A	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Mine Supply												
Canada	18	10	12	19	26	29	29	36	65	71	72	72
Australia	16	16	9	12	13	15	15	15	15	15	15	15
Africa (various)	23	24	20	19	20	22	30	29	25	25	20	19
United States	0	0	0	0	0	2	4	5	6	8	9	9
Total Supply	57	50	41	50	59	68	78	85	111	119	116	115
Potential additional supply												
Eastern Europe	3	4	4	4	4	4	4	4	4	4	4	4
Total Supply - Upside	60	54	45	54	63	72	82	89	115	123	120	119
Reactor Demand												
Canada	6	7	7	7	7	7	7	7	7	7	7	7
South Africa	1	1	1	1	1	1	1	1	1	1	1	1
United States	47	47	46	47	47	47	47	47	47	47	47	47
Western Europe	53	51	50	46	46	46	44	45	46	44	44	43
Mexico	1	1	1	1	1	1	1	1	1	1	1	1
Argentina	1	1	1	1	1	1	1	1	1	1	1	1
Brazil	1	1	1	1	1	1	2	2	2	2	2	2
Total Demand	110	109	107	104	104	104	103	104	105	103	103	102
Potential additional demand												
Eastern Europe	12	13	13	14	14	14	14	15	16	17	18	19
Total Demand - Upside	122	122	120	118	118	118	117	119	121	120	121	121
Western Market Balance	-62	-68	-75	-64	-55	-46	-35	-30	-6	3	-1	-2

Source: Amati

The current supply-demand imbalance in the West reflects the dependence of Western Europe and the USA on uranium from Russia and Kazakhstan and explains the urgency in addressing security of supply.

Financial Players enter the Market in 2021

The Sprott Physical Uranium Trust (SPUT) was launched in 2021 to provide investors (institutions, hedge funds, family offices and individual investors) with a vehicle to hold uranium as U_3O_8 or "yellowcake", speculating on higher prices going forward. Since its launch, SPUT bought uranium on the thinly traded spot market and now holds 58 mlbs of uranium with further financial capacity to buy. A similar product exists in the UK (Yellow Cake plc).

A number of mid-sized and junior uranium companies took advantage of the rally in their share prices on the back of the spike in spot prices, to raise money to also buy uranium on the spot market. Today, between the nine companies and entities listed below, 86 mlbs of physical U_3O_8 is held in warehouses on behalf of their shareholders. This equates to 65% of total world primary supply in 2022.

Figure 8 - Uranium purchases by financial players in the market

U_3O_8 Purchases	mlbs
Yellow Cake plc	18.81
Sprott Physical Uranium Trust	58.67
Denison Mines Corp	2.50
Uranium Energy Corp	2.50
Boss Energy Ltd	1.25
Peninsula Energy	0.31
Uranium Royalty Corp	1.55
Energy Fuels Inc	0.69
encore Energy	0.20
Total	**86.482**

Source: Amati

Rumours of the launch of two more uranium trusts in Asia and in Europe could materially squeeze spot prices in the near term.

The argument for the establishment of SPUT was centred on a growing structural supply deficit in the years to come and the fact that, at ~US$25/lb, the uranium price was well below the average cost of production for the industry. Cameco, who control two of the best deposits in the world, reported total production costs of US$29.47/lb for Q3 2022, while most companies with idled capacity talk about securing term contracts pricing of at least US$65/lb in order to consider restarting production.

In the year to date, Cameco have signed 77 supply contracts with utilities and continue to be working through a list of supply contracts. Long-term supply agreements with the miners are believed to be agreed at term prices of around US$51/lb at the moment.

Opinion

There is little doubt that uranium's strategic role in the global decarbonisation of the planet has been greatly enhanced in recent years with a greater focus on energy dependence and growing security of supply concerns. Public opinion about nuclear energy seems to have greatly improved through the energy crisis and it is now seen as a "green energy" source.

The financial players, like SPUT, are keeping the market quite tight at the moment. A sharp recovery in the spot uranium price is resulting in utilities signing term contracts at higher price – we believe, to be between US$45-55/lb.

The financial players seem here to stay in the short-to-medium term and their involvement, as well as the introduction of new players in the market, could push prices even higher in the short-term, perhaps even over US$100/lb. The current delays in shipments from Kazakhstan to the West through the trans-Caspian route, which was chosen as a preferred alternative route due to a decision to avoid using the port of St Petersburg in Russia, is also adding to the tightness in the market.

While the emergence of the financial players in the market is welcomed by the uranium miners, for investors, it brings with it a high degree of speculation, which is something that we try to avoid. Incentive pricing in the uranium market is difficult because of idled capacity in Kazakhstan and Canada, where the cost of production is well below current term pricing.

There are numerous idled uranium producers in the USA who, industry experts believe, require a price of US$60/lb to stimulate their reopening. This is not that much higher than the spot prices that we are seeing today.

It is our belief that a price between US$50-60/lb suits the larger uranium companies like Cameco and Kazatomprom, and believe that prices will ultimately settle around these levels over the next couple of years, and then could move materially higher as more idled nuclear reactors are brought back online and the reactors currently being constructed are commissioned.

Cameco is our chosen exposure to the sector because of its market dominance, as well the longer-term benefits that we believe will be derived from the Westinghouse acquisition. In addition, Cameco have high quality moth-balled mines that can be brought on line if prices do settle at higher levels.

Literature

Incase, in case you missed our last opinion piece, please click here to read Batteries 101.

Risk Warning

This article is a financial promotion issued by Amati Global Investors Limited, which is authorised and regulated by the Financial Conduct Authority. It is provided for informational purposes only and does not represent an offer or solicitation to buy or sell any securities; nor does it provide you with all the facts that you need to make an informed decision about the merits or otherwise of this Fund. Please refer to the risk warning below.

Past performance is not a reliable guide to future performance. The value of investments and the income from them may go down as well as up and investors may not get back the amount they originally invested. The investments associated with this Fund are concentrated in natural resources companies, which are subject to greater risk and volatility than companies held in other funds with investments across a range of industries and sectors. The return on investments in overseas markets may increase or decrease as a result of exchange rate movements. Shares in some of the underlying companies associated with the Fund may be difficult to sell in a timely manner and at a reasonable price. In extreme circumstances this may affect the ability of the Fund to meet redemption requests on demand.

Sales Team Contacts

Financial Intermediaries

Rachel Le Derf
Head of Sales
Scotland and Northern Ireland
rachel.lederf@amatiglobal.com
07979601223

Colin Thomson
Sales Director
Northern England, Midlands and North Wales
colin.thomson@amatiglobal.com
07884026517

Jonathan Woolley
Sales Director
Southern England and South Wales
jonathan.woolley@amatiglobal.com
07818203013

Direct Investors

Samantha Dalby
Investor Relations Manager
samantha.dalby@amatiglobal.com
01315039116

Amati Global Investors Ltd

8 Coates Crescent, Edinburgh, EH3 7AL

+44 (0)1315039115
info@amatiglobal.com
www.amatiglobal.com
Amati Global Investors is authorised & regulated by the Financial Conduct Authority.
Calls are recorded and monitored.
Date of publication: 28/10/2022