

North American Rare Earth Juniors Consolidate Capabilities to Advance Towards a Total Domestic Supply Chain

There were otherwise unrelated announcements last week, but, with a common purpose, by separate pairs of rare earth juniors: The common purpose was **the advancing of the creation of a domestic American rare earth enabled product(s) total supply chain.**

In one case the Canadian rare earth Junior miner, **Search Minerals Inc. (TSXV: SMY | OTCQB: SHCMF)**, entered into a non-binding MOU for the future delivery of a rare earth mineral concentrate supply, containing 500 tpa of Neodymium/Praseodymium, with one of its investors, privately owned, **USA Rare Earth LLC**, which has committed itself to producing commercial tonnages of rare earth permanent magnets in the United States as early as 2022-23. Another announcement was made by the Canadian rare earth junior critical metals' processor, **Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF | FSE: U9U)**, which announced that it had entered into an MOU with Australia's **Vital Metals Ltd (ASX: VML | OTCMKTS: VTMXF)**: for a supply of rare earth ore concentrates from Vitals' already underway mining operations in Canada's Northwest Territory, to be first processed into a mixed rare earth carbonate in a facility funded by Canada's Saskatchewan Research Council in Saskatoon, Saskatchewan, and then shipped to Ucore's proposed Strategic Metals (processing) Center in Ketchikan, Alaska, USA, for separation into individual rare earths.

These announcements are indicative of a sea-change in the thinking of an increasing number of non-Chinese junior rare earth companies. In the last rare earth boom from 2007-2012 hundreds of juniors had the same goal, the production and sale of a "mixed con" of rare earths, in other words, of an ore concentrate or a concentrate of mixed rare earth solids prepared by hydrometallurgical treatment of ore concentrates. It was commonly believed at that time that Chinese rare earth separation companies, then the only customers, would pay 65% of the "basket value," defined as the market price of separated versions of the rare earths contained in the mixed concentrate. This was magical thinking based on a complete misunderstanding of the value of, and the markets for, either ore concentrates or mixed rare earth concentrates. Even today some juniors still insist that their ore concentrates have a basket value based on the values of finished goods. Chinese separators typically have offered 40% of the basket value, delivered into China for high grade ore concentrates free of elements that interfere with solvent extraction separation of mixed rare earths.

The "supply chain crisis" has clarified the thinking of many juniors. They realize that their product must have an immediate determinable-price demand and that this demand must be by processors who add enough value, so that they can afford to buy the junior's product at a price that allows the junior to make a profit. This may seem trivially obvious, but it was blithely overlooked in the 2007-12 rare earth boom.

A new factor has entered the calculus for determining the price of mixed rare earth ore concentrates or of mixed rare earth solids free of both radioactive and of SX interfering contaminants. That factor is any added value governments and industries are willing to pay for non-Chinese, or domestic, materials of these descriptions.

So far, only one non-Chinese vendor has entered the market with mixed rare earth carbonate (solids) free of radioactive

and SX interferences. That is America's **Energy Fuels Inc. (NYSE American: UUUU | TSX: EFR)**, which is processing non-Chinese monazite ore at its White Mesa, Utah, uranium processing mill. The mixed rare earth carbonate solids are being sold, at a profit to Energy Fuels, to Canada's **Neo Performance Materials Inc. (TSX: NEO | OTCMKTS: NOPMF)**, which has them delivered to its rare earth separation facility in Estonia, where the material is separated into individual rare earths for further processing by Neo or its customers into rare earth permanent magnets, phosphors, ceramic additives, and other fine chemicals. The European Union is already well ahead of the USA in organizing a financial facility to underwrite the creation of a European domestic rare earth enabled products total supply chain without Chinese participation at any level.

In the United States and Canada the supply chain issue is downstream of mining, and is manifested in the total lack of commercial facilities for rare earth separation, metal and alloy making, magnet making, and end use manufacturing.

Europe has existing facilities for up to 12,000 tpa of rare earths separation, a thousand tpa of rare earth metals and alloys, and substantial capacity and existing expertise to make rare earth permanent magnets of the most widely used, sintered, type. Further, both the UK and the EU governments have already begun to support the expansion of existing rare earth processors financially.

The United States and Canada should take a lesson from the UK and the EU: Get industrial end users involved from the very beginning. The UK and the EU speak with industrial experts as well as academics and bureaucrats. The difference is really beginning to show.

Achieving Net Zero Greenhouse Gas Emission Needs Nuclear

The world has (mostly) committed to “net zero” by around mid-century, meaning that there will be no net emissions of “greenhouse gasses”, which encompasses a lot of things. The problem is how to get there? Our world is a mostly hydrocarbon-based energy economy. No one is willing to go backwards or compromise anything to get there, so something has to give.

Crosscheck to nuclear power for a moment, this cleantech option is regrettably demonized by activists. We struggle to counter the social media operatives with science and mathematics. Canada, which once lead the world in nuclear reactor technology with the Candu reactor design (safe and reliable) is still a global leader in uranium exploration, energy resources, and safe and efficient uranium mining, mostly in the province of Saskatchewan.

Enter Fission 3.0 Corp. (TSXV: FUU | OTCQB: FISOF) – a third generation company with a management team that has already succeeded twice in finding uranium in one of the most prolific uranium districts in the world, the Athabasca Basin in Saskatchewan. There are a significant number of exploration companies with exploration assets in the region, but Fission has the benefit of “been there, done that” twice in the area, so we can say with some degree of certainty that Fission is run by one of Canada’s leading uranium exploration teams.

We recently interviewed CEO Dev Randhawa on the Uranium Boomlet and how US President Biden is continuing with former President Trump’s green energy policies. After all, you can’t have electric cars without electricity if Net Zero is the objective, the world cannot generate enough electricity without the nuclear option.

Fission 3.0 recently raised \$8.0 million and has about \$10.0 million cash on the balance sheet, so they are well-funded for future drilling. As investors know “discoveries matter” and also, you must (in any industry) invest with teams that have done it before. The exploration team at Fission has a successful methodology that has a proven track record and in Saskatchewan, that is a necessity.

With cash in the bank, the company estimates that it has enough cash in the bank to initially drill three of its exploration prospects. Plans are being made for winter drilling and the associated logistics, so watch for drilling to commence this winter with results to come out afterwards. The company currently owns their properties, 100%, but may be looking to joint venture with partners as well. In any event, they can drill the projects on their own if they decide to do that.

It is naïve to think that just nuclear energy will save the world from a cold and dark future, as I agree with Bill Gates that the road to avoiding climate disaster will take many difficult paths to get to Net Zero. But in the shorter term, we need alternate, clean sources of energy. You can argue successfully about the contribution of hydrocarbons to climate change, but you cannot argue that nuclear is not a viable option.

Fission 3.0 is part of the solution. They have successfully done it twice before – it’s hard to argue that.

Jack Lifton and Constantine

Karayannopoulos discuss the non-Chinese rare earths' markets

In a recent InvestorIntel interview, Jack Lifton spoke with Constantine Karayannopoulos, President, CEO and Director of Neo Performance Materials Inc. (TSX: NEO) about the current rare earths supply and demand situation outside of China.

In this InvestorIntel interview, which may also be viewed on YouTube (click here to subscribe to the InvestorIntel Channel), Constantine highlighted that the growth in rare earths demand in Europe is primarily driven by the burgeoning growth there in green technology applications such as electric vehicles (EV) and wind power. He continued by saying that although automakers in Europe are setting the goals of having 50% of their rare earths supply chain located within Europe by 2025, there are not enough rare earths produced to satisfy the EV demand, securely, outside of China, at this time. As the owner of the only operating commercial sized rare earth separation facility in Europe, Constantine explained how Neo Performance is very well positioned to capitalize on the opportunity.

To watch the full interview, click here.

About Neo Performance Materials Inc.

Neo manufactures the building blocks of many modern technologies that enhance efficiency and sustainability. Neo's advanced industrial materials – magnetic powders and magnets, specialty chemicals, metals, and alloys – are critical to the performance of many everyday products and emerging technologies. Neo's products help to deliver the technologies of tomorrow to consumers today. The business of Neo is organized along three segments: Magnequench, Chemicals &

Oxides and Rare Metals. Neo is headquartered in Toronto, Ontario, Canada; with corporate offices in Greenwood Village, Colorado, US; Singapore; and Beijing, China. Neo operates globally with sales and production across 10 countries, Japan, China, Thailand, Estonia, Singapore, Germany, the United Kingdom, Canada, the United States, and South Korea.

To learn more about Neo Performance Materials Inc., click [here](#).

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Neo Performance's Constantine Karayannopoulos on the growth opportunities for rare earths in the EV market

In a recent InvestorIntel interview, Tracy Weslosky spoke with Constantine Karayannopoulos, President, CEO and Director of Neo Performance Materials Inc. (TSX: NEO) about joining the UN Global Compact to promote sustainability and about the 'massive' growth opportunities in the rare earths space.

In this InvestorIntel interview, which may also be viewed on YouTube ([click here to subscribe to the InvestorIntel Channel](#)), Karayannopoulos highlighted the lack of sufficient supply of rare earths, lithium, and other critical materials required by the energy transition and electric vehicle (EV) revolution. In addition to being the only company in the world operating dual supply chains inside and outside of China for rare earths and rare earth based advanced materials, Neo also owns the only operating commercial rare earth separation facility in Europe, which allows it to have a significant footprint in the fast-growing European EV market. With its

presence in 10 countries, Constantine explained that Neo Performance is well-positioned to capture growth in the electric vehicle supply chain in Europe and eventually in North America.

To watch the full interview, [click here](#).

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Signature's Lingman Lake Gold Mine Update as Project moves towards a NI 43-101 Technical Report in 2022

Signature Resources Ltd. (TSXV: SGU | OTCQB: SGGTF | FSE 3S3) ("Signature") continues to grow and explore its 100% owned,

27,113 hectare, property containing the Lingman Lake Gold Mine & Project, in Ontario, Canada. Recent magnetometer survey results look positive and have identified six new target areas ranging in interpreted strike lengths from 200 metres to more than 950 metres. Signature plans to drill test the high priority target areas after completing modeling in the fall of 2021. Furthermore, Signature has identified the potential for a porphyry system at the north-western portion of their property.

Drilling continues at Lingman Lake East-side as does property wide exploration for future drilling

A current fully funded 10,000 metre drilling program is underway targeting expansion on the depth and strike length of the east-side of the mineralized zones surrounding the historical Lingman Lake Gold Mine underground workings.

Concurrently, Signature is running an expanded regional exploration program. This includes data compilation and a new property wide summer airborne geophysical and LIDAR surveys for the purpose of the identification and ranking of highly prospective regional targets to then be followed up,

Signature President, CEO and Director, Robert Vallis, stated:

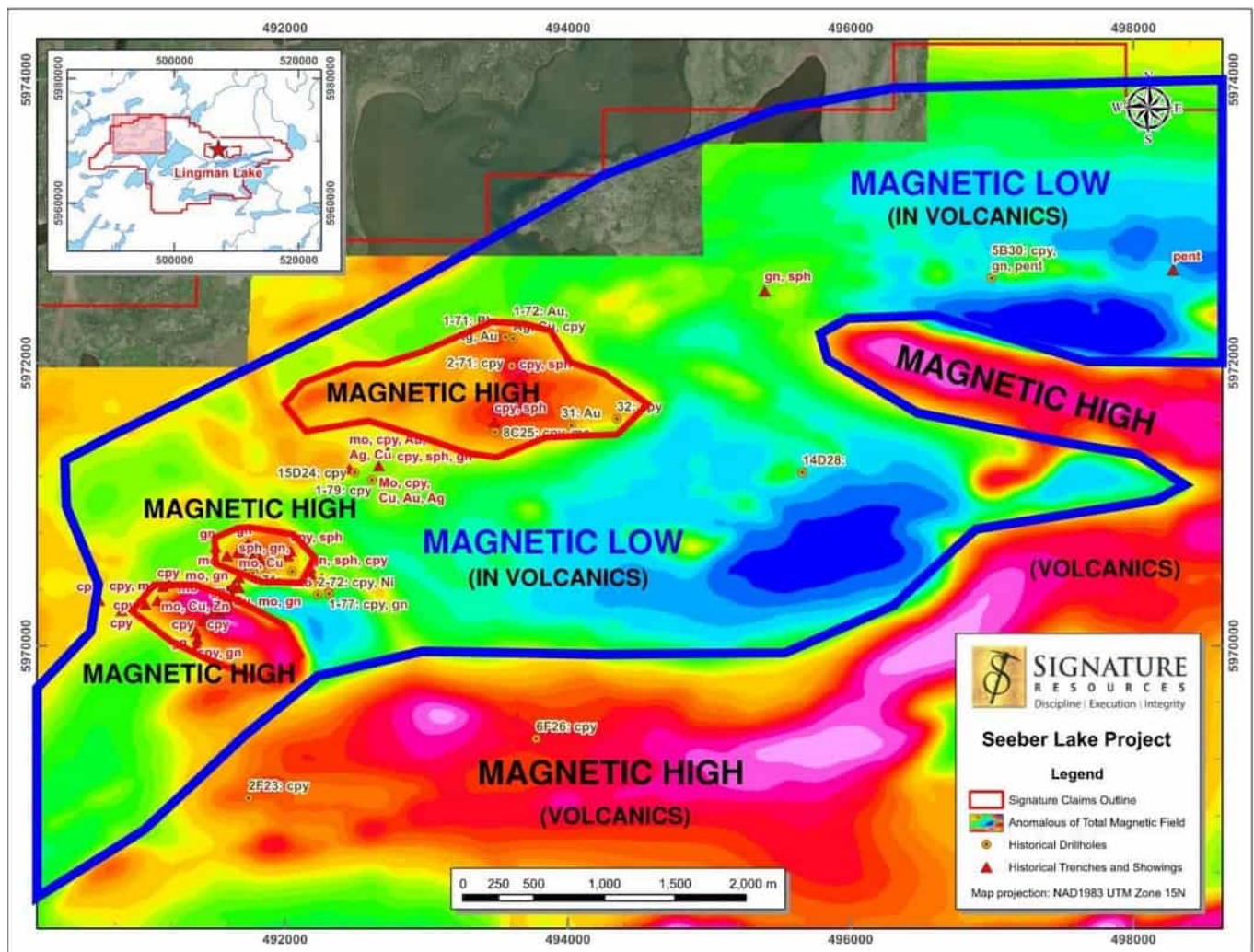
“Signature is now advancing diligently on two main fronts with the Lingman Lake gold mineralization expansion drilling and the regional high-potential target identification, ranking, and focused exploration. We look forward to many new and exciting advancements on these fronts throughout the remainder of this year.”

A potential porphyry structure at the Lingman Lake Property

On September 7, 2021, Signature announced some exciting news stating: “Regional work shows signs of a potential porphyry system.....Gold, silver (precious metals); copper, lead, zinc, and molybdenum (base metals) associated with localized

magnetic highs within the larger magnetic low. Base metal assemblage more indicative of an intrusive (porphyry) system with a precious metal component.”

Signature Resources has discovered signs of a potential porphyry system (precious and base metals associated with localized magnetic highs within the larger magnetic low)



Source: Signature Resources news September 7, 2021

Signature Resources Head Geologist, Walter Hanych, stated:

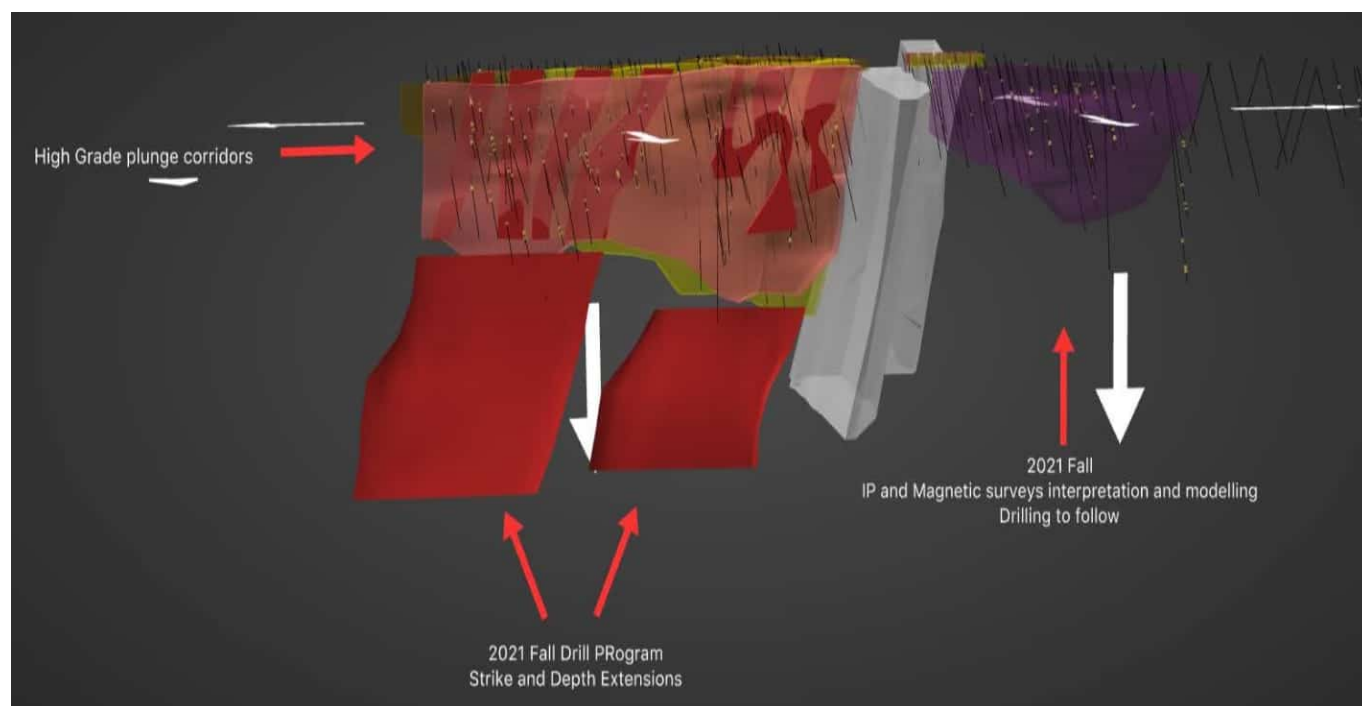
“This is an exciting development in the regional potential of the Lingman Lake Greenstone Belt, as we may be looking at a potential porphyry system in the north-western portion of the property.”

More about Signature Resources

Signature's property has now grown to 27,113 hectares across the Lingman Lake Greenstone Belt. There is also nearby expansion potential at Lingside West and Lingside East, deposits that are thought to be extensions of the Lingman Lake Gold Mine deposit. The Property has a historical mine (Lingman Lake Gold Mine) with a mine shaft and 3 levels along with a 250 tpd mill built in the 1940's.

The Lingman Lake Gold Mine has a historical resource (not yet NI 43-101 compliant, so not to be relied upon) of over **234,684 oz of contained gold averaging 6.86 g/t Au**. It should be noted that Lingman Lake's historic resource was drilled with <700 m strike length and the deposit remains open laterally and to depth.

Signature Resources' historical resource model (red and green shaded area at top) and 2021 drill and exploration locations



Source: Signature Resources company presentation

Next steps

As highlighted in the September 20, 2021 press release ,the Company's ongoing, fully-funded Fall 2021 diamond drill

campaign continues at the mine site and is currently testing inter-level continuity and grade extensions with first assay results pending.

Regional exploration efforts continue, and winter ground-based surveys will be followed by target drill testing in H1 2022.

Closing remarks

Signature Resources has a well regarded and highly experienced management team. Exploration work at their 100% owned Lingman Lake Property is in full swing with a goal to publish a maiden NI 43-101 resource in 2022. In addition to the resource estimate, there is potential for the discovery of a porphyry system at the north-western portion of the property.

Signature Resources trades on a market cap of just C\$16.6 million, which certainly leaves plenty of upside potential should a good maiden resource or a potential porphyry discovery be announced in the next 6-12 months. Stay tuned.

Uranium Finance gets ahead of Climate Politics

A new (state owned) company, ANU Energy OEEIC Ltd, in the Republic of Kazakhstan made the following announcement today, October 18, 2021 – KAP announces investment in physical uranium fund

This announcement has boosted the share prices of uranium miners, refiners, and juniors dramatically, continuing the rally started earlier this Fall by the debut announcement of

the Sprott Physical Uranium Trust, which is a Canadian, well financed (with a target of C\$2 billion), well connected and well managed, trading platform holding physical uranium as an asset. The new Kazakh fund, ANU Energy OEIC Ltd., although initially capitalized at US\$50 million will seek to raise an additional US\$500 million to be used for the sole purpose of buying and stockpiling physical uranium. The Kazakh fund has the advantage that it can buy from its 48.5% owner, Kazatomprom, also a state owned company, and with domestic Kazakh mines that produce 23% of the world's uranium, annually, making Kazatomprom the world's largest uranium marketer.

Climate politics followers know that initially "nuclear," although carbon free was condemned due to the perception of danger from radiation, but the national governments of more and more of the richest nations-the largest users per capita of electrical energy-are today openly moving to enlarge their domestic nuclear industries. China has never wavered and has continued to build nuclear plants, Great Britain has reversed decisions to close existing plants and has reaffirmed orders for new ones. The nation with the largest numbers of nuclear plants, the USA with more than 100 operating plants, has quietly extended operating licenses and federally begun to modernize the existing governmental support structure for nuclear plant regulation. Utilities are being encouraged to continue new construction whereas very recently they were not. France, of course, gets 80% of its electricity from French owned, operated, and built nuclear plants.

What do all of the nations listed above, the USA, the United Kingdom, France, and China have in common? They all get a significant portion of their baseload energy from nuclear plants; they all build and operate nuclear submarines and operate or are building nuclear powered aircraft carriers; and none of them has domestic production of uranium of any significance.

Also, the United States, China, and France combined operate

the overwhelming majority of all global nuclear plants.

In each of these rich nations, uranium is and will remain a critical fuel metal indefinitely no matter what happens with climate change and fossil fuels.

Sprott has had a very good idea and the Kazakh's are in the game. Watch the uranium producers and processors in the USA, Canada, Australia, and Kazakhstan. Miners sell uranium to utilities or to Defense industries. Sales are by contract or spot. Is Physical metal held by traders as large as Sprott or the new Kazakh entity really an accessible supply? Or are these pounds of uranium open value poker chips being used by high rollers. The game has begun. Don't get shut-out.

U.S. nuclear power generation at historical heights as investors buy uranium

There has been a lot of talks lately about fossil fuel energy source prices rising, particularly coal and gas prices. But did you know that uranium prices are up 64% since the August low, and are now at US\$47.20/lb?

Uranium prices are up 64% from the August 16, 2021 low (as on 18 October 2021)



Source: Trading economics

The reason uranium prices are rising is that supply has reduced and demand is reviving with an upward trajectory.

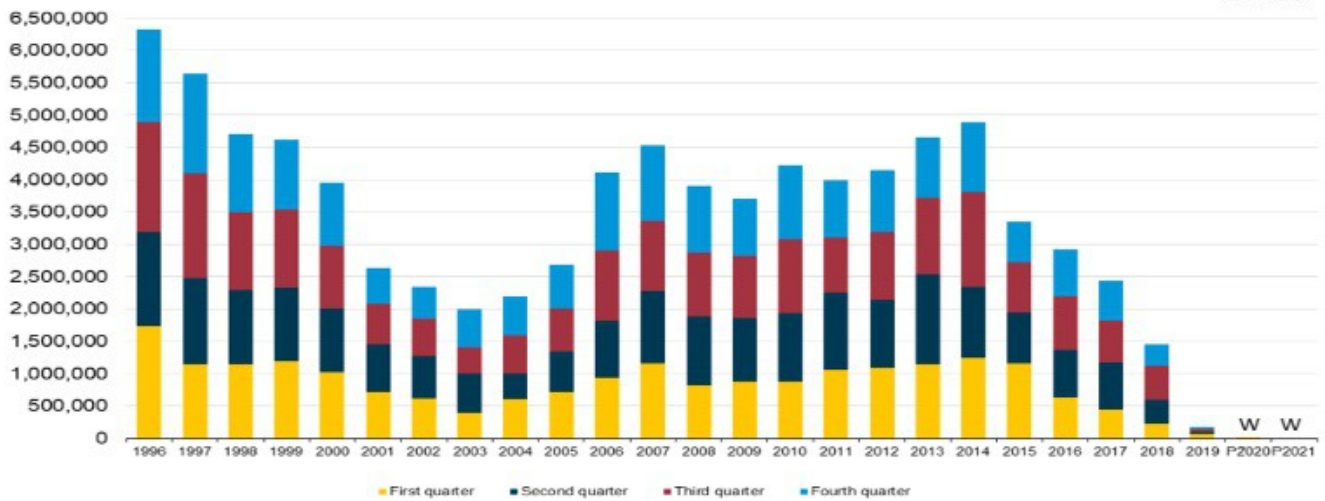
Uranium supply

In 2020, ~46Mlbs or ~35% of global supply of uranium production (annualized), was suspended due to low prices. Kazatomprom, the world's largest uranium miner, announced a 20% reduction in production into 2023. Cameco shuttered McArthur River and (largest in Canada) Cigar Lake mines, and there are several others. Meanwhile, U.S uranium production is non-existent, or as Ur-Energy states: "2020 – 2021Q2: U.S. uranium production continues to be so low EIA unable to report due to commitments of confidentiality."

EIA report: 2020 U.S. mined production negligible – too low to be reported

Figure 1. Uranium concentrate production in the United States, 1996 to second-quarter 2021

pounds U3O8

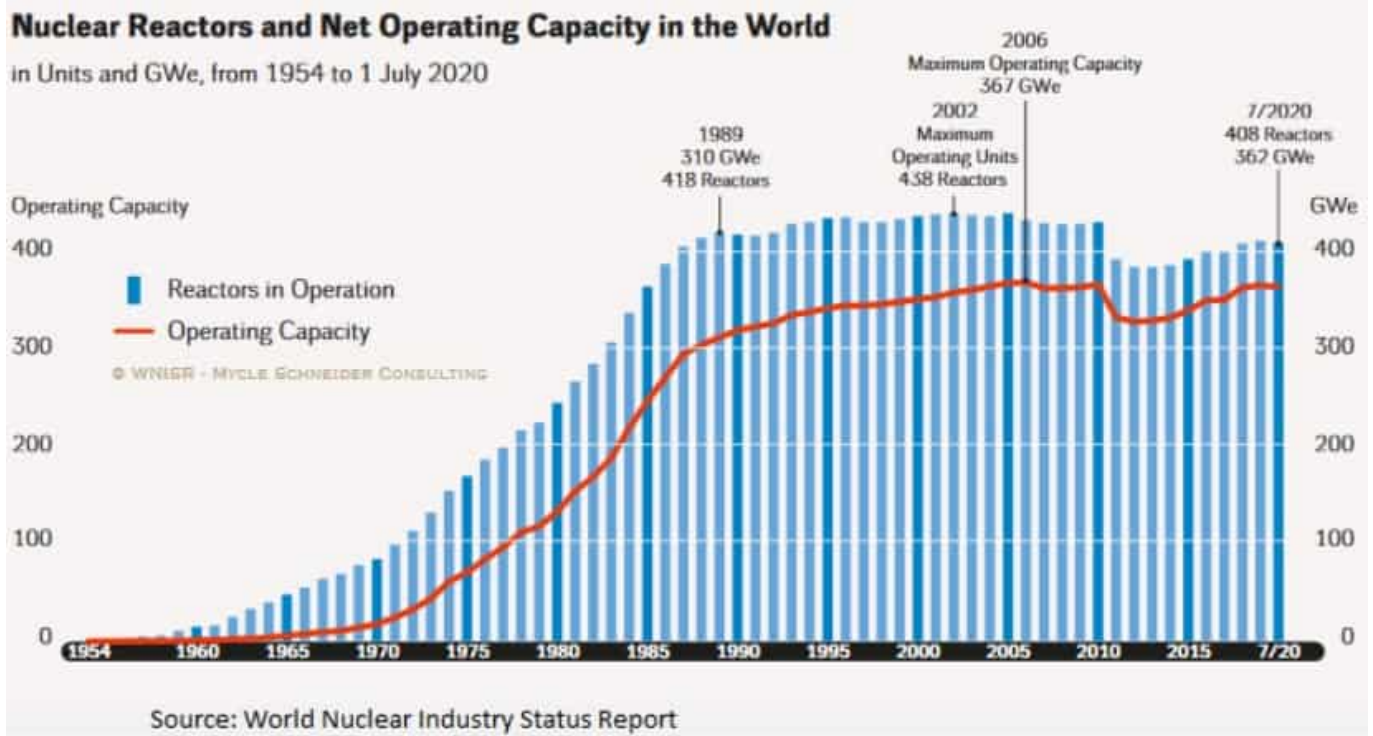


Source: UR-Energy company presentation

Uranium demand

Demand has remained strong and has recently been boosted by some serious market speculators. The one that grabs the headlines most is the Sprott Physical Uranium Trust which has been buying up millions of pounds of uranium. Of course, the regular buyers are the utilities that own and operate nuclear reactors and want to secure supply.

World and U.S. nuclear power generation has recovered from a 2011 post-Fukushima contraction and is near historical peak generation levels

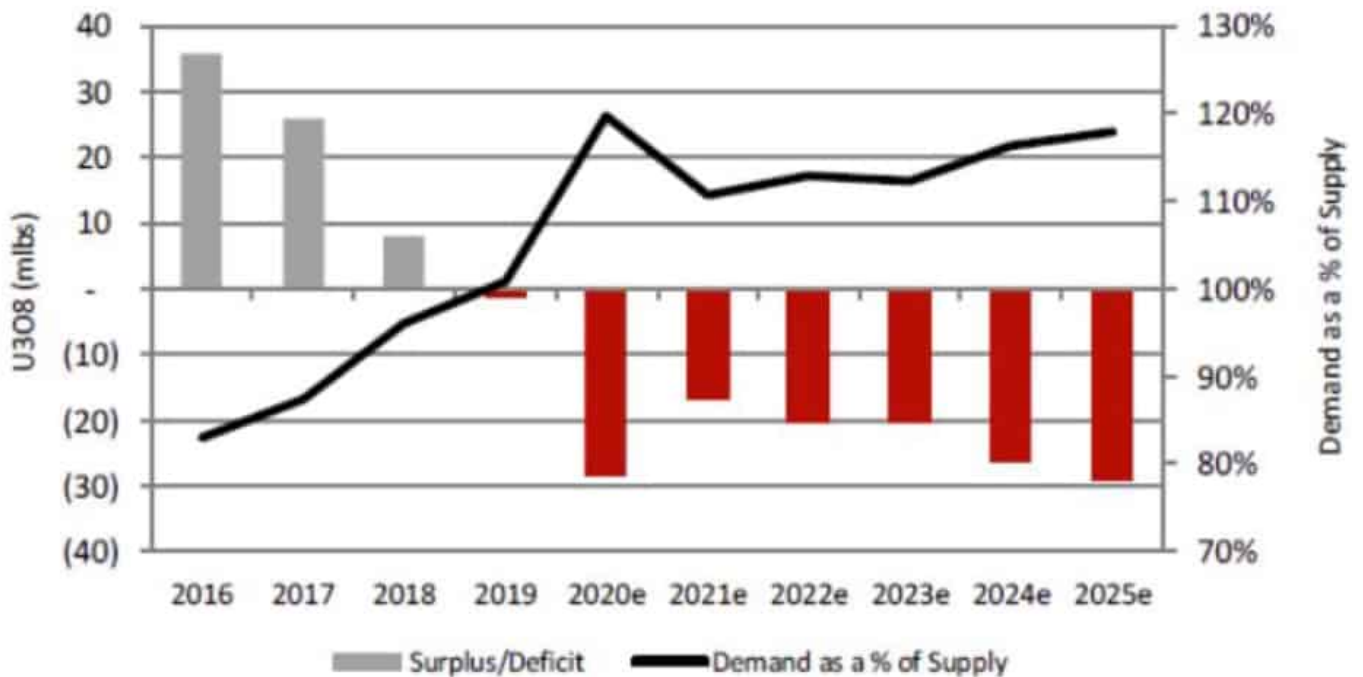


Source: Western Uranium & Vanadium company presentation

While higher prices ultimately encourage supply to come back on, it appears there is no rush for uranium producers to ramp up to large volumes and swamp the market; especially as they are now enjoying the windfall of higher prices after 5 years of very low prices. Many are finding that distressed inventory has become an asset as market pricing exceeds production costs.

Uranium is forecast to be in deficit each year to 2025

The market has shifted into a sustained deficit



Source: Western Uranium & Vanadium company presentation (courtesy Canaccord Genuity estimates)

3 leading U.S uranium producers

Energy Fuels Inc. (NYSE American: UUUU | TSX: EFR) has been building uranium inventory while diversifying into rare earths production. The Company has significant capacity to quickly increase low-cost U.S. uranium production from proven assets and has more production facilities, capacity & experience than any other U.S. company.

Ur-Energy Inc. (NYSE American: URG | TSX: URE) is among the top two U.S uranium producers and is a global low cost uranium producer. Ur-Energy operates the Lost Creek in-situ recovery uranium facility in south-central Wyoming, USA.

Western Uranium & Vanadium Corp. (CSE: WUC | OTCQX: WSTRF) own the Sunday Mine Complex, which is now back in pre-production development. On October 12, 2021 the Company stated: "Active mine development operations have resumed at the Sunday Mine Complex, and the project is already producing strong results.....The ore body is projected to be significantly larger

than indicated by the previous limited surface drilling. Development ore is being stockpiled underground. Full production of the GMG ore body can begin with the improvement of market conditions and after development operations are completed within six months.”

Closing remarks

The leading U.S uranium miners (as mentioned above) have seen significant stock price increases over the past year as uranium prices rose on the back of a growing uranium deficit.

Looking ahead the US uranium producers are well placed to benefit from the Biden policies that are becoming aware of the importance of smart nuclear power generation and of building a significant uranium reserve. After all, key parts of the U.S military and about 20% of U.S electricity rely totally on nuclear and hence uranium. Today, the U.S. imports 95% of its annualized uranium demand. There is a need to ramp up domestic and North American production if the more than 100 U.S. based civilian nuclear power reactors are to remain in service without interruption by geopolitical factors.

Meanwhile Europe, other than France, which gets 80% of its electric power from nuclear, and Asia are learning they also need a stable source of base load power that is not carbon based. As we approach the COP26 climate summit on November 1, the future of nuclear and uranium has never looked better.