# Are we slaves to Russian uranium processing?

written by Jack Lifton | August 29, 2022

I think that investors in an economy to be based on decarbonized energy sources have very limited choices. The best man-made addition to nature’s hydroelectric and geothermal processes is nuclear. Quite a few who were skeptical are now seeing how to keep the lights on without burning fossil fuels by using the heat generated by controlled nuclear fission of uranium-235.

Japan has pulled back from its Fukushima tsunami-caused national shut down of its extensive civilian nuclear power fleet of reactors, and ordered the restart of its nuclear electric industry, France, the most nuclearized electricity generating nation in the world, has ordered 14 new reactors. Germany has postponed its shutdown of its nuclear-electric capacity, and the USA, with the world’s largest fleet of civilian power reactors (96 operational), has licensed the test construction of small “modular” reactors (SMRs), which could built quickly and cost far less than the large scale reactors currently in use.

So, what’s the problem? We’ve seen the light and are going to continue to use and even expand the use of carbon-free uranium fueled nuclear electric generators, right?

The problems are two-fold. First, the largest users of nuclear electric generation – the USA, China, and France – do not have, and cannot have, enough domestically mined uranium production in their respective countries to supply even a small fraction of their needs. Second, 60% (!) of the capability and capacity to enrich natural uranium into reactor fuel (zirconium coated pellets of enriched uranium 235) is located in Russia and China, with most of that today (nearly 50% of the world’s total capacity) being in Russia.

The United States has one operational plant that can produce less than a third of its annual domestic needs, and that plant is managed by its UK-Netherlands-Germany owners. China's China Nuclear Corporation is, of course, working to double its capacity to meet the needs of China's rapidly growing civilian nuclear reactor fleet, so that by 2030 China plans to have nearly one-third of global capacity, which when combined with Russia's capacity that year will give the two of them fully two-thirds of 2030's global capacity to enrich uranium for civilian power reactors.

The USA has no plans to develop or find sufficient enrichment capacity to become domestically self-sufficient by 2030 or any other future date.

And, to compound the problem, the USA today produces just a few percent of its mined uranium demand!

The world's largest fleet of civilian nuclear power reactors is totally dependent on the kindness of strangers for its continued operation and survival. The USA gets 20% of our national needs for fuel for (nuclear) electricity generation from malevolent dictatorships (Russia, China) and the rest from an energy-starved world that is becoming less interested in saving the world from climate change daily. Neither is likely to have America's domestic needs at the top of their lists.

As for the mined uranium, Kazakhstan, Canada, and Australia are the world's principal sources.

It is urgent that the USA mine, refine, and enrich all of the uranium it can from domestic sources as soon as possible.

A prominent American-based uranium miner/refiner told me last week in regard to the above, “Once the US government dropped uranium as a national priority as it once was, things went to hell in a hand basket. Give me $5 billion and 10 years and this can change.”

Perhaps that sum can be obtained from the US Defense Departments’ programs to teach social justice issues like proper pronoun usage to our soldiers, sailors, and airmen.

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# Uranium Finance gets ahead of Climate Politics

written by Jack Lifton | August 29, 2022
A new (state owned) company, ANU Energy OEIC 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 Kazak fund has the advantage that it can buy from its 48.5% owner, Kazatomprom, also a state owned company, and with domestic Kazak mines that produce 23% of the world’s uranium, annually, making Kazatomprom the worlds 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.

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# Lifton challenges the Green Elite Environmentalists to provide real evidence of an industrial park powered solely on alternative energy

written by Jack Lifton | August 29, 2022

## Following the Engineering as well as the Science: Misrepresenting the Type of Energy Production Needs for the Supply of and the Demand for Basic as well as Critical Materials

Our civilization, the age of steel, cannot continue without fossil-fueled or nuclear-fueled baseload electricity generation. So when some ask why are the Chinese building a new fossil fuel fired baseload electrical generation plant on a biweekly basis, and why are they building dozens of nuclear plants for the same purpose? It’s because they know that for maintaining their heavy industrial raw material and manufacturing industries unreliable, intermittent power plants cannot be used and battery storage cannot be engineered to supply the needed continuous heavy industrial loads.

The popularization of science gives cover to many journalists, who simply don’t know what they’re talking about, to rely on a recent neologism known as “settled science,” which is an oxymoronic contradiction in terms. It would be more realistic to speak of “settled engineering,” but that would require quite a bit of physics, chemistry, metallurgy, and mathematics to comprehend. Be aware that once an engineering design is completed, erected, and operational a great deal of time and money has been expended and any changes can only be made at the margin without having to scrap the operation. This is why so-called “disruptive technologies” don’t matter to existing basic and critical metals operations nearly as much as getting settled engineering to work efficiently. This, in fact, was one of the reasons that Molycorp failed financially. The engineering of chemistry, for example, that allows the mass production of iron, steel, aluminum and copper has been essentially the same for nearly a century and a half. The engineering of the production of the raw materials to manufacture rare earth permanent magnets was “settled” a half-century ago when the magnets and the demand for them became large enough to require commercialization.

I do not consider someone to be dumb because they don’t know or even know of the second law of thermodynamics. I don’t consider them dumb if they know of the law but don’t understand its applications to the mining, ore beneficiation, extraction, separation, purification, transformation into metals and alloys, and the fabrication from those metals and alloys of forms suitable for the manufacturing of consumer and military goods; I do, however, consider those who ignore the needs for and types of energy production required for each and every one of the aforementioned steps in the supply chain just detailed here, but pontificate upon green energy anyway, as if the need for fossil/nuclear fueled baseload wasn't a consideration, as dumb.

Every step in the production of a metal from its ores is an application that produces negative entropy. This means that the forms in which we find every natural resource on the earth, both fuel and nonfuel minerals is, when found, already in its natural, highest energy, state for its environment. In order to change that state into one in which we can use the materials requires that we temporarily alter the natural state of the resource by chemically and electrochemically rearranging its energy status and therefore making it metastable in our environment but useful in human terms.

Let's look at the production of steel, the most produced metal (annually) on the planet for the past 150 years, which is, in fact, an alloy of iron.

In its natural state on and near the surface of the earth iron occurs as fully oxidized chemical compounds, the highest energy form of iron that the earth's crust, oceans, and atmosphere allow to be stable at STP (standard temperature and pressure).

For each chemical element, there is only one total energy path that can be taken to put it temporarily into its lowest energy form as a pure chemical element at STP. To achieve that path chemical, metallurgical, and mechanical engineers must cooperate and always compromise with nature's rules.

For the use of iron, and every other chemical element, that path begins with economic considerations: How much iron, proportionately, and measured as metal, at STP, is in the mineral chosen for its entry into the steel supply chain? The higher the iron content (grade) the less overall energy will be required to convert it to a metallic form. Simultaneously it must be determined how much tonnage of iron bearing mineral of this grade is in the deposit (This is known as the “resource” in mining jargon).

Miners then determine by a Techno Economic Analysis (TEA) (An academic acronym for figuring out if something can be done economically with known technologies) whether developing the deposit into a mine is feasible ( I.e., is a profitable venture) in the (mining) near term.

To do a TEA miners must consider not just the amount of iron that can be produced annually but also the projected “life of the mine,” which is a measure of the total amount of iron that can be economically recovered from the project over time. This is measured as how long the mine can produce sufficient output annually to be profitable.

Whether an iron ore deposit can be economically turned into a mine depends not only upon the grade and total tonnage but upon its accessibility and amenability to the machines needed to dig out the ore, the chemical engineering necessary to beneficiate (concentrate) the ore to as high an iron content as possible, and the chemical engineering necessary to process the ore concentrate into crude metallic iron.

With the last step (there are many more) mentioned above comes a dilemma for the Green Elite Environmentalists (GEEs). The conversion of iron ore to pig iron requires a large amount of continuous heat energy. For a blast furnace, the type typically used to reduce iron ore to crude metallic iron, this heat can be supplied by the combustion of coal or natural gas or by electricity. In all cases, the heating must be constant (uninterrupted). The idea of using wind or solar for this is ridiculous. It gets even more ridiculous when the next stage, the conversion of iron into steel is examined. In the USA today 70% of steel is produced by Electric Arc Furnaces using scrap. The arc in those furnaces is maintained at 10,000 to 20,000 amperes, for sometimes more than a day. What solar, wind, or battery field, or any combination of them can supply this without massive costly (and pointless, economically, if alternatives are available) engineering

Thermodynamics requires that to produce a ton of steel requires 440 kwh of energy. Today in the United States that costs around $50.00.

As soon as the switch to alternate energy impacts the cost of baseload fuels and the price of electricity so much that even politicians can understand it the great unthinking public may realize that baseload electricity for air conditioning and water pumping is a small price to pay to adapt to any small increase in temperature, if it ever occurs. I doubt that any culture will allow a return to the thirteenth century BC, when steel was more valuable than gold.