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Uranium Boom and Plutonium Bust: Russia, Japan, China and the World

Peter Lee

Over the last decade, the world of fissionable material has experienced a quiet revolution. Plutonium, once the lethal darling of nations seeking a secure source of fuel for their nuclear reactors (and their nuclear weapons) has fallen from favor. Uranium has replaced plutonium as the feedstock of choice for the world's nuclear haves. And business is booming.

Asian powers like China and India, concerned about energy security and environmental degradation—and despite the disaster at Fukushima—are turning to nuclear power. The demand for uranium is expected to grow by over 40% over the next five years.
The Australian - Global Uranium Demand Expected To Skyrocket

In an unexpected but, in retrospect, logical development, Russia is emerging as the dominant global player in the nuclear fuel industry, with the apparent acquiescence of the United States. Today, as Russia sheds some of its bloated Soviet-era nuclear arsenal, it ships legacy plutonium to the United States to provide almost half of the fuel burned in American nuclear plants. At the same time, the Russian government is moving aggressively to establish its state-run nuclear corporation, ARMZ, as a dominant player in the worldwide rush to increase uranium production.

Russia brings some unique advantages to the nuclear fuel business. The first is an impressive stockpile of excess plutonium. This, however, is a wasting asset as Russia works through its current inventory without generating significant new quantities of metal. Russia is keeping its fingers in the plutonium pot through a program of constructing fast breeder reactors—which generate a surplus of plutonium—despite their technical, safety, and cost headaches.

The second and most crucial advantage is what one might characterize as a determinedly cavalier attitude toward the hazards of nuclear waste, reinforced by the fact that Russia is already a nightmare of nuclear contamination. In fact, it is possible that any additional shipments of nuclear waste to Russia will not contribute significantly to the already dire state of affairs.

Nuclear waste is unpopular, as the successful effort to block the US disposal facility at Yucca Mountain attests. Russia's ability to absorb it—despite growing anxiety and activism within the country—is a major competitive advantage. Countries and companies that burn nuclear fuel but have no local recourse except on-site storage are naturally interested—and sometimes legally compelled—to source their material from a supplier that is willing to accept and dispose of the waste.

Russia—even though its domestic uranium reserves are rather paltry—has become a major player in uranium production through investments in Kazakhstan, Mongolia, and other nations. Mr. Putin and the Russian government has played geopolitical hardball in order to improve the competitive position of its ARMZ Uranium Holding Company, as the Mongolian example discussed below demonstrates.

Russia's pivot toward uranium can be contrasted instructively with Japan's. Plutonium can be regarded as one of Japan's biggest misplaced industrial policy bets. As a very interesting article by Joseph Trento of the investigative organization National Security News Service, reveals, in the 1970s the Japanese government decided that Japan had to have a closed nuclear fuel cycle, in which plutonium would be generated in significant amounts in fast breeder reactors, extracted from spent nuclear fuel, and funneled back into Japanese nuclear power plants.

DC Bureau - United States Circumvented Laws To Help Japan Accumulate Tons Of Plutonium

The ostensible motivation for this policy was the scarcity of the uranium alternative. Nowadays, when uranium reserves are turning up on every continent (and, in the case of Kazakhstan, low-assay ores are processed in situ economically, if not particularly attractively, with a dousing of injected acid and recovered), it is difficult to recall that the dominant perception in the last century was of a uranium shortage.

The Japanese government declared it did not want to substitute uranium import dependence for hydrocarbon dependence, and it wanted to establish its nuclear power industry on the basis of breeder reactors creating plutonium and processing plants separating out the metal for fabrication into fuel—a closed cycle that would render Japan self-sufficient in nuclear material.

It appears that Japan also had two less apparent, or at least less-publicized, motives.

The first was to give Japanese industry—specifically Mitsubishi Heavy Industries—a leg-up in becoming a dominant global force in supplying fast-breeder technology and equipment, a process that was expected to dominate civilian nuclear power generation in the 21st century since it produced more nuclear fuel than it burned.

The second was to generate a reassuring pile of weapons-grade plutonium at a time when the United States was cozying up to a nuclear-capable China as a counterweight to the USSR, and Japan had to confront the possibility that it might be left to find its own security/defense way in the Pacific region.

This effort required US technical assistance. The deal was done with the Reagan administration in a sweetheart arrangement along the lines of what the Bush and Obama administrations gave this century's anti-Communist counterweight, India. Unlike other nations, Japan could dispose of its plutonium-rich waste at its own discretion.

Japan embarked on a major nuclear energy program and generated sizable quantities of nuclear waste. At the same time, the Japanese government poured billions of dollars into fast breeder and reprocessing projects based on US technology that yielded few tangible results and some genuine nuclear hazard scares, such as the cooling system leak that occurred in at the experimental breeder reactor facility at Monju in 1995 and shut down the facility for 14 years.

Japan's two trillion yen spent fuel reprocessing facility at Rokkasho, a sister to the mammoth operations at Sellafield in the UK and

Monju

Le Havre in France, has experienced a series of startup problems and has not yet entered production.

Jan-Feb 2010 Citizen's Nuclear Information Newsletter

Despite a 2006 government report estimating that the cost of reprocessing spent nuclear fuel over the next 40 years would amount to 18 trillion yen, the Japanese energy establishment appears to be in the grip of political and technological inertia and is still proceeding with its program (although non-proliferation expert Frank von Hippel pointed out that mothballing the Rokkasho plant would still provide ample jobs "for decades" for the adjacent village: decontamination expenses related to the current storage operations alone would amount to 1.5 trillion yen).

Japan's Spent Fuel and Plutonium Management Challenges - Katsuda & Suzuki

Kyodo News// Opinion - "Reconsidering the Rokkasho Reprocessing Plant

Without viable local processing capability, Japan stored some of its waste in cooling ponds on site (such as in the cooling ponds now bedeviling Fukushima), at Rokkasho, and at an interim storage facility. The rest is shipped to France and Great Britain, the only two countries that still maintain a reprocessing capability.

Now, despite a stated policy of no surplus plutonium, Japan is the proud owner of an estimated 46 tons of plutonium—ten tons of it in country, the rest of it held by France and Great Britain on its behalf. If Rokkasho operates as planned, Japan's total plutonium stock would triple by 2020.

For comparison purposes, China is estimated to hold less than 20 tons of highly enriched uranium and a small amount of plutonium. The PRC has probably not produced any weapons-grade fissile material since 1990.

Tehelka - the secret of India's nuke stocks is out

While the world wrings its hands over Iran and its 15 pounds of highly enriched uranium, Japan appears the more pressing nuclear weapon breakout threat.

CNS - civil highly enriched uranium: who has what?

A focus of US diplomacy is keeping the Japanese nuclear weapons dragon bottled up. A weaponized Japan, in addition to generating a certain amount of regional anxiety and triggering an arms race, could turn into an Israel of the Pacific i.e. a titular US ally but with its own security policy more beholden to national interests, fears, and politics than US strategic priorities.

Not unsurprisingly, South Korea, surrounded by actual and potential nuclear weapons states, is trying to go the spent fuel reprocessing route, but has, at least for now been rebuffed by the United States. After the current US-Korea nuclear treaty expires in 2014—and the US will still be unable to offer South Korea any spent fuel storage options—it remains to be seen how firm US resolve will remain.

South Korean Reprocessing: An Unnecessary Threat to the Nonproliferation Regime

Overall, today, the world finds itself in a situation in which plutonium is passé and uranium is de rigeur.

Russia continues to build breeder reactors as part of its nuclear portfolio but has shifted its focus to uranium. China operates a small experimental program. India runs a big unit to generate plutonium for its weapons program. And, there's Japan. That's about it.

The US, France, and UK have all shut down their breeder reactors. The UK is considering a shutdown of its Sellafield processing facility because of slackened demand, and is looking at ways to burn weapons-grade nuclear fuel directly into a reactor.

Uranium brings its own matrix of advantages and headaches. Not only is uranium ore relatively plentiful, improvements in centrifuging allow it to be enriched to fuel and weapons grade in a relatively efficient and elegant way compared to the massive diffusion plants that were the norm at Oak Ridge during the 1940s and 1950s.

Perhaps it has become too cheap and easy to pursue the uranium route, as the examples of Pakistan, Libya, Iran, and North Korea imply.

Non-proliferation, instead of relying on the technical and financial barriers erected by the fiendish complexities of generating, separating, and refining plutonium metal or gaseous diffusion of uranium hexafluoride, must turn to the use of sanctions and sabotage (such as the Stuxnet worm) to deter unwelcome actors.

And the general eagerness to advance the commercial development of the nuclear industry has placed Russia—hardly a reliable or benevolent partner of the West—near the center of the world uranium industry with a vested strategic and economic industry in promoting its expansion.

In the case of Iran, a prime customer for Russian nuclear technology and fuel, Moscow is clearly going beyond business imperatives acting in the service of geostrategic calculations that the United States and its allies decidedly do not share.

Meanwhile, Iran's neighbors such as Saudi Arabia and Turkey pursue nuclear energy agreements with Russian and Chinese support. In the Saudi case, Prince Faisal bluntly stated that the Kingdom is interested in nuclear weapons, not just nuclear power.

Saudi Arabia may seek nuclear weapons prince says.

With the decline of plutonium, the proliferation dangers of nuclear energy have not ended. They have simply mutated in response to

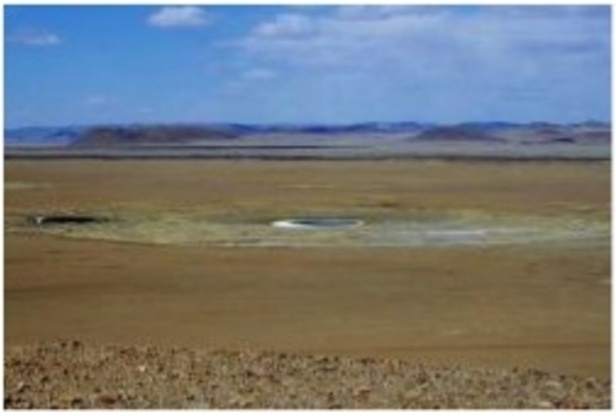
the new commercial and technological imperatives of the uranium industry.

Peter Lee writes on East and South Asian affairs and their intersection with US global policy. He is the moving force behind the Asian affairs website China Matters which provides continuing critical updates on China and Asia-Pacific policies. His work frequently appears at Asia Times.

Appendix, Mainichi Shimbun,

Mongolia's Secret Plan for an International Nuclear Waste Disposal Site

Aikawa Haruyuki



One of the candidate sites for a nuclear power plant in Mongolia is pictured in April 2011. There is no source of water needed to cool down reactors as the lake in the center of the photo has dried up. (Mainichi)

Coverage on a secret document detailing an international nuclear waste disposal site that Japan and the United States had planned to build in Mongolia, for which I won the Vaughan-Ueda Memorial Prize for 2011, has highlighted the difficulties in dealing with radioactive waste.

The secret plan surfaced as the crisis at the tsunami-hit Fukushima No. 1 Nuclear Power Plant has stirred controversy over the pros and cons of nuclear power.

I learned that the Japanese Economy, Trade and Industry Ministry and the U.S. Department of Energy had been secretly negotiating the plan with Mongolia since the autumn of 2010 when I interviewed a U.S. nuclear expert on the phone on April 9, 2011.

"Would you please help the Mongolian people who know nothing about the plan. Mongolia is friendly to Japan, Japanese media certainly has influence on the country," the expert said.

I flew to Ulan Bator, the capital of Mongolia, on April 22, and met with then Ambassador Undraa Agvaanluvsan with the Mongolian Foreign Ministry in charge of negotiations on the plan, at the VIP room of a cafe.

Before I asked the ambassador some questions getting to the heart of the plan, we asked my interpreter to leave the room just as we had agreed in advance. The way the ambassador talked suddenly became more flexible after I stopped the recorder and began asking her questions in English. She explained the process and the aim of the negotiations and even mentioned candidate sites for the disposal facility.

After the interview that lasted for more than two hours, the ambassador said she heard of a similar plan in Australia and asked me to provide Mongolia with any information on it, highlighting the Mongolian government's enthusiasm about overcoming competition with Australia in hosting the disposal facility.

I subsequently visited three areas where the Mongolian government was planning to build nuclear power stations. Japan and the United States were to provide nuclear power technology to Mongolia in return for hosting the disposal facility. I relied on a global positioning system for driving in the vast, grassy land to head to the sites. All the three candidate sites, including a former air force base about 200 kilometers southeast of Ulan Bator, are all dry land. No source of water indispensable for cooling down nuclear reactors, was found at any of these sites and a lake at one of the sites had dried up.

Experts share the view that nuclear plants cannot be built in areas without water. I repeatedly asked Mongolian officials responsible for nuclear power policy how they can build nuclear plants at the sites without water. However, they only emphasized that all the three sites meet the safety standards for nuclear plants set by the International Atomic Energy Agency (IAEA).

An Economy, Trade and Industry Ministry official, who is familiar with Mongolian affairs, said, "Mongolians are smart but their knowledge of atomic energy isn't that good ..."

In other words, Japan and the United States proposed to build a spent nuclear waste disposal facility in Mongolia, a country that has little knowledge of nuclear energy.

In 2010, the administration of then Prime Minister Kan Naoto released a new growth strategy with special emphasis on exports of nuclear power plants. However, there is no facility in Japan that can accept spent nuclear fuel, putting itself at a disadvantage in its competition with Russia, France and other countries that have offered to sell nuclear plants and accept radioactive waste as a package. A Japanese negotiator said, "The plan to build a disposal facility in Mongolia was aimed at making up for our disadvantage in selling nuclear power stations."

The United States wanted to find another country that will accept spent nuclear fuel that can be converted to materials to develop nuclear weapons in a bid to promote its nuclear non-proliferation policy.

Both the Japanese and U.S. ideas are understandable. However, as Mongolia has just begun developing uranium mines and has not benefited from atomic energy, I felt that it would be unreasonable to shift radioactive waste to Mongolia without explaining the plan to the Mongolian people.

During my stay in Mongolia, I learned that many people there donated money equal to their daily wages to victims of the March 11, 2011 Great East Japan Earthquake. I was also present when the Mongolian people invited disaster evacuees from Miyagi Prefecture to their country. I could not help but shed tears when seeing the Mongolian people's goodwill. My interpreter even joked, "You cry too much."

I did not feel a sense of exaltation from learning the details of the secret negotiations on the disposal site. I rather felt ashamed of being a citizen of Japan, which was promoting the plan.

The Fukushima nuclear crisis that broke out following the March 11, 2011 quake and tsunami has sparked debate on overall energy policy. Some call for an immediate halt to nuclear plants while others insist that such power stations are indispensable for Japan's overall energy, industrial and security policies.

"The matter isn't limited to nuclear energy. Our generations have consumed massive amounts of oil and coal," a Finish government official said.

The Mainichi scoop on the secret plan sparked campaigns in Mongolia to demand that the plan on a spent nuclear fuel disposal facility be scrapped and that relevant information be fully disclosed.

Bowing to the opposition, Mongolian President Tsakhiagiin Elbegdorj declared in the U.N. General Assembly session in September last year that the country can never host a radioactive waste disposal facility.

Amano Yukiya, director general of the IAEA, which is dubbed a "nuclear watchdog," says, "Those who generate radioactive waste must take responsibility for disposing of it. It's unfair to expect someone else to take care of it."

However, human beings have yet to find a solution to problems involving nuclear waste.

Aikawa Haruyuki, Europe General Bureau, Mainichi Shimbun

(Mainichi Japan) March 13, 2012
Click [here] for the original Japanese story.

Click [here] for the original English : Mainichi scoop on Mongolia's nuclear plans highlights problems in dealing with waste.

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