Japan Joins the Race for Uranium Amid Global Expansion of Nuclear Power

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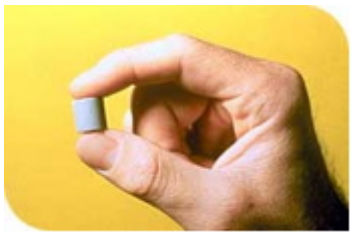
By Hisane MASAKI

TOKYO - Energy-hungry Japan is revving up its drive to secure uranium abroad as global demand for nuclear power rises amid stubbornly high oil and gas prices and growing environmental concerns. Major Japanese trading and energy firms are looking at multibillion yen investments in uranium mine projects, with electronics conglomerate Toshiba in February purchasing Westinghouse, the US power plant arm of British Nuclear Fuels, for about US$5.4 billion. Meanwhile, the government, which attaches great importance to nuclear power as a key to ensuring national energy security, is also considering assistance to help domestic firms in the intensifying global competition for fuel at nuclear power plants. Among those measures are financial aid and more investment-insurance coverage by government-affiliated organizations. Japan is already the world's third-largest nuclear power nation in terms of the number of civilian nuclear plants in operation. Uranium prices are climbing as energy-hungry China and India are stepping up construction of nuclear power plants to fuel their high-flying economies, while some industrialized countries, including the US and Britain, are moving to build new nuclear power plants after many years of suspension following nuclear accidents at Three Mile Island in the US in 1979 and Chernobyl in Ukraine in 1986. Nuclear power generation has begun to come under the spotlight again due to growing environmental concerns as well as the high prices for oil and gas. Nuclear power plants generate much less carbon dioxide, the primary greenhouse gas widely blamed for global warming, than coal-fired facilities. Renewable energy sources such as wind and solar power generation are not available in sufficient amounts - and at affordable prices.



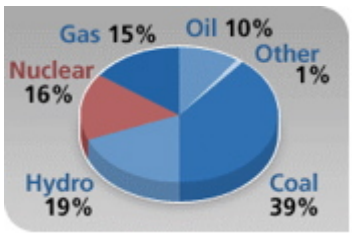
A typical pellet of uranium weighs about 7 grams (0.24 ounces). It can generate as much energy as 3.5 barrels of oil, 17,000 cubic feet of natural gas, or 1,780 pounds of coal.

Japan's investment spree

Private investment in foreign uranium mines has been sluggish since the 1990s, largely reflecting slumping prices for the fuel. Currently, only two overseas uranium mines in which Japanese firms have invested are on stream. One is the Akouta mine in Niger - in which Overseas Uranium Resource Development (OURD) has a 25% stake - the other McClean Lake mine in Canada, in which OURD has a 7.5% interest. Japan-Australia Uranium Resources Development had a 10.64% interest in the Ranger mine in Australia until it sold off the stake in December. However, Japanese firms have begun to refocus on uranium. Itochu, a major Japanese trading firm, announced this month that it and Dallas-based Uranium Resources will conduct a joint assessment of production potential at the Churchrock, New Mexico uranium mine. Itochu

will spend as much as 4 billion yen ($34 million) for a 50% stake in the project being developed by Uranium Resources. The mine may produce 400 tons a year, or 4% of Japan's uranium demand, from as early as 2009. It may operate for 10 years and supply reactors in the US and Japan. Itochu currently sells 4,000 tons of uranium produced in Australia, Canada and Kazakhstan to Japanese customers annually. Last year, Itochu concluded a long-term uranium concentrate purchase deal with Kazakhstan's state-run nuclear power company, Kazatomprom, under which the Japanese firm will buy 3,000 tons over 10 years.

Another major Japanese trading firm, Sumitomo, has acquired an interest in a foreign uranium project for the first time in anticipation of further growing demand for the fuel. In January, Sumitomo and Kansai Electric Power, Japan's second-largest power company, invested in APPAK LLP, a subsidiary of Kazatomprom, for the development of the West Mynkuduk mine. Sumitomo and Kansai Electric Power acquired stakes in APPAK LLP of 25% and 10%, respectively. The necessary initial funding will be approximately $100 million. APPAK LLP plans to start pilot production of uranium products after the completion of the necessary construction stage in 2007 and commence full scale commercial production of 1,000 tons of uranium per year as early as 2010. The mine life is expected to be about 22 years, and the total production of uranium from this mine will be about 18,000 tons. The joint venture is part of Kazatomprom's target of producing 7,000 tons more annually by 2010 through partnerships with foreign companies.



Nuclear energy accounts for 16% of the world's electricity generation

Meanwhile, Tokyo Electric Power (TEPCO), Japan's largest power company, and Idemitsu Kosan, a major Japanese oil refiner, have interests in the Cigar Lake uranium mine being developed in Saskatchewan, Canada. The mine is under development by a joint venture among four partners: TEPCO's and Idemitsu's local subsidiaries, Canada's Cameco and France's AREVA/COGEMA. Commercial production is expected to start in 2007. TEPCO and Idemitsu have stakes in the joint venture of 5% and 8%, respectively. Mitsui & Co, also a major Japanese trading firm, has supplied uranium to Japanese electric power companies, acting as an agent for Japan on behalf of Australia's WMC and other leading overseas suppliers of the fuel. OURD also has a 5.67% stake in the Midwest mine, also in Canada. This mine is to begin production in 2010.

Emphasis on nuclear power

The Japanese government is now in the final stages of drawing up its "New National Energy Strategy", which will call for, among other things, promotion of nuclear energy, as well as reduction in the nation's oil dependency rate to 40% or less by 2030 from the current 50% and securing energy resources abroad through the fostering of more powerful energy companies. Japan imports almost all of its oil. The new strategy will specifically call for raising the percentage of nuclear power in the total national electricity supply from the current 30% to up to 40% or more by 2030 and also establishing a nuclear fuel cycle. In October the Atomic Energy Commission of Japan, the highest nuclear decision-making body affiliated with the cabinet, adopted a long-term nuclear plan maintaining the nation's nuclear fuel cycle program, which reprocesses all the spent nuclear fuel to extract plutonium for future use as nuclear fuel.

Japan's nuclear fuel cycle program entered a new phase in March when a nuclear fuel reprocessing

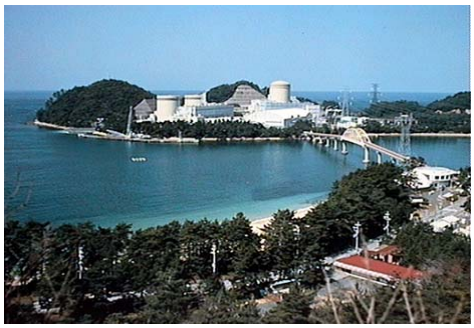
plant run by Japan Nuclear Fuel in the Aomori prefecture village of Rokkasho in northern Japan started test operations to extract plutonium for the so-called pluthermal power-generation project. Under the project, plutonium-uranium mixed-oxide fuel (MOX) will be burned at light-water reactors. The Rokkasho plant is scheduled to come into commercial operation in the summer of 2007. Government officials say the recycling of uranium resources via the nuclear fuel cycle program will contribute to the stability of energy supplies. According to plans by 11 Japanese power companies, as much as 6.5 tons of plutonium will be burned annually at nuclear plants after the pluthermal power-generation project gets under way. The Federation of Electric Power Companies of Japan plans to get pluthermal power generation under way at 16 to 18 power plants by the end of fiscal 2010. The companies said they plan to first use plutonium produced overseas such as in Britain and France at the pluthermal plants and start burning domestically produced plutonium in 2012 or later.

Protesters at the nuclear fuel reprocessing plant in the Aomori Prefecture village of Rokkasho, northern Japan

Lingering safety concerns

But it remains to be seen whether Japanese power companies, facing a serious loss of public confidence in nuclear plant safety in the wake of a spate of accidents, will be able to carry out their pluthermal plans. According to a recent newspaper survey, a majority of Japanese support the promotion of nuclear power generation while remaining concerned about safety at nuclear power plants. Opposition to nuclear power plants is particularly strong in host communities. A local court in March handed down an unprecedented ruling upholding the plaintiffs' argument that a new nuclear reactor should be shut down because of inadequate strength against earthquakes. The court ruled that a large earthquake could damage the number two reactor at Hokuriku Electric Power's Shika nuclear plant in Ishikawa prefecture in central Japan, leading to dire consequences.

In August 2004, Japan suffered its worst nuclear accident when hot water and steam leaked from a broken pipe at the Mihama Nuclear Power Plant in Fukui prefecture, also in central Japan, killing five workers. Also, the nuclear fuel reprocessing plant in Rokkasho got off to a rocky start. Only days after it started test operations, up to 40 liters of water containing plutonium leaked. The leak was contained within its compound and there were no injuries. The accident happened only a day after thousands of people held a street demonstration in protest against the plant's operation.


Mihama Nuclear Power Plant

Meanwhile, Shikoku Electric Power won government approval last month to generate electricity using MOX fuel at the number three reactor of its Ikata nuclear plant in Ehime prefecture in western Japan. It was the sixth to get central government approval for pluthermal power generation. However, only Kyushu Electric Power has so far successfully received local government approval for pluthermal projects, in its case for the Genkai nuclear power

plant's number three reactor in Saga prefecture in western Japan. Scandals, including fuel data falsifications and accident cover-ups, also have rocked the confidence of local governments in such projects.

Another key to the future of the nation's nuclear fuel cycle program is the fate of the fast-breeder reactor (FBR), which produces more fissile material than it consumes. The prototype FBR Monju in the Fukui prefecture city of Tsuruga in central Japan has remained shut since a sodium leak and subsequent fire in December 1995. The operator, then Power Reactor and Nuclear Fuel Development (Donen), tried to cover up the extent of the accident. It remains uncertain when the Monju will resume full operations, although its current operator, the semi-governmental Japan Atomic Energy Agency, has been preparing Monju with an eye toward resuming full operations. Even if the industry plan to get pluthermal power generation at 16 to 18 power plants goes smoothly, only 10% of uranium needs at domestic power plants would be replaced by MOX fuel. Therefore, stable uranium supplies are vital for Japan to keep nuclear power plants operating smoothly, according to officials at the Ministry of Economy, Trade and Industry.

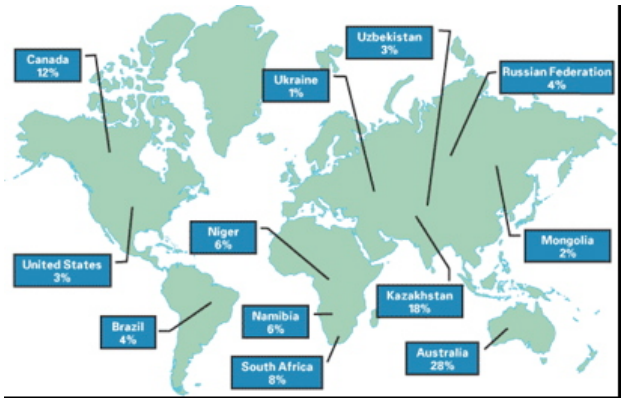
Global rush for uranium

China and India, the world's two most populous countries, are rushing abroad for energy resources, including uranium as well as oil and gas, to feed their robust economic growth. China plans to build 32 nuclear power plants to meet a target of raising nuclear energy output fivefold by 2020. Over the next 20 years, China is expected to build a total of 40 to 50 nuclear power plants and needs steady supplies of uranium. India aims to build 17 reactors to triple nuclear power capacity by 2012.

China signed an agreement with Australia in early April that allows Beijing to import Australian uranium for power stations. The agreement was signed during Chinese Prime Minister Wen Jiabao's visit to Australia. Under the terms of the deal, Australia will export 20,000 metric tons of uranium to China each year, beginning in 2010.
Australia, which has 40% of the world's known uranium deposits, sells uranium only to members of the Nuclear Non-Proliferation Treaty (NPT). The two countries had previously failed to agree on a deal amid concerns China would use the uranium in its nuclear weapons program. Australia insists that potential uranium buyers must agree to a separate bilateral deal stipulating that they will not divert nuclear fuel into weapons programs.

Environmental and opposition groups criticized the deal, suggesting that a guarantee of Australian uranium would allow Beijing to earmark more domestically-produced uranium for its nuclear weapons program.

Meanwhile, India signed a controversial nuclear cooperation deal with the US in early March during President George W. Bush's visit to Delhi. The agreement, which has still to be ratified by the US Congress, gives India access to US technology, although Delhi has not signed the NPT. It reverses US policy, which had restricted nuclear cooperation since India first tested a nuclear weapon in 1974.



Conventional sources of Uranium

In mid-March, India also announced that Russia has agreed to sell it uranium to power two

nuclear reactors. Russia and France have intermittently provided Delhi with uranium since the US stopped supplies following India's first nuclear tests in 1974. India said at the time that Russia, a member of the Nuclear Suppliers Group which controls global nuclear trade, was exporting "a limited amount of uranium fuel" under a safety clause. The provision allows nuclear fuel shipments to be made to non-signatories of the NPT, such as India, in the case of "a radiological hazard to public health and safety which cannot reasonably be met by other means".

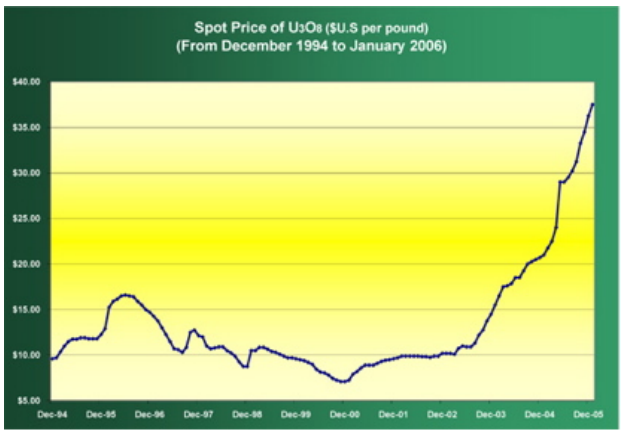
Demand for uranium is expected to be further fueled by policy changes in some industrialized countries. The US has suspended construction of new nuclear power plants since the 1979 Three Mile Island accident. Britain has also frozen construction of new nuclear power plants since 1990. But the US enacted the Energy Policy Act of 2005 in August last year, which supports construction of new nuclear power plants through tax breaks and loan guarantees to power companies. British Prime Minister Tony Blair also declared last year that he would consider construction resumption of new nuclear power plants.

The US has the world's largest number of nuclear power plants in operation, 103. Britain has 23 nuclear power plants. At the start of the year, there were 441 operating reactors, and another 24 under construction, according to the London-based World Nuclear Association. An additional 41 plants have funding and approvals in place. Japan has 55 nuclear power plants in operation, the world's third largest number after the US and France. More than $200 billion may be spent on nuclear generators worldwide by 2030, according to the Paris-based International Energy Agency (IEA).

Rising uranium prices

Currently, global demand for uranium as fuel at nuclear power plants is estimated at 65,000 tons a year. But annual production is stuck at about 40,000 tons. Uranium retrieved from dismantled Russian nuclear weapons and stockpiles make up the gap. However, commercial stockpiles dropped 50% between 1985 and 2003 because mine output could not keep up with demand. Japan uses about 8,000 to 8,500 tons of uranium a year to generate electricity.

Concern about supply shortages helped increase spot prices of uranium. Prices jumped after the two oil crises of the 1970s, rising to a record of more than $40 a pound in the late 1970s, but plummeted sharply after the Three Mile Island and Chernobyl accidents. Uranium prices remained below the $10-per-pound level on the spot market in 2002. But they have been on the rise in recent years, and the pace of increase has accelerated. Prices have risen 13% so far this year to the $40-per-pound level and may go higher because of investor demand and purchases by nuclear power generators to ensure future supplies for their reactors. Some analysts say uranium prices may go up to $54 per pound this year. The spot market, which makes up about 12% of uranium sales, sets a price reference for long-term contracts between miners and utilities.



The rapidly increasing price of Uranium

Natural uranium deposits are estimated at about 4 million tons worldwide. Australia has the world's largest deposits, with 930,000 tons, followed by Kazakhstan, with 850,000 tons, and

Canada, with 440,000 tons. The US has the world's fifth-largest deposits, with 350,000 tons.

The global uranium mining industry has seen a wave of consolidation amid slumping prices for the fuel since the 1990s. Many companies were merged or absorbed. Last year, global miner BHP Billiton Ltd. acquired the massive Olympic Dam copper and uranium mine in Australia when it bought WMC Resources for A$9.2 billion. Currently, eight major producers of natural uranium churn out about 80% of global supply. The eight producers are: Cameco in Canada; AREVA/COGEMA in France; Rio Tinto/ERA in Australia; Kazatomprom in Kazakhstan; BHP Billiton/WMC in Australia; Rossing in South Africa; Priargunsky in Russia; Navoi in Uzbekistan.

Hisane Masaki is a Tokyo-based journalist, commentator and scholar on international politics and economy, and a Japan Focus associate. Masaki's e-mail address is yiu45535@nifty.com)

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