FACT SHEET: Japan's Nuclear Fuel Cycle Program

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Nuclear power generation and a closed fuel cycle offer Japan, a country that combines large energy consumption with scarce natural resources, long-term advantages. The Japanese government has thus implemented policies that enhance the importance of establishing a closed nuclear fuel cycle, such as recognizing spent fuel not as mere "waste" but as "a valuable resource." Based on these government policies, Japan's electric utilities are implementing a nuclear fuel recycling program. As is well documented, Japan is poor in natural resources, relying on imports for over 80% of its primary energy requirements, including uranium. In terms of oil, domestic production accounts for only 0.3% of the total crude oil supply, and 87.9% of the total imported crude oil is supplied from the Middle East. In order to enhance the country's fragile energy security, and from the perspective of a long-term energy policy, we consider it of the utmost importance to establish a domestic nuclear fuel cycle and create an independent fuel supply structure.

At present, there are 52 commercial nuclear reactors in operation in Japan with a total generating capacity of 45,742 megawatts. Nuclear power supplies about 35% of Japan's total electricity demand. It is expected that nuclear energy's share in electricity generation will increase to more than 40% by around 2010. Nuclear power is a key energy source in Japan, with the added benefit of no carbon dioxide emissions. Consequently, nuclear power plays a strong role in controlling global warming problems.

Japan has adopted a nuclear fuel cycle policy. A closed nuclear fuel cycle offers many advantages: in addition to contributing to long-term energy security by further reducing dependence on imported fuels, it conserves uranium resources, and it reduces the amount of highly radioactive waste that must be disposed of. The volume of high level waste (HLW) is reduced to less than half by reprocessing spent fuel, which lightens the burden on final disposal of HLW. A closed fuel cycle means that spent nuclear fuel is reprocessed. Reprocessing is a chemical process that recovers plutonium and re-usable uranium from spent fuel and separates radioactive wastes into more manageable forms. Once recovered, the plutonium is ready to be re-introduced into the nuclear fuel cycle in the form known as mixed oxide (MOX) fuel. **MOX fuel is made with plutonium oxide and uranium oxide.** The characteristics and behavior of MOX fuel have few differences from those of uranium fuel. Since inception, more than 3,500 MOX fuel assemblies have been used, mainly in Europe. Moreover, plutonium is already being used as fuel in existing LWRs. In fact, some 30% of the power generated in nuclear reactors comes from burning the plutonium that results from the fission process. This extensive experience has proven that MOX fuel utilization can be conducted very safely.

MOX fuel contains significant energy potential. One pellet of MOX fuel, which weighs about six grams, can generate the energy equivalent of one ton of coal. A single MOX fuel assembly produces enough electricity to supply 30,000 families for an entire year. After reprocessing spent fuel, plutonium can be used to make MOX fuel, while recovered uranium after re-enrichment can be re-used as uranium fuel. Theoretically, about 40% of the natural uranium resource is saved through recycling.

A commercial reprocessing plant is being constructed at Rokkasho in Aomori prefecture in northern Japan by Japan Nuclear Fuel Limited, a company owned in large part by Japan's electric power companies. It is scheduled to begin commercial operation in 2005, with a designed capacity of 800 tons uranium per year. Currently, construction is about 90% done. Plutonium recovered at the domestic reprocessing plant will be fabricated into MOX fuel assemblies in Japan. There is also a plan to construct a domestic MOX fabrication plant adjoining the Rokkasho reprocessing plant. Domestic MOX fuel fabrication is planned to commence operation in 2009. Additionally, spent fuel interim storage facilities are expected to commence commercial operation by 2010.

Japan's power industry continues its efforts to regain public trust, which has been weakened chiefly as a result of the Tokyo Electric Power Company's (TEPCO's) inappropriate handling of voluntary inspection records at its nuclear power plants. Nuclear-related laws have been amended, and nuclear utilities are now required to evaluate and submit records on equipment safety. The Nuclear & Industrial Safety Agency (NISA) of the Ministry of Economy, Trade and Industry (METI) plans to issue detailed evaluation rules, including the application of private sector standards. To further enhance safety culture, the FEPC, which comprises 10 member electric power companies, will, through evaluations of member management and operations, strengthen links within the Nuclear Safety Network (NS-Net), which is composed of electricity and research organizations

Japan's strong commitment to the peaceful use of nuclear energy has manifested itself in numerous ways. The Atomic Energy Basic Law prohibits the military use of nuclear energy. In addition to this Japanese law, the successive Cabinets of Japan have repeatedly articulated the "Three Non-Nuclear Principles," which is used to describe the policy of not possessing, not producing and not permitting the introduction of nuclear weapons into Japan. There is no change in the position of the Government of Japan in that it continues to uphold these principles. Moreover, in 1976 Japan became a party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and thereby made a binding commitment to forgo the manufacture and acquisition of nuclear weapons and nuclear explosive devices and to accept the safeguards of the International Atomic Energy Agency (IAEA) on all of its peaceful nuclear activities. The IAEA presently applies safeguards to all of Japan's nuclear facilities, employing an estimated approximately 20 to 30 % of its total inspection efforts in Japan. In order to ensure the application of more extensive safeguards, Japan signed the IAEA Additional Protocol in 1998, and it came into effect the following year. The Additional Protocol allows the IAEA to carry out a range of additional measure to make sure there are no undeclared facilities and activities, conferring very important additional rights of inspection on this international agency in verifying the use of nuclear energy solely for peaceful purposes.

Japan also has bilateral peaceful nuclear cooperation agreements with several major nuclear supplier states such as the United States, Canada, Australia, France, the United Kingdom and China. In the process Japan has made commitments to refrain from utilizing nuclear materials, nuclear equipment or the like for any military or nuclear explosive purposes to accept IAEA safeguards on all its peaceful nuclear activities, and to accept various additional nonproliferation conditions and controls subject to those agreements to other countries.

Japan has also supported other important nuclear nonproliferation norms and guidelines. It is a party to the Convention on the Physical Protection of Nuclear Materials. Japan has been a long-time participant in the Nuclear Suppliers Group a group of supplier states that have adopted guidelines designed to ensure the application of common and effective nonproliferation conditions to nuclear export.

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