

Japan's Nuclear Energy Policy and Nuclear Nonproliferation¹

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Distinguished colleagues, ladies and gentlemen, it is indeed a great pleasure for me to have the chance to address you at the second international gathering of the Next Generation Safeguards, of which initiative was launched last year by the United States of America (USA).

My talk this morning consists of three parts. The first part deals with a brief summary of the Japan's nuclear energy policy and issues at present. The second part concerns recommendations for improving the effectiveness of the nonproliferation policy made by the Japan Atomic Energy Commission (JAEC), and then the last part relates to my thought on the actions to be taken by global community to strengthen the nonproliferation regime.

Japan has been promoting the research, development and utilization of nuclear energy since 1956 with a view to securing future energy supply and thus contributing to the enhancement of the living standards of the people of Japan and the welfare of human society as well. In doing so, Japan has strictly limited these activities to only peaceful purposes as provided by the Atomic Energy Basic Law and it has willingly accepted the International Atomic Energy Agency (IAEA)'s safeguards frame work and activities.

Japan has now 53 nuclear power generation units, and is the only non-nuclear weapon state under the aegis of the Treaty of the Non-proliferation of Nuclear Weapons (NPT) to operate both commercial reprocessing facilities and commercial uranium enrichment facilities. In the future, Japan currently plans to add 13 nuclear power generation units at least before 2020 so that nuclear power will make up about 50% of electricity generation at around 2030 as a major effort to combat global warming.

The current objectives of nuclear energy policy in Japan are to a) continue to construct and operate nuclear power plant effectively and efficiently; utilize fissile material recovered from spent fuel through reprocessing in these light water reactors (LWRs) for the time-being, b) develop geological disposal facilities for disposing the glassified high-level radioactive waste from the reprocessing process; c) pursue commercialization of innovative nuclear energy technologies and fast breeder reactor and its fuel cycle technology that will contribute to better utilization of resources and possible reduction of the heat generation rate of the high-level radioactive waste, in particular.

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In order to achieve these objectives we are promoting actions across three different time frames: short term, medium term and long-term.

The short-term actions are to a) continue safe and reliable operation of existing plants, incessantly cultivating the public confidence in operators and regulators; b) promote the mixed plutonium uranium oxide (MOX) fuel utilization in LWRs by utilizing plutonium recovered and stored in Europe and that to be recovered at the Rokkasho Reprocessing Plant (RRP) and c) steadily promote the process to determine the site for a high-level radioactive waste disposal facility.

As for safe operation of existing plants, Japanese operators should be proud of the fact that the annual frequency of unscheduled shutdown of Japanese nuclear power plants (NPPs) has been sufficiently low for past 20 years. As for the efficient operation of their plants, however, they have suffered for low plant availability factors in recent years. The reason for this is the fact that NPPs at Onagawa, Shika, Kashiwazaki-Kariwa and Hamaoka, for some reasons or other, all of them are boiling water reactor (BWR), have experienced unexpectedly strong seismic motions and their operation has been suspended till the re-evaluation of their seismic safety taking into account lessons learned from the experiences is to be accepted by the safety authority. Owing to this, the average availability factor of BWRs in this country has been about 50%, though that of pressurized water reactors (PWRs) has been around 80%, that is a global standard number.

As for the management of used-fuel, we have operated Tokai reprocessing plant for more than 20 years and the recovered plutonium has been used for research and development (R&D) purposes, including MOX fuel loading to Fugen, a prototype heavy water moderated light water cooled reactor. The construction of the RRP has been almost finished and currently the Japan Nuclear Fuel Limited (JNFL) is working hard for establishing the operation procedure of the ceramic-melter for vitrification that is an essential equipment to produce the vitrified waste as a part of its commissioning test, though the company has experienced several troubles in this endeavor. Last but not least, the construction of interim storage facilities of used-fuel is planned, and currently one license application of this kind is under regulatory review.

One of the major medium term actions is to prepare the design of the next generation LWRs that will replace the currently operating LWRs, consolidating Japanese experiences in construction and operation of LWRs and making the most of various innovative science and technologies on the horizon. The project has already started, aiming at the completion of basic designs in 2015.

One of the major long term actions is the promotion of the research and development of a fast breeder reactor (FBR) and its fuel cycle technology by the Japan Atomic Energy Agency (JAEA). The JAEA is aiming at submitting in 2015 a conceptual design that may be competitive in the energy market of the latter half of the 21st century. Design goals specified for the project includes enhanced economy, safety, reliability and utilization of

fuel, and high proliferation resistance.

Needless to say, in the promotion of these actions it is important to assure safety, security and nonproliferation; maintain openness and transparency to the public of any activities including policy making processes, giving the public both formal and informal opportunities to learn what nuclear energy policy and activities are; It is also important to maintain technological and industrial bases necessary for their promotion and secure number and quality of talents for these activities; and promote international cooperation and contribution to pursue mutual benefit with other countries with respect to the utilization of nuclear energy, strengthening international schemes for assuring nuclear safety, security and nonproliferation.

As for openness and transparency, Japan has recognized it important as a part of the nonproliferation policy to pursue openness and transparency in the management of sensitive material. Therefore, when a private company JNFL started the construction of the RRP, the AEC decided a principle of not possessing plutonium of which use was undetermined and since then has been working on improving the control and disclosure of information pertaining to the plutonium stock, jointly with the international partners.

This brings me to my second point. The AEC conducted in 2008 a policy review² to address the changes in the policy environment surrounding Japan's nonproliferation policy and laid out eight recommendations to administrative organizations and private industries concerned. Since these compose a part of current nonproliferation policy of Japan, I would like to introduce you each recommendation briefly.

The first is to secure full transparency of activities related to research, development and utilization of nuclear energy, and make open the result of such activities effectively both at home and abroad.

The second is to make constant efforts to improve the state system of accounting for and control of nuclear material (SSAC) and cooperate with the IAEA for the introduction of the state-level integrated safeguards approach.

The third is to ask the government and the organizations that have a facility to handle nuclear material as well as that regulate them recognize the importance of safeguards activities, arouse awareness regarding them and cultivate positive attitude toward them among peoples working in the facility. We made it clear that their top managements have responsibility to create an organizational culture that put priority on their assurance and the

² The Policy Evaluation Committee of the AEC: "Evaluation of the Basic Concepts of Approaches to Guaranteeing Peaceful Uses and Maintaining and Strengthening the Nuclear Non-proliferation Regime, Specified in the *Framework for Nuclear Energy Policy*," 15 May, 2009.

maintenance of both technology and human resources for them.

The fourth is to ask administrative organizations concerned to endeavor to develop the public understanding both at home and abroad regarding the existence of nonproliferation measures and frameworks in Japan and their reports annually published, and quickly and clearly correct any misunderstanding regarding Japan's nonproliferation policy if reported.

The fifth is to publish annually not only the information about the inventory of plutonium at each location, but also the information about the purpose of the utilization of plutonium to be recovered at reprocessing plants in a year to come with a view to securing utmost transparency of the use of plutonium.

The sixth is to ensure effective and efficient export control of sensitive technology with a view to preventing roundabout exports of sensitive technology that may be covertly applied for weaponisation.

The seventh is to promote the knowledge management and the development of both human resources and technology related to nuclear safeguards and nonproliferation, strengthening cooperation among the operator of the SSAC, R&D organizations, universities and international organizations.

The eighth is to actively contribute to international initiatives to achieve nonproliferation more effectively and efficiently, including those of the IAEA, the "Global Nuclear Energy Partnership" , Forum for Nuclear Cooperation in Asia (FNCA), the "Japan-US Joint Nuclear Energy Action Plan" and so on.

The activities deliberated in relation to this last point are the basis for the third topic I would like to share with you in my talk.

The concern of proliferation starts from the existence of sensitive technological facilities and sensitive materials. In recent years the availability of the expertise to design and construct sensitive facilities has also give rise to a proliferation concern.

What strategies are considered to reduce the concern? There are three strategies; the first, to politically create the security environment globally or at least regionally in which any country do not need or want nuclear weapons; the second, to institutionally prevent the diversion of such materials, facilities or technologies in any country by the IAEA safeguards which are composed of the verification of non-diversion in the country and the imposition of sanction in case of discovery of the diversion; and the third, to physically reduce the inventory of sensitive facilities, material and expertise in any country.

Obviously the first strategy or nuclear disarmament is the only sane path to a safer world, as nothing would work better in eliminating the risk of use than eliminating the weapons themselves. An important action for this purpose is to pursue global agreements to remove

nuclear weapons and develop new structures to manage international crises so that all states can be confident that any further conflict can be defused before a state's vital national interests are threatened. As succinctly but seriously expressed by US President Obama in Prague this spring, Nuclear weapon States should not dismiss this goal at any time and they should work together for nuclear disarmament sincerely and persistently.

At the same time we should pay due attention to the fact that the number of newcomer countries with inexperienced SSAC and those countries that would want to establish new facilities for uranium enrichment, processing of direct-use nuclear material or spent-fuel reprocessing in the future will increase, as global nuclear power projections point to continued strong growth in the longer term.

The non-nuclear weapon state party to the NPT has accepted an obligation not to divert nuclear energy materials and technology from peaceful uses to nuclear weapons and today to conclude the combination of a comprehensive safeguards agreement and an additional protocol with the IAEA has been recognized as the standard for that party. Therefore we should ask all non-nuclear-weapon states to the NPT that have yet to bring into force a Comprehensive Safeguards Agreement (CSA) or a modified small quantities protocol (SQP) to do so immediately, and task all states to adopt and implement an additional protocol. It is important for nuclear supplier states to make the additional protocol a condition for granting export licenses of nuclear materials, services, and technologies at their earliest convenience.

In parallel, we should make sure that the IAEA continue to have all the necessary resources and authority to verify the absence of undeclared activities, giving the agency assistance in development of and training in equipment and detection technologies and cooperating in the area of both capacity building for effectively utilizing information that can enhance the IAEA's knowledge and understanding of nuclear programs and information sharing as each country has substantial information, including intelligence and data on nuclear exports.

Furthermore it is also important to strengthen the current form of the additional protocol as to reporting of dual-use items and export denials and free access to any information, locations, and individuals that may help it carry out its mission.

In this connection, I would like to stress the importance of maintaining and reinforcing social environment for taking the safeguards seriously. Governments and the organizations involved in the regulation and promotion of research, development and utilization of nuclear energy should review the pervasiveness of safeguards culture among leaders, senior managers and operating personnel of facilities and institutions concerned.

Professional bodies in the world community should be encouraged also to exert an influence on the facilitation of effective export controls and measures that can stop transfer of technologies and material through black-market networks, as professional regulations, standards and social climate can influence organizations on a range of matters to do with

proliferation risk.

As for the third strategy, a traditional approach is to reduce the inventory of both high-enriched uranium and weapon-grade plutonium. The approach to increase the proliferation resistance of the materials or reduce the attractiveness of the materials from the viewpoint of weaponisation can also be categorized in this strategy.

Although the interest in this approach is increasing as the research and development to pursue this approach includes challenging topics of nuclear science and engineering, it seems to me that how proliferation resistant is proliferation resistant enough is an untouched question and one of the most crucial topics to be resolved for determining the usefulness of this approach.

For example one can predict that as countries that master this kind of sophisticated nuclear fuel cycle technologies should be viewed as the weapons capable states, the existence of nuclear fuel cycle facilities in such country may not be allowed in the nuclear weapon free world, irrespective of their level of proliferation resistance. In that situation, the purpose of reviewing the proliferation resistance of a facility will be just to review the completeness of safeguards and physical protection for the facility.

To decrease the number of facilities that can produce such sensitive materials is also a convincing approach in this strategy. However, as Article IV of the NPT reaffirms the inalienable right of all NPT parties to develop, research, production, and use of nuclear energy for peaceful purposes, there is no institutionalized mechanism to pursue this approach.

At present the Nuclear suppliers Group (NSG) continues deliberating the way to limit the commercial transaction of enrichment and reprocessing equipment and technologies. It would serve as a useful tool if agreed but the term of its effectiveness would be for some time.

Now, on multilateral mechanism: Dr. Elbaradei of the IAEA proposed to establish a multilateral mechanism to assure nuclear power plant operators to obtain access to nuclear fuel several years ago. The mechanisms proposed along this line so far seemingly have potential to limit the appearance of national enrichment facilities at least, in a positive manner in contrast to the NSG approach that relies on denial.

The establishment of multilateral used-fuel repositories that was mentioned as a part of the menu of expansion of nuclear fuel cycle options in the US Secretary of State Madame Clinton's speech delivered last week at the United States Institute of Peace would be useful to limit the appearance of reprocessing facilities in small nuclear power countries, if they can be used by fuel suppliers to provide nuclear power plant operators with an attractive used-fuel take back option.

Multinational arrangement of nuclear fuel cycle facilities is also an important option to be pursued, since the demand of global community with 1,500 GWe LWRs, which corresponds to the OECD NEA (Nuclear Energy Agency) high case in 2050, can be satisfied by 10 “regional” enrichment plants each of which capacity is 18,000 t SWU/y, and 10 “regional” reprocessing plants each of which capacity is 3,200 ton/y. If these are realized and user states become co-owners of these regional centers, being assured adequate and timely supply of these services for their power plants, the economy of scale of these large scale facilities would surely make any of national facilities unattractive at least economically.

It should be kept in mind that this arrangement will become the only form of such sensitive facilities to be allowed to exist in the future nuclear weapon free world. The reason is because, as already mentioned, countries that have mastered uranium enrichment and plutonium or equivalent weapon usable material separation under high radiation environment can be viewed as the nuclear weapons capable states that could develop nuclear weapons within a short time span utilizing available nuclear fuel cycle facilities when they walked out of the NPT or launched clandestine programmes.

In conclusion, recognizing the safeguards as an essential element for executing the research, development and utilization of nuclear energy, the JAEC is pursuing the rigid application of safeguards activities at every nuclear facility and promoting the nurturing of safeguards culture in the organizations concerned.

Considering the prospect for global nuclear energy growth, the JAEC believes it important for global nuclear community to work hard to increase the effectiveness and efficiency of the IAEA safeguards and prevent misuse of civilian nuclear technology by increasing its resistance to proliferation physically, institutionally and politically.

Although various measures and improvements can be conceived and have been proposed in this respect, they can only be implemented through global recognition of their effectiveness and legitimacy. Therefore it is highly recommendable to continue and strengthen dialogue on these matters among experts in diverse fields and of diverse countries. I sincerely hope that the meeting today and tomorrow will be fruitful to all of you in this respect.

Thank you for your kind attention.