

Challenges the Global Nuclear Community Should Confront for Promotion of Nuclear Energy Utilization¹

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Thank you very much, Mr. Chairman, for your gracious introduction.

Distinguished colleagues, ladies and gentlemen, I am delighted to have the chance to address you at this GLOBAL 2007 conference on advanced fuel cycles and systems, here in Boise, City of Trees.

In May this year, Prime Minister of Japan Shinzo Abe presented to the world an initiative to address global warming entitled "Invitation to Cool Earth 50." He proposed under this initiative a target of cutting global emission of greenhouse gases by 50% from the current level by the year 2050. To pursue this target, he then proposed, as a mid-term strategy, three principles in designing a framework beyond the Kyoto Protocol; these are; 1) participation of all major emitters; 2) acceptance of flexible and diverse emission reduction approaches; and 3) compatibility between environmental protection and economic growth, and as a long-term strategy, he proposed to develop and use zero emission technologies like nuclear, solar, hydrogen technologies so as to realize a low carbon society.

Although many experts commented his proposal positively, at the same time, they pointed out that to realize the target would require an expansion of use of solar, nuclear, carbon-sequestration and high-efficiency energy technologies much beyond any realistic scenarios proposed in the past. In my view, however, the global nuclear community should live up to the expectation and energetically confront various challenges to obtain and maintain public confidence in nuclear energy at strategic, programmatic and operational levels.

The strategic action to be taken for this purpose is to establish and maintain mutual understanding with the public about the characteristics of nuclear energy in the three dimensions of sustainable development; economy, environment and society, so that nuclear energy is appropriately chosen in any energy strategy.

Important characteristics to be shared with the public in the economic dimension are competitive energy production cost and its stability of supply. Those in the environmental dimension are the assurance of low human health impact, small volume of waste production and rarity of severe accidents that contaminate the land on a large scale, and those in the social dimension are the assurance in low neighbor disturbance,

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nuclear nonproliferation and long-term safety of radioactive waste disposal.

In order to establish and maintain such understanding, however, we are required at the programmatic level to demonstrate that nuclear power plants and its fuel cycle facilities have, as a system, the afore-mentioned characteristics in the three dimensions of sustainable development, and sustain their competitive position among various energy technologies over time by promoting research and development activities for the innovation of technologies incessantly, while developing and maintaining trustworthy nuclear infrastructure in each country that wants to achieve a viable nuclear programme.

At the same time, as the devil is in the details, it is important for each individual plant operator as well as the nuclear community as a whole to maintain the desired features of their nuclear energy systems through appropriate quality management activities, periodically performing business risk assessment that includes the review of the adequacy of preparation for undesired events such as plans for managing severe accidents and emergency situations.

Keeping these challenges in mind, the Atomic Energy Commission of Japan is currently performing the first periodic assessment of nuclear energy utilization activities promoted by the Government and industries since the establishment of the Framework for Nuclear Energy Policy in 2005, which set it a target of nuclear energy utilization to increase the contribution of nuclear energy to the stable supply of energy as well as to the reduction in carbon-dioxide emission by making the share of nuclear power in electricity generation after the year 2030 similar to or greater than the current level of 30 to 40%.

The framework emphasizes it as the prerequisite for the promotion of nuclear energy utilization to cultivate the basis for the utilization in accordance with its evolution, which basis is composed of strict limitation of nuclear activities to peaceful purposes, public trust and confidence in both the plant operator's safety management and the effectiveness of safety regulator's activities, assurance of opportunity for the public to participate in policy making processes, steady progress in the safe disposal of all categories of radioactive waste, diverse opportunities for the public to learn about nuclear energy and its benefits and risks in particular and securing of necessary number and quality of talents in nuclear business, acknowledgement of the public and service provided by municipalities where nuclear facilities are located through the subsidization to their efforts for sustainable development.

One of the most urgent issues identified in the assessment is the need for restoring public trust and confidence in both the plant operator's safety management and the effectiveness of nuclear safety regulator's activities, as the public trust and confidence in them has deteriorated since the publication of past misconducts and reportable events hidden in operating organizations, even going back to 30 yrs attracted much attention from the mass media. The Commission expressed its view that the publication is a right action from the viewpoint of promoting transparency and asked operators to review the establishment of safety culture in their organization to deter the occurrence of safety-related misconducts and operators and regulators to promote open and

transparent risk communication with the public as an essential element of their business risk management activities.

The 16 July 2007 Earthquake at Kashiwazaki-Kariwa NPP of Tokyo Electric Power Company, TEPCO, is, to my mind, providing Japanese nuclear community a real trial for sustaining public trust and confidence in nuclear energy.

The operating units were automatically shutdown and all plants behaved in a safe manner during and after earthquake, although the earthquake significantly exceeded the level of the seismic input taken into account in the design of the plant. Though the inspection of the plant is still to be continued, so far there has been no report of significant damage of safety-related structures, systems and components. On the other hand, non-safety related structures, systems and components were affected by anchorage failures and oil leakages due to significant soil deformation.

A fire of the Unit 3 in-house electrical transformer was induced as one of the consequences of the earthquake. As the fire was televised for two hours without detailed explanation of the situation except that the transformer was not directly related to nuclear safety, it has caused public concern about the seismic safety and emergency preparedness of NPP. In addition, as the release of radioactivity to the sea attracted much attention from the mass media, though it caused an individual dose of the public well below the authorized limit for normal operating conditions, it was reported that many tourists cancelled their planned summer visit to the Chuetsu coast.

To restart plant operation TEPCO needs the permission of the regulatory authority, submitting a re-evaluation of the seismic safety of the plant in accordance with new seismic design guidelines of the Nuclear Safety Commission issued in September 2006, taking into account lessons learned from the occurrence of the earthquake of which magnitude was 6.8 in such vicinity of the plant.

As the total capacity of seven units at K-K NPP, 8.2 GWe, represents about 47 % of the TEPCO's nuclear power generating capacity that generate more than 40% of electricity the company sells in regular years, the recognition that it will take some time to restart their operation causes public concern about the effectiveness of nuclear power to assure the stable supply of electricity as well as to reduce the carbon-dioxide emission in the future.

As a guardian of nuclear energy policy, the AEC has announced its view on the situation that what should be done at present is to learn as many lessons as possible for improving design, operation and maintenance of nuclear installations and share them among international as well as Japanese nuclear community for future. In this announcement, the Commission identified a few lessons as important for both operators and regulators to learn, these are 1) to explain the fact and its evaluation quickly and precisely at the occasion of incidents, based on the lesson learned that no explanation under high level mass media attention to the situation is bad news; and 2) to review the business risk arising from earthquakes seriously in their business risk management activities including the appropriateness of their preparation to the crisis, based on

periodic risk assessment at the level of strategy, system and operation that takes into account the feedback from operating experiences and developments in science and technology and seismology, in particular.

Now let me move on to near-term actions specified in the Framework for Nuclear Energy Policy. Since Japan is determined to pursue the recycling of nuclear fuel materials through reprocessing of spent fuel as Japan will use nuclear power as a long-term and major method of power generation on a scale of more than 50 GWe, the completion of the construction of the Rokkasho commercial reprocessing plant is identified as one of the important near-term actions. It is my pleasure to report that the work is going on well and the plant is now in the final stage of commissioning test.

Another important near-term action identified is the decision of the areas for preliminary suitability review for locating a facility for the disposal of the high level radioactive waste based on the application from municipalities. As no mayor of municipalities has successfully applied to the invitation, it is an important item for self-assessment at present.

As it was experienced that just the announcement of a mayor to study the merit and demerit of the application paralyzed the administrative affairs of the municipal office due to the intense media attention and rallies and demonstrations organized by activists to protest the announcement, the AEC is proposing that 1) the application system should be modified so that the role of mayors and governors be limited to an intermediate role at first: 2) the Government should strengthen public information activities as to the importance of the disposal facility at both national and municipal levels, including the promotion of citizen's working sessions to develop a plan for the sustainable development of the municipalities that host the facility, 3) the Government should promote not only relevant R&D activities but also the utilization of the facilities for them and their results for more effective public information.

The Framework asked the Government to review the need for actions to prepare for the time when the current LWR designs will become obsolete due to the innovation of energy technologies. In response, the Government just decided after the review to start a project to support for manufactures' cooperative efforts for developing innovative LWR designs, which will be a major candidate for the capacity increase and the replacement of the retiring plants in the social and economic conditions in 20-30 years.

The characteristics to be pursued were selected after reviewing revolutionary changes in science and technology on the horizon. They are, 1) reduction of spent fuel generated, 2) standardization of plant design through the extensive application of seismic isolation technology, 3) reduction of occupational exposure through the fusion of new material development and advances in water chemistry, 4) reduction of construction period through highly advanced construction technologies, 5) optimal combination of active and passive safety features for excellent reliability and economy and 6) reduction of human errors and need for off-line inspection through the use of advanced information technology.

As for long-term actions, we decided to start the fast reactor cycle technology development project, aiming at the commercial introduction of fast breeder reactor in around 2050. The reference design concepts chosen are the TRU-recycling, mixed-oxide fuel sodium-cooled fast reactor and the aqueous reprocessing process.

The objective of the project is to produce by 2015 the conceptual design that can satisfy performance goals regarding safety, economy, reliability, fuel utilization, environmental burden, nuclear proliferation resistance etc. The Commission requested that activities of both exploration and the proof-of principle on innovative concepts for realizing alternative FBR cycle technologies should also be promoted.

To materialize the design concept that satisfies the development target, the leading R&D organization the JAEA identified thirteen innovative technological concepts and is now promoting their R&D in order to judge whether or not it is feasible to adopt each of them in actual plant designs. It is hoped that the JAEA will make it possible to start a demonstration plant project in 2015, aiming to start its operation in 2025-2030.

Based on the recognition that international cooperation has played a vital role in the development of Japan's nuclear energy utilization, Japan is determined to positively continue the promotion of international cooperation in diverse areas.

One focal area to which the Framework asks the Government to initiate is to positively examine how Japan can contribute at present is to strengthen international nuclear nonproliferation regime. In response, Japan is now contributing to the discussion about the establishment of multilateral frameworks for fuel supply assurance, such as a safety net mechanism to back up the fuel supply market in the event of disruption due to non-commercial reasons, with a view to the reduction of unnecessary incentive for states to have national small scale enrichment facilities that can not enjoy the economy of scale.

The other focal area identified is the cooperation for technology R&D. As innovation of nuclear technologies can occur only slowly and at considerable cost, Japan believes that it is an absolute priority for the global nuclear community to promote the coordination of research activities beyond national prestige to reduce the duplication of effort at the world level.

Therefore Japan is contributing to this kind of coordination efforts in parallel with positively participating in various bilateral and multilateral cooperative activities, such as Generation Four International Forum (GIF), International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) and Global Nuclear Energy Partnership (GNEP), to say nothing of the ITER, International Thermonuclear fusion Experimental Reactor.

In conclusion, to live up to the call to expand the use of nuclear energy much beyond any realistic scenarios proposed in the past, the global nuclear community should energetically promote a thoughtful mix of near-term, mid-term and long-term actions to gain and maintain the public confidence in nuclear energy not only at strategic level but

also at programmatic and operational levels.

Japanese nuclear community is in the midst of difficulties due to the occurrence of an earthquake at Kashiwazaki-Kariwa NPP and unsuccessful call to municipalities for application to the suitability survey for the location of a HLW disposal facility. In parallel with the actions to rectify the defects based on the lessons learned from these experiences, however, Japan started the program of innovating LWR designs as a mid-term action and also the project of R&D of fast reactor and its fuel cycle technologies as a major long-term action, and is steadily increasing its roles in the various international cooperative activities, including those to strengthen international nuclear nonproliferation regime.

To share lessons learned from difficulties experienced in the utilization of nuclear energy and cooperate in the areas of nuclear nonproliferation and technology development among the global nuclear community are essential to the successful promotion of global nuclear energy utilization. Japan will continue these endeavors with the global nuclear community.

I am sure that this GLOBAL 2007 will provide excellent forums for sharing experience and lessons learned and exchanging information and ideas for cooperation. Let me wish you all success in this conference.

Thank you for your kind attention.