

Actions to Promote Nuclear Energy Utilization to Address Global Warming¹

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Thank you, Mr. Chairman for your kind introduction.

Ladies and Gentlemen, it is a great pleasure and honor for me to have this opportunity of presenting my personal view on the necessary actions to promote nuclear energy utilization from the viewpoint of roles and responsibilities of our global nuclear community to address global warming.

Before I focus on that, however, I want to offer my condolences to all the families who are victims of the cyclone in Myanmar. It's a terrible thing, and it's a great example of where the world needs to cooperate and use all of its ingenuity and technology to help out in any way.

Recognizing the importance of mitigating global climate change caused by the emissions of greenhouse gases of which major source is energy supply, as that change might cause the increase in the magnitude and frequency of flood, for example, Japan and other major developed countries have expressed their commitment to the reduction of greenhouse-gas emissions to 50% of the current level in the first half of this century. This means that the annual global carbon-dioxide emission must be 13 GtCarbon/yr below that of business-as-usual case in 2050.

As nuclear power supplies 16% of electricity generated in the world today without emitting greenhouse gases, it is reasonable for the global nuclear community to have a vision that nuclear energy will contribute in many parts of the world as one of the mainstay technology for electricity and heat generation not only to the fostering of economic growth and energy security, but also to the peaking-out of global greenhouse-gas emissions before 2030.

To achieve this vision is formidable; however, as 900 one GWe nuclear power plants replacing coal-fired power plants are necessary for avoiding 1.3 GtCarbon/yr or just one-tenth of the target. Therefore, we global nuclear community should energetically confront various challenges that must be overcome, taking proactive initiative in, a) sustaining safe and efficient operation of existing nuclear power plants, b) improving the technology through unremitting R&D activities and c) shaping the environment for promoting the peaceful uses of nuclear energy in every part of the world.

In this presentation, I will review principal actions we should take to achieve this vision by way of these three initiatives.

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In order to increase nuclear share of global energy production in the future, the existing fleet of nuclear power plants must be operated successfully, maintaining high performance throughout their life, in the first place. In responding to this challenge, we should work hard for the goals of a) maintaining the public trust in both the plant operator's safety management and the effectiveness of regulatory activities for nuclear safety and security, and b) ensuring the high capacity factor and superior safety and economic performance of existing nuclear power plants, with quality management activities and risk assessment and management activities, throughout their life of 60 years at least.

Actions to aim at these goals are; a) to establish safety culture in the operating organization; b) to promote open and transparent communication with the public; c) to steadily promote the process to determine the site for a high-level radioactive waste disposal facility; d) to steadily promote the MOX (Mixed Oxide) fuel utilization in LWRs, in the case of Japan; e) to improve inspection planning and outage management for higher plant availability, adopting improvement in equipment inspection, diagnosis, and repair techniques; and f) to pursue plant life extension utilizing a wide variety of improvement, including the extension of component life and improvement in the prediction of its lifetime. These actions should be promoted under quality management activities with toughness, determination and close attention to detail.

It is also important in the promotion of these activities to carry out risk assessment and management, taking into consideration the feedback from operating experiences, developments in science and technology, including seismology and meteorology about abnormal weather, and changes in business environment and organizational factors of the operating organizations. Due attention should also be paid to the adequacy of plans for managing emergency situations and to the lessons learned from the recent Kashiwazaki-Kariwa plant earthquake that highlights the need to address not only safety but also business continuity risks caused by earthquakes.

To increase the role of nuclear energy utilization in the future, it is definitely important to incessantly pursue technology innovation, and, for this purpose, to promote mid-term and long-term research and development activities, in addition to those R&D activities for utilizing existing asset as efficiently as possible.

The objective of the mid-term R&D activities is to prepare improved nuclear power technologies that will play expanded roles in the combat against climate change in 20-30 years, replacing the currently operating facilities. For this objective, Japan has just started a R&D project for innovative LWRs that should take into account revolutionary changes in science and technology on the horizon, such as advanced material and high burn-up fuel, seismic isolation technology, advanced construction technology, advanced information technology for human friendliness and on-line inspection and maintenance, and combination of active and passive safety systems for optimizing reliability and economy. It is expected that the basic design will be completed in 2015.

The long-term R&D activities are those aiming at overcoming large R&D challenges for advanced nuclear reactor technologies such as FBRs that have potential to make significant contributions in the future for realizing low-carbon sustainable society. Japan is currently promoting a R&D project of fast reactor and its fuel cycle technology, aiming at producing by 2015 a conceptual design of a fast reactor and its fuel cycle system that can compete in the future energy supply technology market.

The long-term R&D activities should also include those aiming at; a) enabling nuclear energy technology to contribute to new missions and markets such as sea-water desalination, hydrogen production, district heating and so on, utilizing HTTR in the case of Japan; and b) exploring the possibility of innovative technologies such as fusion technology and quantum beam technology. As for fusion research, we are to start the construction of the ITER through multilateral collaboration and, as for research and application of quantum-beam technology, we are to start the operation of J-PARC (Japan proton accelerator research center) facilities.

Then, what should we do for shaping the environment to promote the peaceful use of nuclear energy everywhere in the world? I believe that we should make efforts for; a) building a global consensus that nuclear energy is an essential measure against global warming; b) strengthening the international system for ensuring nuclear safety, security and nonproliferation; and c) internationally collaborating for facilitating the nuclear energy use in developing countries.

In order to build a global consensus that nuclear energy is an essential measure against global warming; we should seek both the recognition of nuclear energy as an effective measure against global warming in the post-Kyoto Protocol framework and the positive action of international organizations such as the World Bank to catalyze the investment in the construction of nuclear power plants in developing countries.

To strengthen the international system for ensuring nuclear safety, security and nonproliferation, we should make proactive efforts to strengthen the human and financial resources of the IAEA from the viewpoint of further advancing the activities of the IAEA in formulating relevant technical standards and recommendations and reinforcing the IAEA safeguards activity. We should also actively support its effort to universalize the Additional Protocol and develop nuclear fuel supply assurance mechanisms to suppress the spread of facilities with high nuclear proliferation potential.

To internationally collaborate for facilitating the nuclear energy use in developing countries, we should actively support and contribute to the IAEA's activity to support developing countries to build the infrastructure for nuclear power utilization such as human resources, legal frameworks including safety and security regulations, management of radioactive waste and so on. At the same time, we should cooperate with emerging countries to introduce or expand the capability of nuclear power generation, positively utilizing various bi-lateral and multi-lateral frameworks for mutual collaboration to facilitate their infrastructure development.

In conclusion, in order to make meaningful contribution to the mitigation of climate change, more than 300 one GWe nuclear power plants should be built to replace coal plants by 2030, establishing the infrastructure and workforce needed to support this magnitude of expansion and ensuring safety, security and nuclear safeguards at any plant in any country. This is a formidable target and I believe that international collaboration is essential to the success in its achievement, not only because the international collaboration is the most effective and efficient measure for this endeavors but also because it is a pathway to improved nuclear safety, security and enhanced nonproliferation.

I sincerely hope that the discussion in this conference will provide the focus for much closer international collaboration needed to the achievement of the target.

Thank you.