

Actions Necessary to Promote Nuclear Energy Utilization
for Solving Global Problems We Face¹

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Thank you Professor Oka. I want to thank the Atomic Energy Society of Japan for inviting me to address this international Congress, ICAPP 2009, just after Honorable Mr. Nakasone's insightful address to us.

I also want to recognize the co-hosts of this event, the American Nuclear Society, the French Nuclear Energy Society, the Korean Nuclear Society, the Spanish Nuclear Society and the European Nuclear Society.

This morning, I want to present you my personal view on the joint actions necessary for global nuclear community to promote nuclear energy utilization in the world as a means to rise to the challenge of energy security and climate change our global society is confronting.

There are other acute problems in our global society today such as the global financial instability and global security due to terrorism and H1N1 influenza A outbreak, to which global community is rising together. We cannot imagine a solution to these global problems without there being international cooperation.

The problems of climate change, energy security and the volatile cost of oil and gas are not exception. We are working together for tackling climate change, reducing too much dependence on oil and gas, and bringing about a low carbon economy.

As you know, Japan and other major developed countries have already 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 emissions in 2050 must be 13 Gt Carbon/yr below that predicted in the business-as-usual case.

The global demand for energy will surely continue to increase significantly as countries everywhere seek to eradicate poverty and improve living standard. Therefore it is required for our global society to pursue the increase in energy supply based on low carbon technologies such as nuclear energy and renewable energies and the decrease in energy supply based on fossil fuels, along with the persistent introduction of measures for energy conservation and energy efficiency improvements.

Although nuclear energy is not a panacea for all the energy problems we face, it is reasonable for the global nuclear community to have a vision that nuclear energy will

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contribute in many parts of the world as one of the mainstay technology for electricity and heat generation to the fostering of economic growth, energy security and a low carbon economy.

To achieve this vision is formidable, however, as 900 GWe nuclear power plants replacing coal-fired power plants are necessary for avoiding 1.3 Gt Carbon/yr or just one-tenth of the target in 2050. The OECD Nuclear Energy Agency, however, has projected that global nuclear power capacity will increase to between 580 and 1400 GWe in 2050. That is to say, there is a large uncertainty in the future of nuclear energy at present.

We global nuclear community therefore need to energetically act for; a) sustaining safe and efficient operation of nuclear power plants, steadily installing new plants and managing used-fuel and waste in appropriate ways, b) shaping environment for facilitating the peaceful uses of nuclear energy in every part of the world, and c) realizing competitive and sustainable nuclear energy technology through unremitting R&D activities.

Now to successfully operate the fleet of nuclear power plants and install new capacity that is necessary to satisfy the need for energy, we should work hard to;

- A) Maintain the public trust in both the plant operator's safety management and the effectiveness of regulatory activities for nuclear safety, security and nonproliferation, constantly checking the establishment of safety culture in organizations and incessantly promoting open and transparent risk communication with the public:
- B) Perform risk management activities, carefully considering lessons learned from operating experiences worldwide, new developments in science and technology, and changes in organizational culture and business environment that can have negative influences on the safe operation of the plant and minimizing the effect of its realization through modification of its design and operation.
- C) Prepare and execute plant ageing management activities to ensure their high capacity factor and superior safety and economic performance throughout their life of 60 years at least, introducing technologies to sustain the high performance of reactor plant materials, instrumentation and controls, and fuel:
- D) Assure market force to continue to drive the construction of nuclear power plants that are necessary for satisfying the need for electricity and/or GHG emission reduction.

Why risk management? Because we still have rediscovered same or similar lessons learned in the past in the recent operating experiences and come across unattended new knowledge in science and technology that should have already been reflected on the design and operation as it has large impact on the risk of the plant.

A good example is the recent seismic event at Kashiwazaki-Kariwa plant. In this event, the seismic input to the plant significantly exceeded the level of design basis seismic input of the plant. Nevertheless, the operating units were automatically shut down and

all plants behaved in a safe manner, during and after the earthquake and no significant damage of safety-related structures, systems and components (SSCs) of the plant has been reported, though non-safety related SSCs were affected mainly due to significant soil deformation as they were not connected to the bedrock.

We have obtained diverse lessons that have impact on the risk of nuclear facilities, including need for;

- A) Considering the inclination of a nearby fault towards the plant and the effect of irregularity in geological structure of the underground of the site in the evaluation of seismic input from the fault and the flexibility of floor in the evaluation of the response of plant structures to the input;
- B) Reviewing the appropriateness of seismic design of seismic class C structures and components from the viewpoint of business risk management; and
- C) Paying close attention to detail in reviewing the appropriateness of seismic emergency planning and fire-fighting capability.

The management of used fuel and disposal of high level radioactive waste remain key challenges in many countries. Experts agree that the geological disposal of high level radioactive waste is safe and technologically feasible. Nonetheless, public opinion remains skeptical about it.

In Japan, the Nuclear Waste Management Organization, NUMO, has started to invite municipalities to apply for site suitability review. However, no mayor of municipalities has successfully applied so far.

At present, the Government as well as the NUMO is strengthening public information activities on the possible public support for the sustainable development of the communities that locate the site from the view point of equity of benefit, as well as the safety and the importance of the facility.

Actions to be taken to shape the environment to promote the peaceful use of nuclear energy everywhere in the world are to;

- A) Build a global consensus that nuclear energy is an essential measure against global warming;
- B) Support countries considering the introduction of nuclear power internationally; and
- C) Strengthen the international system for ensuring nuclear safety, security and nonproliferation.

As for global consensus on nuclear energy, the global nuclear community should seek the recognition of nuclear energy as an activity for the clean development mechanism project in the post-Kyoto Protocol framework currently under deliberation, and ask international financial organizations such as the World Bank to catalyze the investment in the construction of nuclear power plants in developing countries and those for water desalination, in particular.

To support countries considering the introduction of nuclear power, the global nuclear community should, first of all, actively support the IAEA and strengthen its human and financial resources as the IAEA has developed milestone 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, with a view to helping countries work systematically towards the introduction of nuclear power. The IAEA also organizes workshops and provides guidance and an integrated nuclear infrastructure review for interested countries.

At the same time, developed countries should also pursue direct collaboration with such countries, positively utilizing bi-lateral frameworks and multilateral frameworks such as GNEP and FNCA to facilitate their infrastructure development through dialogue, consultation and joint activities, recognizing that human resource development and stakeholder engagement are central issues that need urgent attention.

Every country has the responsibility to make use of nuclear energy in accordance with the appropriate standards of safety, security and non-proliferation, adhering to the relevant international conventions, including the Convention on Nuclear Safety, Convention on the Physical Protection of Nuclear Materials, UNSCR 1540 etc.

At the same time, it is important to make the international system for ensuring nuclear safety, security and nonproliferation effective and efficient ones, reinforcing the IAEA's legal authority in nuclear verification, safety and security through universalization of the Additional Protocol and positive acceptance of various IAEA review missions for mutual learning. It is also important to actively promote the establishment of credible multilateral nuclear fuel supply assurances, as a complement to the market.

To incessantly pursue technology innovation aiming for sustainable nuclear energy technology from the long term perspective, the global nuclear community should strengthen the effort to develop Generation IV nuclear energy systems that have potential to make significant contributions to sustain low-carbon society in the future. Japan is developing, in cooperation with international community through GIF and INPRO and GNEP, fast reactor and its fuel cycle technology that satisfies the request for enhanced safety, reliability and utilization of fuel, increased proliferation resistance and low heat generation rate of radioactive waste, and promising nuclear energy technologies such as high temperature water-splitting technology and grid appropriate reactors, that contribute to new missions and markets such as sea-water desalination, hydrogen production, district heating etc.

In conclusion, nuclear energy is one of the key energy supply sources of the future. It can make a major contribution to the fostering of economic growth/poverty eradication, energy security and low-carbon economy in many parts of the world.

Global nuclear community should rise to contribute to sustain safe and efficient operation of nuclear power plants, install new plants that are necessary to satisfy the need for electricity/GHG emission reduction and manage used fuel and waste in

appropriate ways.

Safety, security and nuclear safeguards should be ensured at any plant in any country at any time. The community should support states willing to develop a nuclear power program in their efforts to establish required infrastructure, by helping them to set up the right legislative and regulatory environment and to train the adequate manpower, in close cooperation with the IAEA efforts in these fields..

It is also vitally important for the community to pursue to realize sustainable nuclear energy technologies or Generation IV nuclear energy technologies.

International collaboration is essential to the success in rising to these challenges, not only because the collaboration could reduce the duplication of efforts but also because it could produce better solutions in our pathway to the vision.

I sincerely hope that the discussion in this conference will provide the focus for much closer international collaboration needed to realize your vision.

Thank you.