

## Reflections on the Discussion of the Framework for Nuclear Energy Policy<sup>1</sup>

Shunsuke Kondo  
Chairman  
Japan Atomic Energy Commission

Thank you, Mr. Chairman for your kind introduction.

Distinguished delegates, Ladies and gentlemen, It is a great honor and pleasure for me to be given this opportunity of presenting my personal reflection on the direction of nuclear energy policy in Japan.

Before going into the discussion of the topics, let me first heartily congratulate the Atomic Energy Society of Japan for hosting this excellent international conference of GLOBAL 2005 in science and technology city, Tsukuba. Taking this opportunity, I would also like to express our hearty congratulations to the International Atomic Energy Agency (IAEA) and for its Director-General, Mohamed ElBaradei, for being awarded the Nobel Peace Prize of this year as the recognition of their tireless efforts to curb the proliferation of nuclear weapons and associated technology.

First, I would like to briefly review the role of nuclear power in Japanese energy supply scene. Currently 53 nuclear power plants are in operation in this country, including 23 PWRs and 30 BWRs. Their total capacity is about 47GWe. They are supplying about one-third of the country's electricity and becoming a safe, reliable and competitive energy source, indeed. They contribute to the energy security as they push up the energy self-sufficiency ratio of Japan 16%, though the ratio itself is only about 19%, which is the lowest among industrialized countries.

Nuclear power is also one of the most important means to cope with the request to reduce CO2 emission for the observation of the Kyoto Protocol. In fact, though annual electricity generation last year was more than 21% higher than that in 1990, carbon dioxide emissions in the electricity generation sector increased less than 7% owing to the fact that nuclear power plants were the major portion of electricity generation capacity added during this period.

It should be noted also that this share of nuclear power plants is surely a major reason why the electricity price is essentially stable in this country in spite of the significant jump of oil price in these months.

The role of the Atomic Energy Commission is to decide policies for research, development and utilization of nuclear energy for relevant government agencies. In order to prepare ourselves for such decisions, the Atomic Energy Commission has developed quite recently the "Framework for Nuclear Energy Policy", with the assistance of the New Nuclear Policy-Planning Council established by the Commission, of which members are not only leading experts in the nuclear energy field but also representatives of various sectors of society, including academia, industries, legal professions, local governments, mass media and citizens groups who are critical of the utilization of nuclear energy.

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Obviously one of the most important goals of nuclear energy policy is to ensure that the nuclear energy technology contribute to the sustainable development of human society in a manner that protects public health and safety and environment and promotes the security of our society in economical ways. In order to deliberate the actions necessary to attain this goal, we are required to clarify the position and the role of nuclear energy in energy policy.

When deliberating energy policies in these days, we believe it especially important to note that Asian countries' dependence on the oil supply from the Middle East region will increase due to the continued growth in demand for oil in accordance with their rapid economic growth while it is claimed by some oil experts that we may be reaching the peak of annual oil production as the discovery of new oil fields have stagnated since 1960 and over the last 20 years the increase in the reserves have been below the total production. We should also be cautious to the fact that the developing countries will increase the share of natural gas in their energy supply due to the progress in the modernization of the society as in the case of the developed countries. These observations lead us to the proposal that Japan, an isolated island country, should improve the degree of self-sufficiency in energy supply by increasing the use of non-fossil energy including renewable and nuclear energies, as the markets for fossil energy resources in future will surely become tighter than ever.

Furthermore, it is also important for us to pay due attention to the reality that though energy is an indispensable ingredient of economic development, energy supply is the source of most of the anthropogenic emissions of greenhouse gases that are altering the global climate. Needless to say, the climate change is one of the most dangerous environmental problems as it affects all environmental conditions and processes related with human well-being. The experts in the science of climate change have recently proposed that global fossil fuel use should be halved within this century to stabilize atmospheric CO<sub>2</sub> concentrations below 550ppm. Taking these observations and recommendations into consideration, we have judged it important for Japan to reduce the CO<sub>2</sub> emissions in 2100 to less than 50% of the current level by reducing the share of fossil fuels in primary energy supply while improving the efficiency of energy utilization.

It is important for the realization of such a large scale reduction of the share of fossil fuel in this period to utilize both renewable energy and nuclear energy rather than to utilize either ones as it is clear that the former strategy has better chance of success than the latter especially for us Japan which is already enjoying such a large capacity of nuclear power generation.

In addition to this recognition, we should also take into consideration of future energy policy the prediction that in Japan, the electricity demand will continue to be stable while final energy consumption will decrease due to progress in energy conservation and population decrease. Therefore we have proposed in our policy framework that we should prepare ourselves to be able to make the share of nuclear power in electricity generation after the year 2030 similar to or greater than the current level of 30-40%

It is proposed in our framework that this preparation should be made in a way to pursue a set of actions across three different time frames; short term, mid-term and long-term in parallel, so as to sustain the contribution of nuclear energy over this century.

The short term actions are those aiming at using existing assets as long as practicable: they include activities for maintaining the public confidence in the safety management of existing nuclear power plants and related facilities, improving the performance of existing plants incessantly, promoting the

utilization of the plutonium recovered from the spent fuel in light water reactors(LWRs), and making progress in the search for the site for geological disposal of vitrified high-level radioactive wastes separated in reprocessing of spent fuel.

Mid-term actions are those to prepare advanced nuclear power plant designs with improved performance as candidates for the replacement of the retiring plants, taking into consideration the prediction that significant number of nuclear power plants in operation will start their retirement in 10 - 30 years.

The long-term actions are those related to the development of innovative nuclear energy supply systems which can compete in future electric and non-electric energy market, in terms of social acceptability as well as safety, economy and environmental protection, in addition to basic and/or generic nuclear science and technology research. One of the major projects for this purpose is that of developing fast reactor and its fuel cycle systems, of which objectives in coming ten years or so is to explore and clarify the concepts of fast reactor systems which should be commercially available in 2050s by satisfying the requirements to enhance the economy, safety, and reliability, to achieve the efficient utilization of nuclear fuel resources, to realize sufficient security in terms of proliferation resistance and physical protection, and to minimize the radio-toxicity of the wastes to be disposed of through minor actinide recycling.

One of the issues discussed most extensively as well as intensively before the deliberation of the framework attained to the stage of proposing this set of actions was the nuclear fuel cycle strategy in Japan. Japan's basic policy in this area has been to reprocess spent fuel from light water reactors and use plutonium and uranium recovered in the process. Following this policy, Japan has acquired relevant skills through the construction and operation of the Tokai reprocessing plant, while commissioning the reprocessing to foreign reprocessing firms. Subsequently, the private sectors has promoted the construction of the Rokkasho reprocessing plant, and the Government has developed a legal framework to designate the implementing body of geological disposal of vitrified high-level radioactive waste, the financing system, and the selection process for its disposal sites. In recent years, however, we have experienced the delay in various activities including the use of plutonium in light-water reactors, the completion of the Rokkasho reprocessing plant and the development of fast-breeder reactors.

In the aforementioned Council, several members claimed that the strategy to close the fuel cycle is difficult to realize from the viewpoint of reducing their risk to an acceptable level and uneconomical even if it realize as compared with the strategy to dispose the spent fuel as wastes, pointing out the cases of change of strategy in foreign countries. It is farther claimed that to stick to the closed fuel cycle strategy by Japan when things being what they are might cause anxiety of nuclear proliferation in international community.

Responding to this claim, the council discussed about the possible future nuclear fuel cycle strategy by evaluating four scenarios of future development of fuel cycle activities including those of switch over to the direct disposal of spent nuclear fuel, in addition to the continuation of the current strategy. The evaluation was done from the view points of safety, technical viability, economy, energy security, environmental compatibility, nuclear nonproliferation, social acceptability, adaptability to future uncertainty, and manageability of the social issues generated with change of strategy.

The results of this exercise indicated that the approach to utilize reprocessing technology is superior

in terms of energy security, environmental protection, adaptability to future uncertainty, and other aspects, though this approach is inferior in economic viability under the condition that the current price level of uranium will continue, though there is a possibility that the uranium supply and demand situation may tighten in the future.

One of the issues intensively debated in the evaluation was the effect of the change of strategy on the behavior of the general public as it is essential for policy makers and private companies who operate facilities for the promotion of nuclear power generation and its fuel-cycle to maintain and secure a mutual understanding with the general public. It is clear that if a policy change is made from the reprocessing approach to the direct disposal approach, it is necessary to rebuild a relationship of trust with the communities in which the facilities are located under the assumption that the current strategy be maintained.

The Council recognized through the debate that the national government and private sector companies have conducted various activities toward the achievement of the nuclear fuel cycle up to now and accumulated diverse societal assets over a period of many years such as technologies, relationships of trust with communities in which facilities are located, various international agreements relating to reprocessing in Japan and so on. And it was claimed by majority that they constitute items of great value that should be maintained if Japan rank nuclear power generation as a main source of power and use this on a long-term basis by incorporating technical progress in a timely and appropriate manner and thus enjoy the benefits of energy security, environmental protection, adaptability to future uncertainty and other aspects it will provide.

The Council has concluded based on these discussion that it is appropriate to make it the basic principle of fuel cycle activities for Japan to utilize reprocessing technology from the viewpoint of utilizing nuclear power as a long-term and major method of power generation, though we should be flexible in realization of activities planned and review the principle as the things being changed.

I would like to add that in the process of finalizing the policy framework for nuclear fuel cycle activities, we have paid due attention to the discussion about the Multilateral Approaches to the Nuclear Fuel Cycle initiated by Dr. El Baradei by proposing to establish a new system to maintain and strengthen the international nuclear non-proliferation regimes and the document based on the discussion among international experts ensued that contained the review of such possibilities though preliminary.

I would like to share with you at this occasion my view on this initiative that Japan should cooperate with the IAEA to realize multilateral schemes to nuclear fuel cycle that can reduce unnecessary incentive for states to have national enrichment and reprocessing facilities, by providing not only experiences and ideas but also technologies and capabilities of the activities involved if fitted, to devise and implement an equitable, adequate and achievable framework to assure the supply of nuclear energy services to international community.

As concluding remarks, Mr. Chairman, I would like to emphasize that economy, environment and security are the core of the energy problem and thus energy policy. However, there are dilemma in energy policy such as cost reduction versus environmental protection and nuclear energy production versus nuclear risk reduction. As we are definitely required to increase carbon-free energy supply to stabilize atmospheric CO<sub>2</sub> concentration, it is most appropriate to expand the use of nuclear energy by rectifying the defects and improving the competitiveness of the technologies incessantly.

It is important in this endeavor to recognize that technologies can generally be changed only slowly and at considerable cost, and the social rate of return of the investment into nuclear energy R&D to the world as a whole is higher than to the individual countries. I believe it obvious to you that co-ordination of research activities beyond national prestige to reduce the duplication of effort at the world level must be an absolute priority and world nuclear community should pursue coordination of efforts in research and development needed to realize the required technological innovations in a timely manner. Surely Japan is a member of countries who determined to continue to enjoy the benefit of nuclear energy while contributing to this kind of efforts as well as their coordination for the benefit of global community. I sincerely hope that the conference started here today will be an excellent opportunity for exchange of opinion on this kind of cooperation and coordination.