

# **Interim Report of Advisory Committee on International Affairs**

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## **Introduction**

One of the major problems in the world today is how to deal with climate change and secure a stable energy supply while maintaining sustainable growth. In order to solve this problem, it is necessary to take each and every effective measure to reduce greenhouse gas emissions, such as energy conservation and efficiency improvement in the field of energy use, as well as reduction of the use of conventional fossil energy and the expansion of the use of low carbon technologies, such as renewable energy, nuclear energy, and Carbon Capture and Storage (CCS) technologies, in the field of energy supply. At the same time, appropriate measures need to be taken flexibly in accordance with actual changes in the climate. Various efforts are being made to deal with these problems in the international community and individual countries around the world.

In this context, the peaceful uses of nuclear energy have come to attract attention all over the world. In countries, where nuclear power generation has already been introduced, plans and concepts to expand the use of nuclear energy have increasingly been discussed, and many other countries are now considering starting nuclear power generation for the first time. In the international community, cooperative efforts have been made to develop and improve the system and technology for enhancing safety and to develop and expand technological and social infrastructure for the use of nuclear energy, including the rearing of human resources. In the meantime, there is also a sign of strengthening international cooperation for non-proliferation and elimination of nuclear weapons, i.e. preventing the use of nuclear technology for military ends and curbing the proliferation of negative

aspects of nuclear energy. On September 24, 2009, the United Nations Security Council Summit on Nuclear Non-Proliferation and Nuclear Disarmament was held and the UN Security Council Resolution 1887 was adopted. This Resolution comprehensively covers nuclear disarmament, nuclear non-proliferation, peaceful uses of nuclear energy, and nuclear security.

For over 50 years, Japan has positively promoted research, development and utilization of the full-fledged nuclear fuel cycle, which consists of nuclear power generation and such sensitive technologies as uranium enrichment and spent nuclear fuel reprocessing strictly limiting it to peaceful uses. As a result, nuclear power generation now accounts for nearly 10 percent of the primary energy supply and nearly 30 percent of the electricity supply in Japan. We need to continue steady efforts to use nuclear energy, while giving top priority to safety and obtaining understanding and trust from the general public. At the same time, we are determined to make positive contributions to the world's move toward nuclear disarmament and nuclear non-proliferation as the only country to have suffered nuclear attacks and as a country that firmly upholds the three non-nuclear principles and is committed to a non-nuclear-weapon state. Our commitment was reiterated in the address by Prime Minister Hatoyama at the 64th session of the UN General Assembly.

Based on scientific discussions held at the Intergovernmental Panel on Climate Change (IPCC) and the understanding that industrial countries are required to take the initiative in the reduction of greenhouse gas emissions, Japan commits itself to positively working on establishing a long-term reduction target and has also expressed its firm resolution to the whole world that Japan will take all possible measures to realize its mid-term target to reduce its greenhouse gas emissions by 25% from the 1990 level by the year 2020, this pledge is premised on the establishment of a fair and effective international framework in which all major economies participate and of their agreement on ambitious targets.

Under such circumstances, the peaceful uses of nuclear energy including nuclear power generation will become increasingly important for Japan's management of international affairs. Therefore, this Advisory Committee invited experts from such fields as nuclear power, energy, environment, international economy, and international politics, and held discussions on basic ideas concerning (i) the role that Japan is to play to support the

world's efforts in promoting peaceful uses of nuclear energy, and (ii) how Japan should respond to the international community from now on so as to promote Japan's use of nuclear energy.

This interim report compiles major opinions of members presented at Advisory Committee's meetings until December 2009. The issues that are raised for consideration here need to be examined in more detail to come up with the concrete measures that Japan should take.

## **1. Promotion of Peaceful Uses of Nuclear Energy and Nuclear Non-proliferation**

### **1-1 International Significance of Japan's Peaceful Uses of Nuclear Energy**

#### **<Models and Norms for Peaceful Uses of Nuclear Energy>**

- The Atomic Energy Basic Act, which was enacted in 1955, declares that the research, development, and use of nuclear energy shall be limited to peaceful uses. Since the enactment of this act, Japan, as a non-nuclear-weapon state, has strictly complied with the international norms, has developed a legal system, structure, and technologies so as to realize the full-fledged nuclear fuel cycle only for peaceful purposes, and has accomplished successful performance. Japan has thus obtained the trust of the international community. Japan should start the examination of desirability of clearly and actively appealing to the international community that this is not a special case only applicable to Japan but can be an international model (or good practice) and the norm to follow generally when they use nuclear energy for peaceful purposes for all countries, whether they are non-nuclear-weapon states or nuclear-weapon states.
- In its pursuit for realization of the full-fledged nuclear fuel cycle, Japan has obtained the understanding of the United States and other relevant countries through bilateral and other agreements, not only by firmly complying with international commitment on nuclear non-proliferation but also by positively promising and actually ensuring the transparency of the pursuit. It is important to maintain such understanding of other countries, but furthermore, as Japan's practical use of nuclear fuel cycles progresses and the world's peaceful uses of nuclear energy expand, we will have to make more

positive efforts to make our peaceful uses of nuclear energy widely recognized as an international normative model. It would be effective that Japan clearly appeals to the international community that Japan has developed nuclear fuel cycles, not due to having been vested with special interests but due to holding general rights and the qualification to exercise them. Such positive appeal may help Japan promote the development and introduction of nuclear fuel cycles proactively in the future as needed.

#### **<International Benefits of Models and Norms>**

- If there are some international models and norms for the peaceful uses of nuclear energy, it will be beneficial for countries that intend to develop nuclear fuel cycles peacefully in the future, because such models and norms clarify the required qualifications. Japan should examine the desirability of positively collaborating and cooperating with countries that can share Japan's models and norms, in order to establish and disseminate specific international models and norms. Such models and norms will reveal more clearly how countries that have problems concluding related agreements or complying with the safeguards lack the required qualifications, and will strengthen the grounds on which the international community demands compliance with the norms. On the other hand, these models and norms are expected to make even nuclear-weapon states more deeply aware that in order to lead the nuclear non-proliferation regime, it is effective for them to promote nuclear disarmament, as well as at least distinguish between peaceful uses and military use of nuclear energy, and bring transparency at a similar level as in Japan to the peaceful uses, and clearly show that there is no diversion.

#### **<Improvement and Innovation of System and Technologies for Peaceful Uses, Including Safeguards>**

- Japan is leading the world with its system and technologies for the safeguards necessary for promoting the nuclear fuel cycle consisting of nuclear power generation by light-water reactors, uranium enrichment, and spent nuclear fuel reprocessing, etc. With the world's trust obtained through good performances so far, Japan is also most advanced in the application of integrated safeguards that aim to realize rational

safeguards. Japan should further promote improvement of the safeguards system and technologies to enhance detection capability and the effectiveness and efficiency of quantitative management and inspections, thereby aiming to realize safeguards that are more acceptable to countries that intend to bring transparency to their peaceful uses of nuclear energy. Japan should consider working to encourage the international community to widely utilize the results of these efforts.

- In order to have Japan's past performances recognized as an international model and norm, it is necessary to be highly evaluated not only in the field of nuclear non-proliferation, but also in the fields of nuclear safety and security, as well as in the field of economic efficiency. For that purpose, the use of nuclear fuel cycles need to be promoted in a healthy manner right now; and in a longer range, we should select means that are appropriate in terms of economic efficiency, reliability, nuclear proliferation resistance, and the like, from among various options concerning nuclear fuel cycles, including the next reprocessing plant and fast reactor cycle, and develop them for practical use while improving and innovating a system and technologies to ensure their peaceful uses accordingly.

## **1-2 Japan's Contribution to International Nuclear Non-proliferation Regime**

### **<Stance that Japan Should Take>**

- As the peaceful uses of nuclear energy expand globally, it becomes extremely important to prevent diversion of them from peaceful to military purposes under the framework of the IAEA Safeguards Agreement and Additional Protocol, based on the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and at the same time, to strengthen the nuclear non-proliferation regime by controlling exports of materials and transfer of technologies, in accordance with the guideline specified by the Nuclear Suppliers Group (NSG).
- As the only country to have suffered nuclear attacks and as a country that has maintained its position as a non-nuclear-weapon state and has achieved performances sufficient enough to be recognized as an international model for peaceful uses of

nuclear energy, Japan is entitled to make persuasive arguments on nuclear non-proliferation and elimination of nuclear weapons. Japan should consider them as one of its responsibilities in the international community and should examine the possibility of playing a leading role in the international efforts to universalize NPT and AP and strengthen the safeguards and export control.

### <Responses to Various Countries>

- With regard to a means to induce non-parties to the APs to join it, Japan needs to positively facilitate consensus-building on the international stage, such as at the meetings of the NSG, G-8 summit, and G-20 summit on making participation in the AP the condition for exports of materials and transfer of technologies related to nuclear energy.
- In order to urge countries that have problems complying with the safeguards take appropriate measure, it is necessary for Japan to proactively participate in activities of the international community such as adoption and implementation of UN Security Council Resolutions that include sanctions.
- The aforementioned UN Security Council Resolution 1887 and the "Renewed Determination towards the Total Elimination of Nuclear Weapons" proposed by Japan at the 64th session of the UN General Assembly demand non-member countries to join the NPT swiftly as non-nuclear-weapon states. Such activities need to be continued into the future. However, regarding India, which holds nuclear weapons without joining the NPT but has expressed its commitment to nuclear disarmament and nuclear non-proliferation, the NSG has already determined to permit cooperation in the field of peaceful uses of nuclear energy on an exceptional basis. Bearing this in mind, we need to review Japan's stance on future cooperation with India in this field, in the framework of a comprehensive bilateral relationship including political, economic, and security relations. Such review should be premised on India's clear commitment to ensuring the distinction between peaceful uses and military use and thorough transparency in the peaceful uses of nuclear energy.
- Furthermore, considering that nuclear-weapon states, as well as non-nuclear-weapon states, are responsible for nuclear non-proliferation, Japan should continue to seek

assurance of peaceful use from the nuclear-weapon states in order to prevent the diversion of materials and technologies provided by Japan under bilateral agreements to military purposes. In addition, Japan should consider emphasizing the necessity for nuclear-weapon states to voluntarily take stricter measures to ensure peaceful uses, such as implementing safeguards comparable to those to which Japan adheres in order to make their peaceful uses of nuclear energy transparent.

#### **<Japan's Commitment to the IAEA>**

- The IAEA plays a significant role in promoting peaceful uses of nuclear energy and maintaining and strengthening the nuclear non-proliferation regime on a global basis. Japan should take initiative for international cooperation so that the IAEA to streamline its management and increase the budget and staff appropriately. Furthermore, Japan needs to bear its fair share of the burden in terms of technology, system, and personnel to continuously support the IAEA's activities, thereby making full use of Japan's experiences in the field of peaceful uses of nuclear energy.

### **1-3 Responses to the Concept of Multilateral Management of the Nuclear Fuel Cycle**

#### **<Concretizing the Concept>**

- All countries are entitled to utilize nuclear energy for peaceful purposes under the safeguards, and the NPT also recognizes the inalienable right of all signatories in Article 4. On the other hand, for the purpose of ensuring non-proliferation under circumstances where the peaceful uses of nuclear energy are expanding globally, the need to prevent proliferation of sensitive technologies under multilateral management of nuclear fuel cycle has become the topic of international discussion of late, in addition to the need to thoroughly enhance the current nuclear non-proliferation regime. Therefore, Japan must carefully examine what sort of multilateral management of commercial facilities, to which the safeguards based on the NPT and AP are applied, can heighten the effect of preventing diversion to military use and nuclear proliferation more effectively.
- For that purpose, the following concrete matters should be reviewed to clarify the

effectiveness and the necessity of multilateral management of the nuclear fuel cycle, as well as any political, social, legal and technical problems that may arise when putting the concept into practice:

- i. Scope: Whether to cover only a specific part of nuclear fuel cycle, such as uranium enrichment or spent nuclear fuel reprocessing, or to cover the whole cycle, including back-end processes
- ii. Object of management: Rules, capital, technologies, facilities, etc.
- iii. How to share the scope and the contents of the arrangements among participating countries

### **<Pursuit of Benefits in Neighboring Regions>**

- When the nuclear fuel cycle is commercialized and becomes industry or enterprise, international division of roles or cooperation may be facilitated in pursuit of economic efficiency and reliability, in accordance with the capabilities and circumstances of individual countries and corporations. As a result, countries that can handle uranium enrichment or spent nuclear fuel reprocessing may be limited. This is noteworthy from the viewpoint of compatibility between the promotion of peaceful uses of nuclear energy and nuclear non-proliferation. From the viewpoint of promoting peaceful uses of nuclear energy, it would be effective if countries that are taking a lead in this field would provide nuclear international fuel cycle services to countries that intend to or have just started to introduce peaceful uses of nuclear energy, as one of the means to support such newcomers. Further discussions will be necessary for Japan concerning, for example, the possibility of leading the promotion of multilateral management and internationalization of nuclear fuel cycles, which will be beneficial for the overall East Asian region as well as for Japan, as a part of realizing the concept of an East Asian Community.

## **2. Nuclear Energy as Countermeasures against Global Warming**

### **<Utilization of Nuclear Energy as Countermeasures against Global Warming>**

- The need to reduce greenhouse gas emissions at least by 50% by the year 2050 has come to be widely recognized as a long-term common target in the international



community. This was also reconfirmed at the G-8 summit in L'Aquila in July 2009.

- In order to achieve this global long-term target, it would be effective to incorporate nuclear power generation and other peaceful uses of nuclear energy in the international framework of measures to reduce greenhouse gas emissions.
- It is necessary to examine how to fully utilize Japan's power in the field of nuclear energy at home and abroad in the process of achieving Japan's and the world's mid-term target of the reduction of greenhouse gas emissions.

### **<International Negotiations on Positioning of Nuclear Energy>**

- At the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC), discussions were held on emission-reduction targets for developed countries, obligation of developing countries to reduce emissions, and the framework of international cooperation for achieving the numerical targets after 2012, the commitment period under the Kyoto Protocol, which is the current international framework for reducing greenhouse gas emissions. Under the Kyoto Mechanism introduced in the Kyoto Protocol, which includes the Clean Development Mechanism (CDM) that can be used by signatories as a means of international cooperation to reach emission-reduction targets, emission reduction through the use of nuclear energy is not considered. Therefore, in order for a post-Kyoto framework to incorporate nuclear energy into a system of international cooperation for achieving emission-reduction targets, Japan needs to stress on such occasions as the UNFCCC that the problems of safety and disposal of radioactive waste can be resolved and that nuclear energy is effective and indispensable as countermeasures against global warming, while strategically collaborating with countries that share this view with Japan.
- Furthermore, for the purpose of facilitating the use of nuclear energy more actively, it is necessary to examine the possibility of incorporating nuclear energy not only into the framework of the Kyoto Protocol but also into other moves to build a new mechanism for international collaboration and cooperation for climate control that includes existing global emissions trading and financial support schemes.

### **3. International Development of Nuclear Industry and Nuclear Enterprise**

#### **<Nuclear Industry>**

- A certain level of demand for the nuclear industry is expected to continue in domestic markets and may possibly expand in the future. In the meantime, the size of foreign market is highly likely to expand substantially along with global expansion of peaceful uses of nuclear energy. Under such circumstances, it is urgently necessary for Japan to seek expansion into international market from the viewpoint of keeping or developing existing nuclear technologies, the nuclear industry and nuclear enterprise in order to maintain stable use of nuclear energy for peaceful purposes.
- At present, in order to fully utilize their own technologies and know-how nuclear-related corporations in Japan are promoting independently or jointly in collaboration or cooperation with other domestic and foreign companies, (i) exports of engineering and hardware including power generation plants and equipment, etc. and (ii) system design and construction for supply chains of fuels equipments and materials. The government is engaged as necessary in (i) provision of public support for exports in terms of finance and insurance, and (ii) development of smooth environments for international cooperation through nuclear agreements. The government should continue to implement these measures appropriately so as to support the global expansion of Japan's nuclear industry.

#### **<Nuclear Enterprise>**

- Some Western countries and companies not only export power generation plants and equipments but also are seeking international development of their nuclear power generation enterprise. If Japan can succeed in formulating an internationally acceptable Japanese-style nuclear business model that includes a safety management system, regulation mechanism, and know-how on operation and maintenance of facilities, etc. and can effectively develop such model internationally, it will help Japan to lead the international community in dealing with climate change. This will also contribute to ensuring Japan's energy security.
- Such international development of nuclear enterprise needs to be promoted from the viewpoint of the overall BOT (Build, Operate, and Transfer) system for project finance

including business risk management and the social infrastructure enterprise, including the construction of a comprehensive power system. This inevitably requires the involvement of the political and economic quarters, in addition to the nuclear industry, business leaders, and R&D organizations. It is necessary for political, governmental, and private sectors to cooperate with each other to fully ascertain the necessity and effectiveness of the international development and examine such matters as proper entities and role-sharing among them and the target of international development of nuclear business.

- The use of nuclear energy for power generation and other purposes requires the overall nuclear fuel cycle, which includes not only power generation plants but also uranium enrichment, fuel production, and back-end processes such as management and reprocessing of spent nuclear fuel and disposal of nuclear wastes. At present in Japan, efforts have been made to establish the nuclear fuel cycle by developing and using domestic technologies, equipments and materials, and facilities and by making the most of international cooperation and international markets. Likewise, we run nuclear enterprises in foreign countries, not all processes need to be handled by Japan. Rather, it is appropriate to positively seek while maintaining integrity international cooperation with other countries, including related parties, and to effectively utilize international markets.

#### **<Support for Newcomers>**

- As a means to support countries that intend to or have just started to introduce peaceful uses of nuclear energy, helping them develop technical and social infrastructure, such as in training human resources and building a regulation system, can contribute to the expansion of the peaceful uses of nuclear energy in safety, while ensuring nuclear non-proliferation and nuclear security. Japan should proactively promote such activities. Japan has a substantial word of providing such support primarily in neighboring Asian countries, and a cooperation system among relevant organizations is now being developed for effectively promoting such activities. We should establish a proper system for setting the scope and targets, deciding the size of the resources to be input, and evaluating the performances, from a viewpoint of effectiveness and

necessity of governmental support and promote these activities more effectively, efficiently, and strongly.

#### **<Commitment to the IAEA>**

- The IAEA plays a significant role not only in nuclear non-proliferation but also in technical cooperation, such as infrastructure development, and the enhancement of nuclear safety, Japan should continuously support the IAEA's activities by bearing its fair share of the burden in terms of technology, system, and personnel.

### **4. Ensuring Japan's Technical Superiority in the International Community**

#### **<Necessity of Superior Technologies>**

- Resource-poor Japan has to make the most of its scientific technologies and intellectual property of software and hardware at home and abroad. Nuclear energy is one of the significant energy sources in Japan and is expected to be used as a major means to reduce greenhouse gas emissions. Therefore, establishing a position of superiority in front-end to back-end technologies of nuclear energy and positively utilizing such technologies for the international development of the nuclear industry and nuclear enterprise and promotion of international cooperation in research and development will make a significant contribution to ensuring Japan's energy security.

#### **<Maintenance and Enhancement of Existing Technical Superiority>**

- Some private corporations in Japan already have sufficient technologies for the construction and operation of nuclear power plants that can be provided internationally, and they have further improved and developed such technologies. Therefore, we should consider closely examining and selecting technologies for which Japan can excel internationally, and the government and private sectors should cooperate with each other to maintain or enhance the superiority of such technologies, and actively utilize them. For example, it may be effective to set a higher target for the safety, security, and safeguards for such technologies as a global standard, and lead the world to achieve the newly set target. At the same time, proper assistance should also be continued for R&D activities in the private sector, as has already been provided for the

intensive use and improvement of existing light-water reactors and the development of new light-water reactors. Furthermore, basic and academic research and development in the related fields should be promoted as well, so as to properly maintain and improve the basis to support such development.

#### **<Development of Future Technologies>**

- Considering that advanced recycle technologies, such as a fast reactor cycle system, will become necessary in the future, Japan has been conducting large-scale R&D with the aim of putting such technologies to practical use. Based on the fact that it is not easy to have the full-set technologies for the nuclear fuel cycle as Japan's original, we should consider partially depending on other countries or international cooperation as needed. Then, we need to clarify and select technologies that should be developed domestically and intensively devote our efforts to them. In that process, Japan should seek superiority in its originality and performance.
- Developing large-scale future technologies, such as an advanced recycle system, requires a long time, large cost and human resources, and their effectiveness and necessity varies significantly depending on domestic and international situation concerning energy, environment, politics, and economy. Therefore, we must prepare multiple scenarios for their development, taking such difficulties and uncertainties into account, so as to cover resulting risks effectively. As we develop these technologies, it is also important to continuously conduct a flexible examination including consideration of foreign technology introduction and international cooperation, with regard to the enhancement of the efficiency of investment and development and the maintenance of technologies up to the time of practical implementation and commercialization in the future.

#### **<Promotion of International Technology Development and R&D Activities>**

- As in the case of a short-term development project, when conducting long-term technology development and R&D activities for the future in the framework of international cooperation and collaboration, it is necessary to analyze the mutual competitiveness and to clarify the effectiveness and necessity of the projects, based on such factors as the targets and role demarcation and rights. It is also important to

evaluate achievements on a timely basis and carry on projects while confirming their effects.

## **5. Developing Human Resources Useful for Demonstrating Comprehensive Power**

- In order to solve problems in securing (i) the compatibility between the promotion of peaceful uses of nuclear energy and nuclear non-proliferation in Japan and abroad, (ii) the incorporation of nuclear energy into countermeasures against global warming, (iii) the international development of the nuclear industry and enterprise, and (iv) technical superiority in the international community, as mentioned in sections 1 to 4 above, it is necessary to continue nurturing human resources who have advanced expertise in diverse fields related to the peaceful uses of nuclear energy, as well as to develop human resources with project management capabilities who can connect each of those fields and integrate them.
- Furthermore, in order to send message internationally on the peaceful uses of nuclear energy as a part of Japan's total power, while properly integrating it into Japan's energy and environment policy, including its international response policy, and to actually implement them, experts in all related fields, including energy use, environment, economy, and politics, need to collaborate with each other in an organic manner. This requires human resources who are sufficiently capable of carrying out tasks in each field, while fully understanding the significance of cross-sectional work with other related fields. We should consider developing a system to nurture such human resources who can help demonstrating comprehensive power by integrating related fields.
- It is also necessary for each of political, government and private sector to nurture human resources who are capable of sending message on Japan's nuclear energy policy properly on international stages. For that purpose, it would be effective to develop a system to appreciate people's work experience at the IAEA or other international organizations and to integrate it as a positive phase in their career path.

## **Conclusion**

The Advisory Committee on International Affairs of the Japan Atomic Energy Commission has examined, since its first meeting in July 2009, the basic ideas concerning (i) the role that Japan is to play in international community's efforts to promote peaceful uses of nuclear energy, and (ii) how Japan should respond to the international community from now on so as to promote Japan's use of nuclear energy, based on information on the current state of nuclear energy use in Japan and in the world. In the past five meetings, we held active discussions about such basic ideas from comprehensive point of view based expertise in technologies, industry, and business of nuclear energy as well as in the energy, environment, politics, economy, and so on. Through such discussions, all the major opinions seem to have been presented, and this "interim report" compiles those opinions as reference for establishing a concrete policy.

As mentioned in the "Introduction", the peaceful uses of nuclear energy have come to attract attention all over the world and at the same time the move in the international community toward the elimination of nuclear weapons is experiencing a new upsurge. Under such circumstances, it is timely and urgently necessary for Japan, which has utilized nuclear energy as one of the significant energy sources, to clearly state its intention concerning future use of nuclear energy based on accumulated achievements in the peaceful uses of nuclear energy and to dispatch these messages internationally. The Advisory Committee hopes that this interim report will serve as a reference and that the Japan Atomic Energy Commission and the government swiftly will determine the basic position Japan's international response regarding nuclear energy, and will establish and implement a concrete policy that embodies it. Lastly, it should be pointed out that any international response regarding nuclear energy can be implemented effectively only when it is properly incorporated into the overall external strategies of Japan.