

**Atoms for the Sustainable Future:  
Recommendations on Nuclear Energy in the 21<sup>st</sup> Century**

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## **I. Growing Hope for Nuclear Energy and Deepening Concerns over Nuclear Threats**

Nuclear energy has two facets. When it is used for peaceful purposes such as power generation, medical services, agriculture and industry, it can make a contribution to the betterment of the quality of life. However, it can also be used for military or criminal purposes. Thus, there are both great opportunities and great risks.

Nuclear energy can ease energy security competition. As economies grow, energy demands also increase. For example, in Asia where there are rising energy-consuming countries such as China and India, it is predicted that meeting the demand for energy will become a serious challenge not only to each country but to the region as a whole. In other regions such as Africa and the Middle East, plans and expressions of interest in nuclear energy have been increasing. The expectation that nuclear energy will fill the gap between energy demand and supply has become very high.

Nuclear energy is also expected to contribute to global efforts to cope with the global warming problem as its carbon dioxide emissions are much smaller than those from fossil fuel sources. Among major energy sources, including non-fossil fuels, nuclear power is one of the most effective energy sources for reducing CO<sub>2</sub> emissions.

Given the energy security and environmental challenges that we face, we believe that promoting nuclear energy globally would provide an effective way to cope with these challenges. To this end, international cooperation should be deepened and expanded.

While we expect nuclear energy to play an increasing role that will better our lives, nuclear energy also poses serious security challenges.

The world has had to live for more than sixty years with the serious threat of nuclear devastation, a threat that is the result of the huge number of nuclear weapons that could destroy the earth several times over. While this danger continues, we also face rising nuclear proliferation threats caused by the diversion of peaceful nuclear programs to military use and withdrawals from international non-proliferation treaties and agreements, as well as the threats of nuclear terrorism and thefts of or illicit trade in nuclear materials by non-state actors.

It is our hope that all nuclear threats will be reduced and eventually eliminated. All human beings should remember that the total elimination of nuclear weapons is the goal of every civilization. All nations must share a common goal regarding nuclear disarmament and make every effort to achieve it, while the legitimate security concerns of every nation must be addressed in the course of achieving this goal.

We also recognize that no other actor, either state or non-state, should be allowed to possess nuclear weapons and weaponization capabilities. Neither should any state or non-state actor assist others' proliferation activities. As the use of nuclear energy spreads, the risks and threats that arise from such activities will also rise. In particular, recent challenges such as the cases of North Korea and Iran present great risks of proliferation, illustrating the inadequacies in the international mechanisms that oversee and prevent exploitation of peaceful nuclear activities for military purposes.

One could divert peaceful nuclear facilities into military ones without detection, if safeguards do not properly function for such facilities. One could use a peaceful nuclear program to accumulate materials and capabilities for military purposes, hiding such intentions, before withdrawing from the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the International Atomic Energy Agency (IAEA) and other international non-proliferation obligations. One could also use a peaceful nuclear program to cover clandestine nuclear activities.

Therefore, our great challenge is to establish universal principles for the promotion of nuclear energy to contribute to sustainable growth in the global economy, to solve global warming problems, and to meet energy security needs, in balance with furthering efforts to reduce the risks posed by the threats of nuclear proliferation, nuclear terrorism, and existing nuclear weapons. We also need to be reminded that concerns over the safety of nuclear activities have become increasingly important for maintaining the credibility and sustainability of nuclear energy activities. The peaceful use of nuclear energy should not be exploited to acquire nuclear weapons capabilities.

Nuclear terrorism is now perceived as one of the gravest security threats in nuclear-related activities as it is an event with severe consequences. While the probability of such event is not

high, once it happens, it would cause serious damage to economic, social and security order. The security of nuclear materials and facilities must become a priority.

It is extremely important for the international community to make a long-term, sustained commitment to a ‘balanced’ approach to the peaceful use of nuclear energy in a world that is safer from nuclear risks. We believe that various international fora, including G8 Summit meetings, should provide platforms for discussing ways to cooperate toward this common goal.

Therefore, we recommend the international community urgently address the following issues.

## **II. Toward a More Balanced Approach to Promoting Peaceful Use of Nuclear Energy by Strengthening Global Nuclear Non-Proliferation**

We reaffirm that each nation has the “inalienable right” to enjoy the benefits of the peaceful use of nuclear energy in conformity with the non-proliferation provisions and safeguards obligations in the NPT and the IAEA Statute. This ‘inalienable’ right should not permit the acquisition of sensitive nuclear materials and technology without transparent and plausible plans for strictly peaceful programs.

Since nuclear energy promotes energy security and better protects the environment, we recognize the importance of international cooperation in promoting the peaceful use of nuclear energy. At the same time, it is important that all nations be aware of the risks related to the introduction of nuclear power.

### **Recommendation 1: Establish the “Three S” as universal guiding principles for safe and secure development of nuclear energy activities**

Due to the dual nature and necessity of nuclear energy risk management, states that intend to introduce peaceful nuclear activities must take into account: a) the safety of their facilities and operations; b) the security of facilities and materials; and c) non-proliferation (or safeguards) (Safety, Security, and Safeguards: “Three S”). There is a new international environment for nuclear activities in which the threat of terrorism is rising, and the need for nuclear energy has been increasing in developing countries. This mandates broader and clearer awareness of the indispensability of the “Three S” for the introduction and operation of nuclear power and for the

harmonization and, where necessary, strengthening of the rules and regulations governing the “Three S” in an integrated manner, so that the world can enjoy the benefits of nuclear energy while minimizing the nuclear risks. With such an integrated and, where necessary, strengthened and streamlined framework for the “Three S”, the prerequisites for introducing and operating nuclear energy activities will become clearer, and the transparency and sustainability of international cooperation and technology transfer for the peaceful use of nuclear energy will be enhanced.

The G8 should endorse the “Three S” for strengthening nuclear security, nuclear safety and non-proliferation rules and guidelines, and appropriate international fora such as the IAEA could discuss and decide the details. It would also be useful to invite the nuclear industry into discussions on the “Three S” as they have expertise and are, in many cases, primarily responsible for building and operating nuclear facilities.

It is not our desire to discriminate between the ‘haves’ and the ‘have-nots’ by setting up this framework. Rather, we propose that the international community (in particular the G8 countries) provide necessary assistance (both technical and financial) to states that have nuclear power plants or that have plans to introduce nuclear power programs so that they can meet the requirements of the “Three S”. For safe and peaceful promotion, mechanisms for international cooperation should be established in the areas of technical assistance, including human resource development, and best practices in safety, security and non-proliferation activities shared.

**Recommendation 2: Provide appropriate international financial assistance to nuclear energy programs and projects in developing countries**

Capital procurement would be key to expanding nuclear energy worldwide. Nuclear power generation needs a large initial capital investment and requires a long-term payback period. Developing countries need to attract international capital for their nuclear programs. Therefore, the international community should offer innovative financial mechanisms with which private and public investment for the construction of nuclear reactors would be facilitated, as the IAEA General Conference requested of the Director General of the IAEA (cf. GC(50)/res/13, September 2006 and GC(51)/res/14, September 2007). Other existing financial mechanisms such as World

Bank loans and OECD guidelines for export credit, which currently discriminate against nuclear projects, should be made available for nuclear power projects.

It may also be worth examining the linking of financial support through the mechanisms mentioned above with the fulfillment of “Three S” guidelines since this would contribute to enhancing the safety and security of nuclear activities as well as non-proliferation.

**Recommendation 3: Address nuclear energy as an effective tool for coping with global warming and develop appropriate schemes to incorporate nuclear energy into such efforts**

Currently, there is no incentive or mechanism to facilitate the utilization of nuclear energy for environmental purposes, even though nuclear energy is quite effective in terms of reducing CO<sub>2</sub> emissions. Such discrimination against nuclear energy might undermine international efforts to cope with global warming. We urge the international community to acknowledge that nuclear energy would be an effective way to contribute to containing the increase of CO<sub>2</sub> emissions. Relevant mechanisms should be available for nuclear energy projects. In particular, we back the creation of a policy mechanism to systematically incorporate the promotion of nuclear energy in the efforts to tackle global warming in the new round of negotiations.

**Recommendation 4: Address safety and liability properly both in the domestic regulatory framework and in international cooperation**

We recognize that nuclear safety and liability are important issues when introducing nuclear energy programs. Confidence in the safety of nuclear power operations is an indispensable basis for promoting nuclear energy. Obtaining such confidence should be a high priority for government and industry in introducing nuclear power plants.

The lack of a nuclear liability scheme could also be a serious obstacle for states that would provide cooperation and assistance in peaceful nuclear activities. All states should establish liability legislation and a mechanism for compensation relevant to nuclear accidents that would be in conformity with internationally established norms and principles for nuclear liability.

The international community should provide cooperation to states wishing to introduce nuclear energy in establishing a regulatory framework and administrative capacities to properly address safety and liability.

**Recommendation 5: Universalize the Additional Protocol and enhance the export control regime**

**(1) Pursue universalization of the Additional Protocol**

We believe that universalization of the Additional Protocol (AP) to IAEA safeguards agreements is one of the most important and effective ways to check nuclear proliferation. We recognize that it would be difficult to make the AP obligatory now. However, in the spirit of cooperation, and given the shared interests in reducing nuclear threats, the international community must create a more effective way to utilize the AP in multilateral and bilateral ways for the purpose of non-proliferation.

**(2) Make adherence to Additional Protocol a condition for nuclear trade**

Strengthening export control measures is essential for preventing proliferation. We strongly encourage the NSG to adopt adherence to the AP as an additional condition for supplying nuclear-related materials and technology in the NSG guidelines. If this is too difficult, G8 countries may voluntarily declare that concluding the AP will be a condition for the supply of nuclear materials and technology.

While we are aware of concerns over its unconditional extension, a moratorium by the G8 regarding the transfer of sensitive technology and materials to additional states should be extended until a proper guideline or mechanism to regulate nuclear trade is established. In the meantime, we encourage the G8 and NSG to continue discussing this issue.

**Recommendation 6: Explore ways to utilize assurance of fuel supply and multilateral approaches to the nuclear fuel cycle for promoting non-proliferation and sharing nuclear energy opportunities**

**(1) Reliable assurance of supply as key to effective multilateral mechanisms**

Assurance of fuel supply for non-nuclear fuel cycle states (or multilateral approaches to the nuclear fuel cycle) has significance in shaping and embedding robust non-proliferation norms and habits in the international community. The introduction of such mechanisms would contribute to non-proliferation.

Given Article IV of the NPT, it would be impossible to force all states to join a fuel supply mechanism. However, it is important to discuss assurance of supply and multilateral approaches as these would contribute to strengthening international non-proliferation norms. Reliable fuel supply assurance mechanisms are a realistic option to keep nations from developing their own enrichment and reprocessing capabilities.

**(2) Multilateral mechanisms should not create new nuclear ‘haves’ and ‘have-nots’**

International interdependence is already a fact in the area of nuclear fuel supply, and it will become increasingly important as most ‘national’ fuel cycle programs have international elements. Therefore, for some countries -- such as those with small-scale nuclear programs -- it would be more efficient to rely on an international mechanism as a backup to fuel procurement through market mechanisms. Multilateral approaches may provide an alternative means for states to procure nuclear fuels. Furthermore, international interdependence would help ensure that ‘national’ programs would not be diverted for military purposes as interdependence could function as a mutual oversight mechanism.

We are aware of concerns about these mechanisms. First, such multilateral fuel cycle arrangements should not distort existing, relatively well-functioning market mechanisms for fuel procurement. Second, consumer states would be concerned over the possible emergence of a nuclear energy producers’ cartel that would extend control over not only the fuel market, but also consumer states’ sovereignty over their nuclear programs. There is also concern that such mechanisms could fix the status of supplier states (or ‘nuclear haves’) and consumer states (or ‘nuclear have-nots’) – in other words, they could create another form of discrimination in the international nuclear order. Therefore, it is necessary for such mechanisms to be flexible enough to accept various types of contribution by member states, depending on what they can provide to the mechanisms. Such mechanisms must be inclusionary rather than exclusionary. Third, focusing on enrichment service in the multilateral approaches or assurances of supply is not sufficient in coping with the risk of fuel supply disruption. Attention should also be paid to other functions in the front end process, such as mining, conversion, and fuel fabrication, when envisioning such mechanisms.

**Recommendation 7: Address concerns over the backend of fuel cycle**

We should also look at the entire nuclear fuel cycle, from mining to spent fuel management. Most countries with civilian nuclear reactors face problems relating to the management of spent fuel. To make international assurance of supply credible and attractive, we need to address the management of the back end of the fuel cycle. Providing viable spent fuel management options would further increase the reliability of international mechanisms for managing the nuclear fuel cycle.

We also should be reminded that effective management of the back end of the fuel cycle is important in the context of both non-proliferation and nuclear security, as well as utilization of resources. Measures should be taken to increase transparency on stockpiles of recovered uranium and plutonium. The stockpiles of plutonium should be maintained at appropriate sizes, and they must be properly protected. We may pursue efficient use of recovered uranium and plutonium, such as burning them in reactors, for the sake of utilizing them as resources. This would also contribute to the reduction of the stockpiles of such materials.

**Recommendation 8: Strengthen enforcement and implementation mechanisms for non-proliferation**

**(1) Strengthen supplementary measures**

Policy measures such as UNSCR 1540 and the Proliferation Security Initiative (PSI) are important elements of the international non-proliferation regime. They can play a role in filling gaps that are not covered by other conventional non-proliferation mechanisms such as export controls and IAEA safeguards.

**(2) Set conditionalities for withdrawal from NPT**

Exploitation of the provision for withdrawal in the NPT (Article X) is a great concern, especially after North Korea's declaration of withdrawal. Exploitation of Article X could undermine the effectiveness of NPT norms. Conditionality for withdrawal from the NPT may be properly addressed at the NPT Review Conference.

**(3) Strengthen the linkage between the IAEA and the UN Security Council for enforcement**

Enforcement in cases of non-compliance is necessary to maintain the credibility and reliability of the international non-proliferation regime. In this sense, the linkage of the IAEA and the UN Security Council, which is prescribed in the IAEA Statute, should be reinforced in a way that strengthens the capacity for enforcing non-proliferation rules. The international community's demonstration that it is united and will not tolerate non-compliance with IAEA safeguards agreements through the adoption of resolutions at the UN Security Council and the imposition of sanctions authorized by these resolutions would strengthen non-proliferation and deter potential proliferators.

**(4) Proper combination of dialogue through ad hoc fora, incentives, and enforcement is important**

In the meantime, addressing region-specific or issue-specific security concerns in multilateral fora other than the UN or IAEA can provide effective ways to reduce nuclear threats, and supplement efforts made through the UN or IAEA. For example, for imminent proliferation problems such as North Korea and Iran, multilateral negotiation frameworks such as the Six-Party Talks and the EU3 + 3 can play significant roles in securing channels for dialogue with the countries concerned and finding solutions. The proper combination and balance among dialogue, incentives, and credible enforcement with the possibility of sanctions should be utilized for resolving existing proliferation problems.

**Recommendation 9: Deepen and widen international collaboration in developing proliferation-resistant technology, sophisticated safeguards and verification technology**

A proper combination of political, institutional and technological measures would strengthen capabilities for coping with nuclear proliferation problems. In this sense, the development of proliferation-resistant technology is one promising approach to strengthening non-proliferation efforts. The international community should be further engaged in developing more proliferation-resistant fuel cycle and nuclear reactor technologies and more effective safeguards technologies, through international collaborative bodies such as INPRO, GIF and GNEP. The technological approach to nuclear non-proliferation is important as it might create new ways to pursue nuclear energy while promoting non-proliferation. The technological approach and international cooperation to spur innovative research and development for safer and

more secure nuclear technologies could be effective approaches as they could supplement other non-proliferation measures.

### **III. Reducing Nuclear Threats**

In order to make the world safer from nuclear threats, all types of security threats derived from nuclear activities should be equally addressed. A balanced approach of promoting the peaceful use of nuclear energy while strengthening safety, security and safeguards seeks to strengthen non-proliferation and suppress nuclear terrorism, and reducing existing nuclear weapons is another important element in the pursuit of a world free from nuclear threats and able to enjoy the benefits of nuclear energy.

We recognize that the ‘grand bargain’ among the three pillars of the NPT -- non-proliferation, the peaceful use of nuclear energy, and nuclear disarmament – continues to be a vital part of the international non-proliferation regime, and each component should be addressed. In particular, it should be remembered that the political commitment of nuclear-weapon states to further efforts in nuclear disarmament, reiterated at the 1995 NPT Review and Extension Conference and the 2000 Review Conference, must be faithfully pursued. In order to further widen and strengthen the global non-proliferation campaign, disarmament efforts by all nuclear armed states are indispensable. In this context, we need to revisit the importance of addressing and adopting measures for nuclear disarmament.

#### **Recommendation 10: Reemphasize nuclear disarmament and reaffirm the total elimination of nuclear weapons as an important goal for human civilization**

We believe that all nuclear-weapon states, whether *de facto* or *de jure*, share a heavy responsibility in reducing nuclear threats around the world. They all should commit to further efforts toward nuclear disarmament, and take concrete steps toward the total elimination of nuclear weapons. In this regard, we welcome the progress made by certain states, including the United States and Russia, on nuclear arms reduction and urge that further concrete steps be taken by the United States and Russia in achieving less reliance on nuclear weapons for a stable strategic balance, especially through negotiations for post-START I and post-SORT strategic arms control arrangements between the two countries. Such efforts by the United States and Russia would lead

other countries to make their own commitments to reducing nuclear weapons. We believe that such progress would serve to create international circumstances for nuclear disarmament and non-proliferation favorable to the total elimination of nuclear weapons.

**Recommendation 11: Address security incentives for nuclear proliferation**

To that end, nuclear-weapon states should take measures that diminish the role of nuclear weapons in their security policies to minimize the risk that such weapons would ever be used, and to facilitate a process that ends in their total elimination. These measures should include efforts to eliminate other weapons of mass destruction such as chemical and biological weapons and to improve regional security environments, particularly in conflict-stricken regions, since the presence of such weapons could be used to justify the pursuit of nuclear weapons.

We also recognize the importance of confidence building for reducing nuclear threats and anxiety by increasing the transparency of both military and civilian nuclear activities, including nuclear doctrines and nuclear energy plans.

**Recommendation 12: Achieve early entry-into-force of the CTBT and start negotiation on an FMCT**

We recognize the importance of the CTBT and an FMCT to supplement the NPT in further reducing nuclear threats. We urge states that have not signed or ratified the CTBT to do so promptly. We also urge members of the Conference on Disarmament not to block FMCT negotiations. In the meantime, we urge all nuclear armed states both inside and outside the NPT to declare a moratorium of the production of fissile materials for weapons purposes, respecting the spirit of an FMCT. Furthermore, we request all nuclear armed states strengthen accountancy and control of their fissile materials for nuclear weapons and disclose information on their status for confidence building purposes.

**Recommendation 13: Strengthen international efforts to combat nuclear terrorism and nuclear security concerns**

Coping with threats of nuclear terrorism is the current security priority. The international community should unite to confront these threats under the International Convention for the Suppression of Acts of Nuclear Terrorism, the Global Initiative to

Combat Nuclear Terrorism and the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities, and strengthen domestic control and management over materials and facility security. Yet a global effort to cope with nuclear terrorism could be more effective. To do this, the G8 countries should offer assistance to other countries to implement effective accounting and control over their stockpiles of nuclear, radioactive and other radiological materials.

The Global Partnership against the Spread of Weapons and Materials of Mass Destruction (nuclear, radiological, biological and chemical) was launched at the G8 Kananaskis Summit in June 2002 to cope with the growing threat of terrorists acquiring such weapons and materials. The G8 and their partners have been implementing specific projects in Russia, including the securing of nuclear materials, the dismantlement of nuclear submarines and the destruction of chemical weapons. Because the prospect of related materials, equipment and technology falling into the wrong hands is a global danger, the activities under this Partnership should be globally expanded in scope and membership. In this sense, the G8 Global Partnership could be utilized as a channel for providing the necessary financial and technical cooperation to countries urgently requiring measures to strengthen security and physical protection of nuclear and radiological materials, and for implementing UNSCR 1540.

We also take note of the importance of sharing information, expertise and best practices among like-minded countries on nuclear security and physical protection as well as that of protecting sensitive information. In particular, efforts to facilitate information sharing and mutual cooperation among nuclear operators and facilities should be promoted.

## **Conclusion**

The world faces serious challenges that could threaten the survival of the human race. Tightening energy supplies and global warming are among these imminent challenges. Safe and secure utilization of nuclear energy will play an important role in coping with these problems, by easing pressure from energy security needs and supplying energy with far fewer CO<sub>2</sub> emissions than other major energy sources.

Yet, nuclear energy also poses serious security and safety challenges. It is extremely important that the peaceful use of nuclear energy take into account nuclear security against terrorist activities, the safe operation of nuclear energy facilities, and the prevention of proliferation. Without addressing these challenges, the peaceful use of nuclear energy cannot be promoted. Therefore, we must take a balanced approach to strengthen nuclear safety, security, and non-proliferation measures as well as to promote peaceful use in an appropriate, effective manner. In this regard, the “Three S” would provide a useful conceptual framework to comprehensively deal with nuclear risks while pursuing safe and secure nuclear activities. In addition, nuclear disarmament should be further promoted. Promoting nuclear disarmament would strengthen the norms of the international non-proliferation regime, and thus it would encourage states to engage in global non-proliferation efforts. We believe that respecting the “Three S” concept in promoting nuclear energy and sincerely encouraging nuclear disarmament are essential in helping nuclear energy gain universal legitimacy and confidence.

It may take time to realize and implement measures to meet these challenges, but the risks are imminent. The G8 must take the initiative in discussing concrete actions and taking immediate steps to reduce such risks.

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