

## Politics of Nuclear Power and Fuel Cycle

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### Abstract

NPT served the world community reasonably well during its first 40 years in limiting the spread of nuclear weapons. It has however failed in its stated goal of substantial movement toward elimination of nuclear weapons. Limited proliferation that did take place can at least partly be blamed on either the nuclear weapons states' support of such, or on the lack of movement toward elimination of these weapons. During this period peaceful use of nuclear power did not see the growth once foreseen. However, due to rising energy cost and climate concerns, nuclear power is once again being seriously considered as an energy source by several countries. This revival of nuclear power may however get stifled due to lack of adequate assurances and undue restrictions on nuclear power.

The overlap between the peaceful and military use of nuclear power is often in the fuel cycle options available and chosen. While it will be a near impossibility to completely decouple the peaceful uses of nuclear power from its more destructive applications, if nuclear power is to be tapped for its peaceful potential, and if NPT or its replacement has to survive for another 40 years, it is imperative that clear and consistent treaties and national policies be developed and followed, avoiding *ad hoc* country specific arrangements. Alternative will be either stifling of the potential in this source of energy or irrelevancy of the treaty. We here review the state of interest in nuclear power, current policies, and discuss policy and fuel cycle options that may pave the way for future growth of nuclear power.

### Background

Number of countries that have nuclear power plants is now around 30; nine countries possess nuclear weapons technology; and an additional few may be able to develop and test it on short notice. It should be recognized that despite the global nature of the treaty and large number of signatories, NPT is of most concern to about twenty to thirty countries: the recognized weapons states (five); non-signatories (and North Korea which withdrew from the treaty) and 10-15 other signatory countries that linger on the boundary with potential aspiration for either nuclear power or even nuclear bomb. Mohamed El-Baradei has recently talked about a group of up to 30 "virtual new weapons states" on the horizon [1]. The horizon for *thirty* might be far, but one can more easily imagine a group of say ten countries that may aspire for nuclear weapons in the short run (10-20 years). Several countries have plans to explore the nuclear option for power or desalination purposes. These include: Egypt, GCC member countries, Indonesia, Iran, Jordan, Malaysia, Morocco, South Africa, Thailand, Turkey, etc. The prospects for peaceful use of nuclear power are closely tied to perceptions and geo-political situation. To make sure that peaceful and legitimate uses of nuclear energy are not stifled inadvertently due to unnecessary

restrictions and/or bad policies and decisions on the part of some governments and international agencies, it is necessary to help countries and international agencies formulate policies that are consistent with the desire to improve world security and long term potential of nuclear power.

## **Introduction**

It has long been recognized by those involved in the nuclear business that because of its close relationship with “the bomb,” the technology will always be on the verge of controversy. Increasing energy demand, and now climate concerns, will at the same time continue to propel nuclear to the center stage as a viable energy source. However, no matter how strong the need for a safe, reliable, green and efficient source of energy—that can possibly be filled by nuclear—due to its large capital cost, candidate countries will not seriously consider the nuclear path without a consistent and long term global nuclear policy. NPT and its recent extension have provided such a framework for the last four decades. During this period the decision to go nuclear or not was largely driven by economics (and not politics). Now that nuclear power may be becoming economically and environmentally more feasible, recent political developments have however cast a cloud of uncertainty that will likely deter countries interested in pursuing peaceful uses of nuclear power from this path, or may even suggest paths that circumvent the treaty to assure access to nuclear power. These, for example, include overt suspicion of initiatives to pursue peaceful use of nuclear power by countries that currently do not have any nuclear program. *Ad hoc* steps to reward countries that have not signed NPT via nuclear technology transfer due to “business opportunities” or due to “realities on the ground” are also likely to send the wrong signals. It is imperative that the cloud of uncertainty be lifted expediently and a unified and comprehensive policy be developed and followed that can provide the framework for future development of peaceful uses of nuclear power. *Ad-hoc*, country specific policies—dictated by political concerns—are more likely to hurt non-proliferation and world security than help.

In this paper we will identify current status of interest in nuclear power. Suggestions for a unified global nuclear policy and steps to start a new nuclear energy program are given.

## **Nuclear power and weapons**

Some of the issues that affect the growth of nuclear power are identified and discussed below.

### *Narrow band (?) between peaceful uses of nuclear power and weapons program*

Question is often asked as to how easy it is to acquire the weapons technology once a country has developed an indigenous nuclear power program? While a very relevant question, clearly it must have been on the mind of those who developed and then signed the original NPT. Obviously, to convince the non-nuclear weapons states to agree to sign the NPT, it was decided to not ask that question. So much so, that Article V guarantees the benefits of weapons technology to non-nuclear weapons states if it can be used for peaceful purposes. With a greater amount of trust than exist today, it was hoped that inspection regimes would be sufficient to catch any violators. The fact that this question has bubbled to the top of the factors influencing the proliferation debate is an indication of failure of inspection regimes and an increasing loss of

trust among countries. It will not be easy to get all of the non-weapons states signatory to NPT to agree to remove certain technologies—like fuel manufacturing and recycling—from the list of activities allowed to the non-weapons state. Moreover, though some countries may pursue nuclear power under such conditions, others are likely to either give up on nuclear power or simply pursue it outside the newer restrictions.

### *Violations of NPT and failure of inspection regime*

Some non-weapons states have attempted to hide their nuclear activities. Weapons states are blamed for not living up to their commitment to work toward a complete elimination of nuclear weapons. While failures on the part of weapons states are subjective and difficult to quantify but visible for all to see; violations by non-weapons states require an inspection regime to catch. The failure of treaty verification mechanism to detect such activities has led to a loss of trust in the treaty. At the same time, plans to develop next generation of nuclear weapons by some of the weapons states also cast doubt if the weapons states are at all serious about their part of the bargain. This failure of verifications and open flouting of stated goals has led to a lack of trust and an environment which is putting pressure on the non-weapons states to either violate the treaty or leave it altogether. Lack of consistent and meaningful no-first-use policy against the non-nuclear-weapons (NNW) states has also contributed to pressure on the treaty.

### *An environment of mistrust*

While there are success stories (case of Libya), lack of trust and international relations will continue to strain the limits of the treaty. To complicate the matter further, occasional *rewarding* of a country outside the scope of NPT (case of India) may also send the wrong signal. This environment of mistrust is likely to do considerable harm to the cause of peaceful use of nuclear power. While as signatory they can claim their right to nuclear technology for peaceful purposes, countries may be tempted to hide their nuclear activity fearing that they will not be allowed to develop indigenous nuclear programs. Others may be tempted to even leave the treaty and develop their own programs outside the treaty believing that once their program is in place, they would be “rewarded” as well.

### *Rewarding the non-signatories*

Recent US-India nuclear cooperation agreement is still being debated. With significant R&D in certain areas of nuclear technology in India, it is not entirely clear if the agreement will be a “reward” for India, or if US can also benefit, in addition to the touted business opportunities from this agreement. In an article in March 2007 issue of Nuclear News, Mark Maiello writes: “[t]he agreement damages the security interests of the United States in at least two major ways: (1) It works outside of the established framework of the nuclear nonproliferation agreements and thereby undermines them, and (2) it sets a double standard whereby the United States determines who, for the moment, is the enemy” [2].

### Non-signatory states

Existence of non-signatory states also puts pressure on the treaty and its stated goals. It suggests an alternative which seem even more appealing when there is no penalty, and a country may even be rewarded for working outside the treaty.

### **Path forward**

#### NPT, international treaties and weapons states

To move forward toward a relatively stable nuclear regime, immediate international focus should be on:

1. A meaningful commitment on the part of weapons states to not threaten or use nuclear weapons against non-weapons states.
2. Eliminating non-signatories of NPT by either including them in existing categories in NPT or creating new categories of countries.
3. Restrict the development of new weapons systems.

It seems unlikely that the weapons states in the near future will willingly move toward a complete disarmament in any meaningful way. For near term development of nuclear energy systems and nuclear technology, a “nuclear-weapons-free-world” should be, at least temporarily, left off the table. A more reasonable expectation would be to convince the nuclear weapons states that not developing new nuclear weapons will actually increase their security. To proceed several options may be considered. The simplest is to include India and Pakistan in the list of weapons states. Middle East may be declared a nuclear weapons free zone. This would be consistent with Israel’s stated policy to not be the first to introduce nuclear weapons in the region. [North Korean situation may soon be resolved.] Another option is to define a new class of countries -- those that want to develop their own fuel cycle. Any country may opt to be a “fuel developing” country. However, all countries in this group may have to agree to a more strict set of inspection regime.

Nuclear weapons states must not hamper development of peaceful uses of nuclear power simply because of geo-political considerations. Such efforts are counter productive and in fact the non-weapons states because of such measures may either take their nuclear activities underground or may even consider leaving the NPT. There are risks and benefits to an expansion of nuclear technology around the world. As perceived threat to our planet from increased CO2 emission becomes even more significant and urgent, and larger than the threat from a nuclear confrontation, a slight potential increase in likelihood of proliferation may be an acceptable price for allowing countries to develop their own fuel cycle if that is what it would take to convince them to seriously consider the nuclear option.

#### Non-weapons states

The non-weapons signatory states should insist on rights given to them by NPT. These rights are substantial and sufficient for all peaceful nuclear activities. Recent experience suggests

that it is the lack of trust in their rights and in the treaty that might be the complicating factor. For example, in the case of Iran, if her interest is only in peaceful use of nuclear power then nuclear related work outside IAEA safeguards only cast doubt on their stated intention. Since it is every country's right to pursue peaceful use of nuclear power, Iran or for that matter any other NPT signatory can and should assert that right. Circumventing the treaty obligations will only give credence to those critical of such programs. As more and more countries show interest in peaceful uses of nuclear power, they should make sure that they adhere to the responsibilities under the NPT. When satisfying their treaty obligations, they will have the moral high ground to demand their rights to peaceful uses of nuclear power guaranteed to them under the treaty:

### **Starting new nuclear programs**

A single nuclear power plant in a country may be good for the prestige of the country, but as is made abundantly clear by the consolidation of nuclear power plants in the hand of a few utilities in the United States of America and in many other countries with substantial nuclear power, such units are likely to be inefficient, and moreover unlikely to make a major impact on the energy scene. Hence, in order for nuclear power to play a significant role, countries that decide to "go nuclear," would most likely want to diversify a significant fraction of their electricity generating capacity (and possibly heating and, in the future, hydrogen production) to nuclear, possibly requiring at least few and possibly many nuclear power plants. Another option, especially for some of the smaller countries, would be to join hands and form nuclear consortia and thus build a large enough nuclear program to be economically feasible.

In order to proceed with the nuclear option, these countries would expect a certain level of long term assurance on the fuel supply. Nuclear power plants (NPP) and fuel options available to countries for their nuclear programs can be categorized as follows.

- A. Fully indigenous program with complete development of power plants and fuel cycle.
- B. Fully or partly indigenous program for power plant development; while depending on an international consortium for fuel supply and waste treatment.
- C. Rely on international consortia to build and operate all aspects of nuclear power plants (with local manpower).

A total of around fifty to seventy five countries are likely to be interested in nuclear power in the next fifty years. As they choose their options (A through C), it is likely that, with time, there will be some expectation that a country will move to higher levels (C to B and B to A). Note that under the current NPT, signatories have an "inalienable right ... to develop research, production, and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II." Moreover, paragraph 2 of Article IV further underscores that each NPT state-party "undertake[s] to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy." Fuel cycle is clearly an important part of nuclear power, and few would argue that non-weapons states do not have the right to develop their own fuel cycles. However, proliferation concerns are also real, and must be adequately addressed. Neither attempt to hide weapons programs behind a fuel processing façade nor to deny fuel processing due to geo-politics will help the cause of nuclear power.

Future fuel cycles are still being debated even in countries with established nuclear power programs. It is far too early for non-nuclear states in early stages of their programs to lock in to a fuel cycle. Fuel cycles may change dramatically in years to come, and the technology is expensive. Best path for new states now considering the nuclear power option may be to simply insist on their right to have a complete indigenous fuel cycle option but not exercise it. They will have a much stronger argument for an indigenous fuel cycle once they have an established nuclear power program with few to several nuclear power plants running.

On the other hand, proposals to develop fuel cycles that concentrate all fuel processing in fuel-suppliers states and deny the technology associated with this aspect of nuclear power to the end user actually contributes to the atmosphere of mistrust and hence leads to pressure on the treaty. Insistence on transportation of fresh and used-fuel over long distances may actually be more problematic than on-site or regional processing carried out under strict supervision. Concerns for nuclear fuel supply and rights are real and to address them IAEA organized a workshop of 140 countries to discuss proposals to guarantee countries' supply of nuclear fuel (September 19-21-, 2006; Vienna).

## **Summary**

As difficult as it may be, if nuclear power is to play its useful role, technology, treaties and policies must be developed that: 1) allow nations to freely pursue the development and use of nuclear power for peaceful purposes; 2) provide disincentives to develop nuclear weapons; and, 3) establish a universal verification regime that detects a country's move toward acquiring nuclear weapons. At the same time, countries embarking on the nuclear power path, while retaining their theoretical right, should, in the short run, not insist on exercising that right for fuel development and processing. The weapons states in return should refrain from at least the development of new weapons system.

## **Reference**

1. Paul B. Stares, "To Ban the Bomb, Sign the Peace," New York Times, p. A23, January 30, 2007.
2. Mark L. Maiello, "The U.S.-India Nuclear Cooperation Agreement: A controversial move," Nuclear News, March 2007.

## **Appendix**

Selected articles of the NPT.

### Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.