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The "Prague Agenda" and Nuclear Energy

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The views in this paper are the author's and do not necessarily reflect the views of NTI or the Lowy Institute.

1. INTRODUCTION

In his Prague speech of April 5, 2009 President Obama outlined four key areas for action in working towards a world without nuclear weapons:

1. Action on nuclear weapons – **reducing** their role in national security, pursuing further cuts in weapon numbers, and pursuing global bans on nuclear testing and fissile material production for nuclear weapons.
2. Strengthening the Nuclear Non-Proliferation Treaty (NPT) as a basis for international nuclear cooperation, and building a new framework for such cooperation.
3. Upholding a rules-based system – addressing compliance and enforcement, especially resolving the Iranian and North Korean challenges.
4. Strengthening nuclear security – addressing the danger of nuclear terrorism.

The importance of the "Prague Agenda" is not limited to a particular Administration and a particular point in time. Action on these four key areas will remain vital to reducing nuclear threats for the foreseeable future.

To date most attention on this agenda has been on nuclear weapons and nuclear security, e.g. with New START and the Nuclear Security Summit process, and also on compliance and enforcement issues raised by Iran and North Korea. In addition there are the challenges of bringing the Comprehensive Nuclear-Test-Ban Treaty into force and starting negotiations on a Fissile Material Cut-off Treaty. Closely related to the FMCT is the need to halt the growing nuclear arms race in South Asia.

How the Iranian and North Korean nuclear challenges are resolved will be crucial to confidence in a rules-based approach for the future. Until the members of the Security Council are prepared to work more closely together to deal with treaty violations, doubts about their commitment to compliance enforcement will impact not only on non-proliferation but also on the prospects for substantial progress in disarmament.

Currently receiving less attention is the second of the areas listed above, in particular action to build a new international framework for nuclear energy. This is the topic addressed by this paper.

President Obama expressed the issue this way:

> … we should build a new framework for civil nuclear cooperation … so that countries can access peaceful power without increasing the risks of proliferation.

The challenge of ensuring "the peaceful atom" has been with us since the beginning of the Nuclear Era – Resolution 1 of the United Nations, when it first met in 1946, established an Atomic Energy Commission to deal with "the problems raised by the discovery of atomic energy", specifically, how to ensure its use only for peaceful purposes. The issue comes down to this – how to ensure effective control over proliferation-sensitive aspects of the nuclear fuel cycle, i.e. those technologies and materials that can be used to produce nuclear weapons.

This issue is raised squarely by Iran's assertion of the "right" to operate a uranium enrichment program. As the Iranian case clearly demonstrates, demands for national programs in proliferation-sensitive areas run counter to the global interest in non-proliferation. The Iranian enrichment program was developed in secret − and doubtless would still be secret today if it had not been exposed − but after the program was outed the Iranians have skillfully exploited North/South political dynamics to portray it as a legitimate exercise of rights under the NPT.

Iranian influence is reflected in the statement by the Nonaligned Movement (NAM) at the 2010 NPT Review Conference that:

> The Nonaligned Movement rejects any attempts aimed at discouraging certain peaceful nuclear activities on the grounds of their alleged "sensitivity" and emphasizes that any ideas or proposals pertaining to the non-proliferation of any peaceful nuclear technology are inconsistent with the objectives of the (NPT).[1]

There is a need to break through the political rhetoric, to find the right balance between national and international interests. The dialogue should not only be about national rights, but also national responsibilities. Governments need to recognise that their national interest is best served through action that strengthens, not weakens, non-proliferation.

Every state has a legitimate interest in security of energy supply on terms that are non-discriminatory and equitable – but this does not justify developing the means to produce nuclear weapons. A new international framework for the nuclear fuel cycle is needed – a framework that emphasizes international cooperation rather than national "rights". As will be described, much work is already underway on proposals for practical and attractive alternatives to national programs in proliferation-sensitive areas. However, major political and diplomatic effort is required to build international support for this.

2. THE NPT AND SENSITIVE NUCLEAR TECHNOLOGY

Article IV.1 of the NPT refers to the "inalienable right" of NPT parties to develop and use nuclear energy for peaceful purposes provided this is done in conformity with the Treaty.

Iran in particular has been very vocal in asserting that Article IV gives it a right to undertake enrichment or any other fuel cycle activity. However, Article IV does not refer to any specific

1. NAM Working Paper, NPT/CONF.2010/WP.46.

nuclear technology, but rather uses the broad term *nuclear energy*. Iran conveniently overlooks that the right given by Article IV is not unqualified, but must be exercised for *peaceful purposes* and in conformity with key provisions of the NPT on non-proliferation and safeguards.

The conventional legal view is that *whatever is not specifically prohibited in a treaty is permitted*. On this basis, some argue that since the NPT does not specifically proscribe enrichment or reprocessing, these activities are permitted, provided they are undertaken in accordance with IAEA safeguards. This is a simplistic interpretation, since it does not take due account of the important conditions in the Treaty regarding peaceful purposes and non-proliferation. The Treaty does not give clear guidance on the application of these conditions, other than the obligation to comply with safeguards – an obligation which Iran has violated.

It is now apparent that the NPT does not deal adequately with the issue of sensitive nuclear technology. When the Treaty was negotiated it was thought that in practice enrichment and reprocessing programs would be limited to the nuclear-weapon states and a small number of advanced industrialised states. Recent historical research has brought to light that during the NPT negotiations UK officials warned their US counterparts that the newly emerging technology of centrifuge enrichment presented a serious risk to the NPT's objectives.[2] Unfortunately this warning was not heeded. US officials considered that IAEA safeguards would be sufficient to deal with this problem, and the language of Article IV was left unchanged. The UK's warning proved prescient, as there has been a gradual spread of proliferation capabilities, particularly centrifuge enrichment technology, to other states, accelerated by black market activities, notably involving the Pakistan-based AQ Khan network.

To date proliferation challenges from within the NPT membership have been based on secret nuclear programs rather than safeguarded civil programs. This has led to the common assumption that proliferation risk lies with clandestine rather than declared programs. The Iran case, however, shows this assumption is not valid. Iran, having been compelled to place under safeguards a program which had hitherto been secret, now raises the spectre of safeguarded proliferation − a program conducted under safeguards could be used for break-out to nuclear weapons production.

A key objective of safeguards is to provide timely warning of diversion, to allow for international intervention before a proliferator has time to turn diverted nuclear material into nuclear weapons. However, centrifuge enrichment technology presents a serious challenge to this objective − the relative ease of concealing centrifuge plants and the potential speed of break-out mean that adequate warning time cannot be guaranteed. Even if removal of enriched uranium from safeguards, or use of a safeguarded facility for high enrichment[3], is detected immediately, the time required for international deliberations could result in practical intervention not being possible within the necessary timeframe.

Similar timeliness issues are raised where stocks of separated plutonium are held. The risks are exacerbated where high-fissile plutonium is involved, e.g. with fast breeder reactors or large "research" reactors.[4] There is a real concern that if plutonium is diverted, and the state has been

2. John Krige (2012), *The Proliferation Risks of Gas Centrifuge Enrichment at the Dawn of the NPT*, The Nonproliferation Review, 19:2, 219-227.

3. One problem here is that production of highly enriched uranium is not prohibited – if a state started to do this, vital time could be lost on legalistic arguments.

4. Such as Iran's Arak reactor.

able to make the necessary preparations in advance, the plutonium could be turned into nuclear weapons before effective intervention is possible.

Underlying the problems outlined here are the issues of nuclear latency and nuclear hedging.

Nuclear latency and nuclear hedging

Nuclear latency refers to the situation where a state has established, under an apparently peaceful nuclear program, dual-use capabilities that could be used for the production of nuclear weapons. Nuclear latency might be considered inadvertent: a state with uranium enrichment or reprocessing capabilities thereby has the basic capability to produce fissile material for nuclear weapons, even if it has – at least in foreseeable circumstances – no intention of doing so.

Some commentators refer to such a state as a *virtual* nuclear-weapon state. The common example given is Japan, sometimes described as being "just a screwdriver turn away" from having nuclear weapons. This is simplistic, overlooking the other capabilities required, such as weaponisation and suitable delivery systems, as well as Japan's longstanding and strongly held commitment against pursuing nuclear weapons. Nonetheless, it does illustrate the problem of enrichment and reprocessing capabilities being in national hands. Even a state as firmly committed to non-proliferation as Japan could change its position in the future – a concern reinforced by recent comments by some Japanese figures about the need to maintain fuel cycle capabilities in order to ensure a nuclear weapon option.[5]

The issue of nuclear latency is very much in the background in current negotiations between the US and South Korea for the renewal of their nuclear cooperation or "123" agreement, where the Koreans are seeking consent to undertake enrichment and reprocessing. While no-one is suggesting that Korean intentions are anything but peaceful, it cannot be overlooked that enrichment and reprocessing provide proliferation capabilities – and as in Japan, some Korean political figures have been advocating a nuclear weapon option.

Japan has been used as an example to justify national aspirations by states as diverse as Iran and South Korea. Far from Japan's fuel cycle program being an appropriate model for others, one would hope that Japan would be prepared join, or even lead, efforts to establish multination control of proliferation-sensitive facilities, discussed later.

Today, in addition to the five recognised nuclear-weapon states[6] and the other four nuclear-armed states[7], there are at least eight states with demonstrated enrichment capability[8], and five with demonstrated reprocessing capability[9], a total of ten states (this number reflects that three have both capabilities). There is no doubt that the larger the number of states perceived as *virtual* nuclear-armed states, the greater the potential destabilising effect on the non-proliferation regime.

If nuclear latency is supposedly inadvertent, nuclear hedging refers to a deliberate national strategy of establishing an option for the relatively rapid acquisition of nuclear weapons, based on an indigenous technical capacity to produce them within a relatively short timeframe – ranging

5. E.g. see the remarks of Japan's defense minister, Satoshi Morimoto, prior to his appointment, that Japan's nuclear reactors are "taken by neighbouring countries as having very great defensive deterrent functions", Japan Times 6 September 2012.
6. US, Russia, UK, France and China.
7. India, Israel, Pakistan and North Korea.
8. Argentina, Australia, Brazil, Germany, Iran, Japan, Netherlands and South Africa.
9. Belgium, Brazil, Germany, Italy, and Japan.

from several weeks to a few years. Nuclear hedging is contrary to the NPT's objectives. Hedging could result in *virtual* arms races, with the risk of degenerating very quickly into real arms races, break-out from the NPT, and nuclear war. The existence of nuclear hedging programs undermines the confidence and stability that the NPT is intended to promote.

How to address these problems?

It is essential to gain international recognition that nuclear hedging – setting out to establish a nuclear weapon break-out capability – is not a peaceful purpose permitted by the NPT. The problem is how to determine the real intent of a state – how to distinguish between a genuinely peaceful program and a program whose purpose is to establish a nuclear weapon option, or worse, is part of a planned nuclear weapon break-out?

There are indicators which could point to an effort to manufacture nuclear weapons – e.g. systematic safeguards violations, apparent weaponisation activities, and development of nuclear-capable delivery systems. However, some of these indicators will be difficult to detect – so the apparent absence of indicators is not necessarily reassuring – and even if detected, the purpose could be ambiguous. The only visible indicator of hedging may well be an enrichment or reprocessing program that has no clear civil justification.

These issues are highlighted by the case of Iran. Iran's behaviour has highlighted the dangers inherent in national enrichment and reprocessing programs – if a state decides to apply these technologies for military use, IAEA safeguards may not be able to provide adequate warning. By the time a treaty violation is detected and deliberated upon it may be too late for effective intervention.

It is essential to promote more critical thinking on the application of the NPT, particularly the interpretation of *peaceful purposes*, and the interpretation of the term *manufacture* in the commitment not to manufacture nuclear weapons.[10]

Crucially, there is no international process for determining whether a particular national program involving sensitive nuclear technology presents unacceptable proliferation risk. Already a significant number of states have the capability to produce fissile material, and if nothing changes this number will increase. It may be necessary for the Security Council to consider some process for determining the acceptability, or otherwise, of national enrichment or reprocessing programs, but at this stage there is no proposal for such a process. Ultimately the only sure way to address the issues of latency and hedging is to gain international support for alternatives to the national control of proliferation-sensitive stages of the fuel cycle.

3. 123 Agreements and the 'Gold Standard'

One approach to the issue of halting the spread of sensitive nuclear technology is for states to voluntarily forgo such capabilities. This was the approach taken in the nuclear cooperation agreement concluded by the US and the United Arab Emirates in 2009 – the UAE committed not to possess sensitive nuclear facilities and not to engage in enrichment and reprocessing activities. This approach has come to be described informally as the *gold standard* for future US agreements.

10. NPT Article II.

So far no other state has been prepared to emulate the UAE by accepting an agreement based on this gold standard. The US is negotiating nuclear cooperation agreements with Jordan and Vietnam, has held discussions with Saudi Arabia, and is negotiating renewal of the agreement with South Korea. Jordan and Saudi Arabia have publicly rejected UAE-like restrictions, Vietnam is reported to have declined them, and South Korea has asked for enrichment and reprocessing consent.

In January 2012 the Obama Administration announced it had adopted a case-by-case approach to the non-proliferation objectives to be included in nuclear cooperation agreements. It is understood US policy is currently the subject of interagency consideration.

There are two difficulties with the present US approach. First, it is hardly surprising that states are reluctant to unilaterally forgo future fuel cycle options, no matter how unrealistic or distant these might be, when no alternative arrangements have been presented, apart from reliance on the commercial market. While the market has worked very well, states are naturally reluctant to commit now to rely solely on the market for many decades into the future. Even the UAE has not entirely relinquished its options – the US-UAE agreement contains *most favoured nation* provisions, under which the agreement can be renegotiated if the US gives enrichment or reprocessing consent to any other state in the Middle East.

Second, the US has limited leverage when it is acting alone. The US should develop a comprehensive policy position, with practical alternatives for states being asked to forgo sensitive technologies, and should campaign for buy-in from other nuclear suppliers. While the starting position for other suppliers may be to maintain commercial advantage by not requiring fuel cycle restrictions, if convincing alternative arrangements can be developed and the non-proliferation advantages demonstrated, it will be difficult for the major suppliers to stay outside these.

Pending development of practical alternatives to national programs, new 123 agreements might include: (a) a general consent provision for enrichment or reprocessing (i.e. rather than outright exclusion, US consent would be required); and (b) a commitment (e.g. in a side-letter) for the parties to work together to establish such alternatives.

What a new international framework might involve

The needs of states with nuclear energy programs, or planning such programs, can be outlined as follows:

- Reliable access to reactors and fuel on secure, non-discriminatory and equitable terms;
- Reliable access, also on non-discriminatory and equitable terms, to fuel cycle services, especially for used fuel management;
- Support in establishing regulatory systems; support through training and capacity building; sharing of expertise in reactor operations, nuclear safety and nuclear security.

The economic costs of developing an indigenous fuel cycle are substantial, and there may be other significant costs as well, e.g. the impact on a state's national security and its international relations if its pursuit of sensitive nuclear technologies is seen by others as a strategic threat. Further, not many states have uranium resources sufficient to maintain a nuclear power program independent of external supply. Energy independence may be cited as justification for a national fuel cycle, but few states are in a position to achieve this. For most states international cooperation is likely to be a necessity, and for all states such cooperation will offer major

advantages. Thus there are important points of leverage for convincing states that participation in international fuel cycle arrangements will lead to better outcomes than pursuing national independence.

IFNEC and international fuel banks

A number of proposals have been made to reflect these ideas. The proposal showing most progress is the International Framework for Nuclear Energy Cooperation (IFNEC), the successor to the Global Nuclear Energy Partnership (GNEP). GNEP started as a US initiative, but today IFNEC is thoroughly multilateral, having 31 participating states and 31 observer states.

There is a very pragmatic idea behind IFNEC − to set aside political arguments about "rights" and instead focus at the expert-level on practical problems and solutions. IFNEC is developing the concept of comprehensive fuel service arrangements, including fuel leasing, to meet the need for reliable fuel supply and to provide used fuel disposition options. The basic idea is that nuclear suppliers would commit to provide nuclear consumers with long-term whole-of-life fuel service assurances –providing fresh fuel and taking back used fuel, or assisting in other ways with used fuel management. The practical and economic benefits of this international cooperation would be such that nuclear consumers have no legitimate reason for pursuing national programs in proliferation-sensitive technologies.

An important complement for such international approaches is the establishment of international fuel banks, as a fuel provider of last resort if supply arrangements fail. There are now two such fuel banks – one established by Russia at the International Uranium Enrichment Centre at Angarsk, and one being established in Kazakhstan, under IAEA auspices and with funding assistance by the Nuclear Threat Initiative (NTI) and a number of IAEA members.

The IFNEC approach is to establish strong practical and economic advantages for states not to pursue sensitive technologies. While this approach has considerable merit, however, in itself it is not sufficient. First, it does not address the problem cases, except indirectly in the longer term. If IFNEC succeeds in establishing an international norm of behaviour against new national enrichment and reprocessing programs, this would be helpful in isolating those who act against this norm, but this is a long way off. The need to deal with Iran, and others that may assert the "right" to establish fuel cycle programs in dubious circumstances, is rather more immediate.

Second, arrangements that are mostly commercial in nature might not offer sufficient assurance to states concerned about long-term security of supply. States are likely to have greater confidence in arrangements where assurances are legally binding in international law, i.e. are based on a treaty-level umbrella. It would provide additional confidence if the IAEA is given an oversight role in these arrangements, to ensure that decisions are taken on an objective non-discriminatory basis.

Third, the IFNEC concept does not address existing enrichment and reprocessing programs. Some of these programs are of potential strategic concern, and all of them provide the operating state with *nuclear latency*. This is not only a non-proliferation issue, it is also an issue for disarmament. As nuclear disarmament progresses, the potential for rapid break-out from disarmament commitments will be just as great a concern as the potential for break-out from non-proliferation commitments. Further, non-nuclear-weapon states being asked to accept restrictions on national nuclear programs are likely to argue that the new approaches should be non-discriminatory, i.e. they should also apply to the nuclear-armed states. Concepts are needed for

the transitioning of all nationally controlled enrichment and reprocessing programs to an appropriate alternative model within a realistic timeframe.

Multination approaches

The most practical alternative to national control of sensitive nuclear programs is some form of multination control. This concept has been incorporated in the Nuclear Suppliers Group (NSG) Guidelines:

> If enrichment or reprocessing facilities, equipment or technology are to be transferred, suppliers should encourage recipients to accept, as an alternative to national plants, supplier involvement and/or other appropriate multinational participation in resulting facilities. Suppliers should also promote international (including IAEA) activities concerned with multinational regional fuel cycle centres.[11]

A key objective is to establish technical and institutional barriers against a state attempting to misuse enrichment and reprocessing capabilities. The less control an individual state has over such capabilities, the harder it will be to misuse them. Of course no barrier can be totally effective – a state can always seize facilities regardless of who owns and operates them – but arrangements such as black box technology can be important in making misuse more difficult, providing more time for international intervention.

Multination approaches are not an unrealistic aspiration, examples already exist, i.e. the European enrichment group Urenco and the Angarsk International Uranium Enrichment Centre. These precedents have important characteristics that can be built upon in future models, e.g.:

- A treaty providing for mutual oversight of facility operations (Urenco);
- Consumers having product supply guarantees and equity participation (Angarsk);
- Supply of sensitive technology only on a *black box* basis (Urenco, also Russian practice).

Drawing all this together, a possible model for future fuel cycle arrangements could be along the following lines:

- Fuel suppliers and fuel consumers form comprehensive partnerships covering all aspects of the fuel cycle, including fuel supply guarantees and cooperation in safety and security, fuel fabrication, and management of used fuel and high level waste
  - partnership arrangements, including fuel guarantees, are covered by treaty, with provisions binding in international law and under IAEA oversight
  - these include fallback arrangements in case of supplier default.
- Sensitive facilities – enrichment and reprocessing – are operated by fuel suppliers under multination arrangements
  - where possible, technology is provided to the operator on a *black box* basis, as is currently the case with Urenco supplying the US and France, and Tenex supplying China
  - fuel consumers have equity participation in the facilities, including profit-sharing
  - fuel consumers are involved in facility operations (without accessing sensitive technology) as an additional measure to assure against misuse of the facility.

11. NSG Guidelines, INFCIRC/254/Rev.10/Part 1, paragraph 6(e).

Nuclear safety and nuclear security

A new international framework for nuclear energy should also address nuclear safety and nuclear security concerns, particularly the need for international standards and greater international transparency and accountability. Here too a preoccupation with national "rights" stands in the way of a more sustainable balance between national and international rights and responsibilities. These issues are beyond the scope of the present paper.[12]

4. CONCLUSIONS

Establishing a new international framework for nuclear energy is an ambitious undertaking. But as we approach the 60th anniversary of the Atoms for Peace initiative it is timely to review the lessons from the past six decades and to develop a new framework that will reverse the spread of nuclear weapons and nuclear weapons capability, and strengthen international peace and security. The Iranian nuclear crisis highlights the deficiencies in the current framework. It is imperative to resolve this crisis before it worsens, but this can be set in a broader context – as a step in the establishment of a new generic approach to controlling the nuclear fuel cycle.

The ideas outlined in this paper do not involve a re-opening of the NPT, but rather re-energising the NPT – promoting a better appreciation of the NPT's importance to international peace and security, hence to the national security of every state (even the non-parties), and building support to make the NPT work better. An essential part of this effort will be to shift the political discussion away from rhetoric on national "rights" and back to the international interest in non-proliferation and disarmament. It is essential to address NAM assertions that the NPT permits all states to develop all aspects of the fuel cycle. It is especially important to reject the idea that the NPT permits activities aimed at nuclear hedging.

The Nuclear Security Summit has shown the value of engaging directly at heads of government level – compared with officials, leaders have a broader perspective and a better understanding of what really serves their national interests. This engagement was warranted for nuclear security, and is clearly warranted for non-proliferation.

These issues are complex and enormously challenging. They cannot be addressed effectively by the US acting alone. A comprehensive strategy is needed, to build effective partnerships and coalitions, to share the policy development and diplomatic burden, and to promote more productive engagement across the whole non-proliferation agenda.

12. See e.g. the author's paper *After Fukushima: Implications for Nuclear 3S (Safeguards, Safety and Security)*, Asan Institute conference *Nuclear Crisis in Northeast Asia*, Seoul, 31 October-1 November 2011.