

**Challenges to the Nuclear Non-Proliferation Regime:
Can the Regime Survive?
An Australian Perspective**

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This paper presents the personal views of the author and not necessarily those of the Australian Government.

1. Introduction

Although the nuclear non-proliferation regime has enjoyed considerable success, today it is facing serious threats. Recent and continuing violations of the Nuclear Non-Proliferation Treaty (NPT), particularly by the Democratic People's Republic of Korea (DPRK) and Iran, as well as the lack of substantive outcome from the 2005 NPT Review Conference, have led some critics to question whether the NPT may be reaching the end of its useful life. These concerns have been heightened by the DPRK's conduct of a nuclear test and Iran's defiance of the Security Council over its nuclear activities.

Other factors prompting this perception include:

- the frequent charges that the nuclear-weapon states (NWS) have not lived up to their disarmament obligations;
- a major technology challenge – the emergence of a black market in centrifuge enrichment technology and know-how, and even the sale of nuclear weapon designs;
- closely linked to the previous point – concerns about the ability of International Atomic Energy Agency (IAEA) safeguards to detect undeclared nuclear activities, especially centrifuge enrichment plants;
- many are concerned about the impact on the NPT of a possible “India exception”, the proposed exception for India from the full scope safeguards standard for nuclear supply.

In addition, there is a broader technology challenge – will the major expansion of nuclear programs expected this century lead to a much wider spread of proliferation-sensitive nuclear technology, i.e. enrichment and reprocessing? The assertions of Iran and others that the NPT guarantees all Parties the right to develop the complete fuel cycle pose a direct challenge to the non-proliferation regime. Further, in a substantially expanded nuclear industry, plutonium recycle will be necessary for efficient use of uranium and the most effective management of high level waste. Can the wider use of plutonium be compatible with non-proliferation objectives?

Today, the most important single issue facing the non-proliferation regime is, how to deal with a determined proliferator. One way or the other, the outcome of Iran's pursuit of technologies that would give it a nuclear weapon capability will have a major impact on the future of the regime.

The Iranian situation is not just a regional problem – strategic developments in the Middle East are of global significance. If Iran is able to develop nuclear weapons, or the ability to do so within a short time frame, states that feel threatened by this situation could well seek the same capabilities. In such circumstances it would be very difficult to stop the non-proliferation regime unravelling.

Despite the gloomy outlook, the non-proliferation regime has considerable strengths, many of which can be developed further. The most important strength is the fact that an effective non-proliferation regime is in the interest of every state. Paradoxically, this is the case even for a nuclear weapon aspirant. Such a state benefits from the number of nuclear-armed states being limited – a consequence of the regime. A proliferator imagines it would be joining a select group. But its perceived advantage would be negated – indeed the state would end up much worse off – if its actions simply prompted its neighbours to do the same.

Although it is clear that all states have a strong interest in the non-proliferation regime, however, it is equally clear – e.g. from the 2005 NPT Review Conference and from the number of states uncritically supporting Iran’s alleged “right” to develop proliferant technology – that not all national representatives appreciate this. One of the great foreign policy challenges is to refocus the minds of political leaders on the national security benefits of the NPT and the common interest in increasing the Treaty’s effectiveness.

The non-proliferation regime can survive – and it is in the vital national interest of all states that it do so – but maintaining the strength of the regime requires collective will and commitment to deal effectively with the challenges facing the regime, especially that presented by Iran.

2. The non-proliferation regime – a complex whole

The regime comprises complex inter-acting and mutually reinforcing elements. The centrepiece is the NPT, which gives political and legal expression to the non-proliferation norm. A key feature of the NPT is its verification mechanism, the IAEA safeguards system. As reflected in the adage “trust, but verify”, credible verification has a vital role in reinforcing the commitment of NPT Parties to the objectives of the Treaty. But the regime is much more than the NPT and IAEA safeguards. Other important elements include:

- nuclear export controls, particularly restraints on the supply of sensitive nuclear technology – including coordination through the Nuclear Suppliers Group (NSG);
- multilateral regimes such as the Comprehensive Test-Ban Treaty (CTBT)¹ and the proposed Fissile Material Cut-off Treaty (FMCT);
- various regional and bilateral regimes, including nuclear weapon free zones;
- a range of other security and arms control arrangements – such as the Missile Technology Control Regime (MTCR);
- national intelligence activities, and information-sharing between governments and with the IAEA;
- the Convention on the Physical Protection of Nuclear Material and other measures dealing with security of nuclear materials and facilities;
- programs to strengthen national regulation of nuclear materials and technology – including pursuant to Security Council Resolution 1540²;

1. Although the CTBT has yet to enter into force, much of the International Monitoring System required under the Treaty is already operational.

2. UNSCR 1540 requires all states to criminalise the proliferation of WMD, apply strict export controls on proliferation-sensitive technologies, and secure sensitive materials.

- coordination of national law enforcement activities – including through the Proliferation Security Initiative;
- the development of proliferation-resistant fuel cycle technologies; and, strongly linked to this ...
- the development of multilateral approaches to the nuclear fuel cycle.

Especially important are political **incentives and sanctions** in support of the non-proliferation norm – in other words, the preparedness of the international community, where necessary, to take action to uphold compliance with non-proliferation obligations.

3. Has the NPT been effective, and how?

In considering the present state of the non-proliferation regime and its future prospects, it is necessary to recall the context in which the NPT was developed. In the 1960s it was thought the proliferation of nuclear weapons was inevitable, and it was predicted there would be some 25 to 30 nuclear-armed states by the 1990s. Since the conclusion of the NPT in 1968, the Treaty has helped to establish conditions under which proliferation, while not stopped, has been substantially slowed. Today, in addition to the five nuclear-armed states that existed then – the US, Russia, the UK, France and China – there are only four states that have or are believed to have nuclear weapons: the three non-NPT parties – India, Israel and Pakistan – and the DPRK.

There have been five cases of non-compliance with NPT safeguards reported by the IAEA Board of Governors to the Security Council – Iraq (1991), Romania (1992), DPRK (1993 and again in 2003), Libya (2004) and Iran (2006). The cases of the DPRK and Iran remain ongoing.

On the other side of the ledger, major successes include South Africa's decision to dismantle its nuclear weapons and join the NPT, Argentina and Brazil joining the NPT, and the three newly independent states that had nuclear weapons on their territories at the dissolution of the Soviet Union – Belarus, Kazakhstan and Ukraine – deciding to join the NPT. As discussed below, Libya has also become a major success.

The NPT's success in slowing proliferation can be attributed to a combination of factors:

- the political commitment by most states to the objective of non-proliferation – most states recognise they cannot afford the monetary and political costs of a nuclear weapon program, and that, far from enhancing their security, possession of nuclear weapons would only increase the risks to their national security;
- the role of IAEA safeguards as an objective technical mechanism for verifying that non-proliferation commitments are being observed;
- the limited availability of weapons-grade fissile materials – these are not normally found in civil nuclear programs – and restrictions on the availability of the technologies needed to produce these materials (i.e. uranium enrichment and reprocessing).

A further factor is also very important here. With the near-universalisation of the NPT, the principle of non-proliferation is no longer based on the Treaty alone but has become established as an international norm. States should not expect that they can break this norm with impunity. The consequences could include a range of sanctions, both multilateral and national, and the isolation of the proliferator from normal international relations.

The wish to avoid international pariah status is a powerful incentive to remain within the non-proliferation regime. This can be illustrated by one of the regime's success stories, the

renouncing of weapons of mass destruction (WMD) by Libya. Libya intended to develop nuclear weapons, and bought a complete centrifuge enrichment installation, as well as a nuclear weapon design, on the black market. When this was discovered through intelligence activities, the Libyan leadership reached a momentous decision – that Libya’s best prospects for the future lay with economic development, made possible through wider engagement with the international community. Following negotiations with the US and UK, Libya renounced WMD, dismantled its clandestine nuclear program under IAEA supervision, and reaffirmed its commitment to the NPT.

4. Maintaining political support for the NPT

The lack of a substantive outcome from the 2005 NPT Review Conference, notwithstanding that proliferation is widely seen as one of the most serious issues in contemporary international affairs, is seen by many as a weakening of support for the Treaty. Perhaps this is more apparent than real, in the sense that the overwhelming majority of states remain committed to the NPT – only the DPRK has sought to withdraw. Iran is in breach of the Treaty, and Iranian representatives have threatened to withdraw, but most observers believe Iran is unlikely to take such a step, which would remove any semblance of legitimacy for its nuclear program.

The problem does not appear to one of deliberate policy, but rather a lack of an appropriate calculus sufficiently valuing the national security benefits of an effective non-proliferation regime. Too often there seems a disconnect between positions expressed in places such as NPT Review Conferences and the paramount national interest that every state has in maintaining a stable international strategic environment.

Many developing countries seem to regard proliferation as an issue more relevant to the security of the developed “North” – which therefore can be useful to the less-developed “South” as a negotiating point. For many countries the focus of their interest in the NPT now seems to be almost exclusively on its disarmament and peaceful use (i.e. technology acquisition) provisions. For these the non-proliferation core of the Treaty seems to have receded in importance. It is difficult to understand this perspective, since existing proliferation cases have emerged from the ranks of developing countries. In any event, the consequences of the wider spread of nuclear weapons will be just as serious, if not more so, for the countries of the “South” as for the “North” – not least through the negative effects that increasing security uncertainties will have on global trade and economic development.

It needs to be pointed out that the discussion about technology acquisition has been subverted by Iran, in an attempt to justify its development of proliferant technology. In fact the NPT has established the conditions necessary to support global nuclear trade. Over 30 countries have nuclear power programs, and this number is likely to increase significantly in the next decades. In all, 64 NNWS NPT Parties have significant nuclear activities. This wide-spread sharing of the benefits of nuclear energy would not be possible unless suppliers of nuclear technology and material were confident of not contributing to the risk of proliferation.

An important objective for NPT supporters should be to impress on governments generally the major benefits of the Treaty for all states, and to try to achieve a more considered approach by national representatives in international fora such as the IAEA, the UN and NPT Review Conferences.

5. Disarmament and the NPT “bargain”

The common description of the NPT is that it is a “two-way bargain” between the nuclear-weapon states (NWS) who commit to nuclear disarmament and the non-nuclear-weapon states (NNWS) who undertake not to seek nuclear weapons. This overlooks the deeper nature of the NPT as a **three-way** bargain – the commitment by the NNWS not to seek nuclear weapons is given not only to the NWS, but very importantly, to fellow NNWS. It is essential to the security of NNWS that they do not find themselves facing nuclear threats from other NNWS.

Regarding nuclear disarmament, critics of the NWS overlook two points. First, in fact the major NWS – the US and Russia – have substantially reduced the numbers of deployed strategic warheads from the 1991 level of 10,000 each, and are proceeding to levels of between 1,700 and 2,200 by 2012. There is more to be done, but it is not constructive to ignore that considerable progress has already been made.

Second, the disarmament commitment in the NPT (Article VI) places nuclear disarmament into the context of a commitment by **all** NPT Parties to work towards a treaty on general and complete disarmament under international control. Thus the NPT recognises the link between nuclear disarmament and other weapon types. Clearly there are limits to how far nuclear disarmament can proceed if there is a threat of proliferation of other WMD or, especially, a threat of further proliferation of nuclear weapons.

An effective nuclear non-proliferation regime is an essential condition for nuclear disarmament. Those who genuinely wish to encourage further disarmament should recognise this by providing strong support for the non-proliferation aspects of the Treaty.

6. The proposal for an Indian “exception”

The basis of concern that extending nuclear cooperation to India will undercut the NPT appears to be, that some NPT Parties may conclude they could withdraw from the NPT with impunity. The logic of this proposition is questionable. The policy of requiring full scope safeguards as a condition of nuclear supply was intended to encourage membership of the NPT. This policy has been very successful – now the NPT is near universal, and there are just three hold-outs: India, Israel and Pakistan. India has been consistent for some 40 years that it will not join the Treaty.

Now India needs to substantially increase electricity production, and the choice is whether this will be fuelled almost entirely by coal, or there will be a significant nuclear contribution. There are sound environmental reasons for allowing India access to modern and safe nuclear power technology. If this can be done in a way that brings India into the nuclear non-proliferation mainstream, extending safeguards coverage in India and promoting non-proliferation standards, this can only be considered beneficial.

There are a number of steps before the barriers to nuclear supplier to India may be relaxed: the conclusion of an India/US bilateral nuclear agreement; conclusion of an appropriate India/IAEA safeguards agreement and additional protocol; and agreement by the NSG membership to grant India an exception from the current full scope safeguards policy. Australia has welcomed the India/US political agreement, and is closely following these developments.

No NPT Party is going to withdraw from the Treaty because it objects to nuclear trade with India. Arguments about the “India exception” are a distraction from the real issue, how to deal with proliferation challenges from within the Treaty.

7. Importance of IAEA safeguards and the IAEA's decision-making processes

The NPT has two distinctive features:

- it provides for an intrusive verification system to confirm treaty compliance;
- the Treaty itself has no executive machinery – in particular it has no decision-making mechanism for determining compliance.

Both these functions are entrusted to the IAEA. Formally, IAEA Board of Governors decisions concern compliance with safeguards agreements, rather than the NPT as such, but non-compliance with a safeguards agreement constitutes non-compliance with a fundamental obligation under the NPT and hence with the Treaty itself. The IAEA and its processes thus bear directly on the effective operation of the NPT.

The IAEA's safeguards responsibility involves more than technical verification activities. The credibility of the safeguards system – whether the system meets international expectations – depends on confidence in two aspects: verification capability, and the outcomes resulting from verification findings. Predictability and consistency of safeguards decisions are essential.

A fundamental safeguards objective is to deter proliferation through the risk of detection. But technical detection competence will be of limited value – the deterrent effect will be ineffectual – if proliferators believe that the consequences of detection are low-risk. In cases of non-compliance, the international community must be prepared to take action to uphold compliance. The international community's ability to do so, however, depends on the effective operation of IAEA processes, in the Secretariat and the Board, in identifying and determining cases of non-compliance. Confidence in the security guarantees afforded by the NPT depends to a large extent on how well compliance problems are addressed.

The program to strengthen safeguards The traditional NPT safeguards system was primarily focused on verifying **declared** nuclear materials and activities. It was assumed that development of fuel cycle capabilities independent of declared facilities would be beyond the resources of most states, and in any event would be readily detectable, and therefore if proliferation did occur it was likely to involve diversion of nuclear material from declared facilities. The discoveries made about Iraq's clandestine enrichment program demonstrated that these assumptions were no longer valid.

The program to strengthen safeguards is focusing particularly on establishing the technical capabilities and legal authority necessary for detection of undeclared nuclear activities. Central to these efforts is the effective use of information – involving collection and analysis of information that can enhance the IAEA's knowledge and understanding of nuclear programs – and providing more extensive rights of access to nuclear and nuclear-related locations, including for the resolution of questions arising from information analysis.

Areas of safeguards development include:

- detection methods for undeclared activities – including environmental sampling and analysis, and satellite imagery;
- safeguards procedures – particularly greater use of unpredictability in inspections (e.g. through unannounced or short-notice inspections);
- the “state-level approach” – tailoring safeguards implementation to state-specific circumstances – moving from the uniformity of traditional safeguards, and basing safeguards intensity on information analysis and expert judgment taking account of all relevant circumstances.

Underpinning the program to strengthen safeguards is the additional protocol (AP) - a legal instrument complementary to safeguards agreements, which establishes the IAEA's rights to more extensive information and physical access. Of the 64 NNWS NPT Parties with significant nuclear activities, at the time of writing 45 have APs in force and 12 have signed APs or had APs approved by the Board – an uptake of almost 90% of such states.

The combination of a comprehensive safeguards agreement and an additional protocol now represents the contemporary standard for NPT safeguards. It is of serious concern however that seven NNWS NPT Parties with significant nuclear activities have yet to adopt the AP³ – in addition Iran, which was applying the AP on a “provisional” basis, has now “suspended” its cooperation under the AP.

The additional protocol is essential to the strengthening of IAEA safeguards. Promotion of universalisation of the AP should be a priority for all supporters of the non-proliferation regime. Australia has taken a number of actions in this regard, including making an AP a condition for the supply of Australian uranium to NNWS. Australia urges all nuclear suppliers to do likewise.

Undeclared nuclear activities and confidence in safeguards conclusions The IAEA has decades of experience verifying non-diversion from declared nuclear activities, and conclusions in this regard can be reached with a high degree of confidence. Conclusions on the absence of undeclared nuclear activities, on the other hand, are necessarily **qualitative**. Partly this reflects the need to develop more effective detection techniques, but even if these were available today, it is not possible with absolute certainty to prove a negative, i.e. the **absence** of undeclared activities. It is essential to avoid false assurance, to recognise there are limitations to the assurance that safeguards can deliver.

This situation raises two issues. First, a mechanistic and legalistic approach by states to the implementation of safeguards is not acceptable. Where safeguards conclusions are more qualitative, a state's cooperation and transparency to the IAEA assume greater importance. The Agency will need broader information, including access to locations of interest. Denying access will simply serve to heighten suspicions that the state has something to hide.

Second, IAEA safeguards may need to be complemented by confidence-building measures, particularly measures to enhance transparency amongst states. For example, confidence-building measures could have an important role in particular regions. Mechanisms could include collaborative nuclear projects, and bilateral or regional safeguards arrangements such as ABACC.⁴

The IAEA's decision-making processes Recent events have highlighted that safeguards credibility depends not only on technical capability but also on preparedness to take appropriate decisions in case of non-compliance. While non-compliance involves technical⁵ and political dimensions, it is essential to avoid conflating the two. The distinction between technical and political aspects is reflected in the IAEA Statute, which requires non-compliance findings, and questions that are within the competence of the Security Council, to be reported to the Security Council. This is a clear indication that political efforts to resolve non-compliance are matters for the Security Council, and where necessary government-to-government negotiations (such as the DPRK Six-Party Talks), rather than the IAEA.

3. Argentina, Brazil, DPRK, Egypt, Iraq, Syria and Venezuela.

4. Argentine-Brazilian Agency for Accounting and Control of Nuclear Materials.

5. “Technical” here is taken to include relevant legal aspects.

In the Iranian case, concern about the consequences of a non-compliance finding – e.g. whether Iran would cease all cooperation with IAEA safeguards inspectors, or even withdraw from the NPT, and whether in any event the Security Council could agree on a response – led to what amounted to plea-bargaining within the IAEA Board. There could be no doubt of Iran's non-compliance – Iran had committed a number of serious safeguards breaches over some 20 years – but the non-compliance finding was delayed while efforts were made to negotiate a satisfactory outcome with Iran.

If these negotiations had been successful, some Board members envisaged that the eventual non-compliance report to the Security Council would have been largely a formality, a matter of record. Others however envisaged that the non-compliance finding might have been waived altogether. It was even argued in some quarters that non-compliance ceased to be non-compliance with the passage of time – in effect, that a clandestine program becomes legitimate once it has been discovered and documented. This overlooked that even today there is no assurance that all of Iran's undeclared nuclear activities have been discovered.

Delaying the non-compliance finding may have seemed a pragmatic approach, but the delay – which extended for three years – emboldened Iran and ultimately exacerbated an already vexed situation. If a non-compliance finding had not been made in such a clear case as Iran's, the integrity and credibility of the IAEA's processes would have been seriously damaged. The Iranian case illustrates the dangers of mixing technical and political considerations in non-compliance decisions. It cannot be considered an appropriate precedent for the handling of a future case.

8. Controlling proliferation-sensitive technology

This issue goes to the heart of the non-proliferation regime. On the one hand, there is the right recognised in the NPT for all states to enjoy the benefits of nuclear energy. On the other, if the means to produce fissile material – enrichment and reprocessing – become widely available this will inevitably undermine the security benefits all enjoy from a strong non-proliferation regime.

This area illustrates how political objectives – non-proliferation, and the desire to share the benefits of nuclear energy – can be reinforced by developments in technology. Accordingly it is worthwhile spending some time discussing technological as well as institutional proposals.

Nuclear energy as such – the use of reactors to generate electricity – does not present a proliferation risk. It has long been recognised, however, that the spread of SNT (sensitive nuclear technology) would threaten non-proliferation objectives. When the NPT was negotiated it was envisaged that the NWS would provide enrichment and reprocessing services for the NNWS. In fact this has happened – US, Russian, French and UK entities are the leading suppliers of fuel cycle services, on a commercial basis, to the world's civil nuclear industry.

In terms of the NPT itself, the right to use nuclear energy is not unqualified, but is subject to the other provisions of the Treaty – including the commitment against seeking nuclear weapons and the commitment to place all nuclear material under IAEA safeguards. Ultimately, the NPT is a treaty on **non-proliferation**, not technology acquisition.

Here, it should be noted that concerns about SNT are not addressed simply by placing these activities under safeguards. Safeguards cannot provide assurance about the future intent of states. An enrichment or reprocessing facility under safeguards today could be used as the

basis for break-out from non-proliferation commitments in the future. An essential aspect of non-proliferation is minimising the risk of break-out occurring.

Since the NPT does not elaborate on the means of access to the benefits of nuclear energy, it is now apparent there is a need to develop an international framework to deal with the issues involved. These include:

- reducing the availability of SNT for misuse now or in the future;
- ensuring that states with nuclear power programs have a secure and reliable supply of fuel without any need to develop national enrichment or reprocessing capabilities;
- developing proliferation-resistant fuel cycle technologies.

Several proposals and initiatives to address these issues are currently under development. The main ideas are outlined as follows.

Reducing the availability of SNT Addressing the **supply** of SNT, in February 2004 President Bush proposed that the NSG should refuse transfers of SNT to any state not already possessing full-scale enrichment or reprocessing facilities. This proposal has not been taken up by the NSG.

Successive G-8 Summits⁶ have agreed that SNT would not be supplied to states that may seek to use them for weapons purposes, or allow them to fall into terrorist hands. The G-8 agreed that the export of such items should occur only pursuant to **criteria** consistent with global non-proliferation norms and to those states rigorously committed to these norms. These criteria are to be developed in the NSG.

The NSG has been discussing possible criteria for supply of SNT but has not yet reached agreement. Details are not publicly available, but possible criteria might include:

- the state's non-proliferation and safeguards record, including whether it has an additional protocol in place;
- whether there is a clear rationale for the proposed project in terms of energy requirements and economics;
- whether the project will be wholly national or involves others, e.g. through multination/regional arrangements;
- whether the project has any implications for international/regional security and stability.

Nuclear fuel supply assurances These address the **demand** for SNT, on the basis that states with fuel supply guarantees have no requirement to pursue SNT.

An early example was the nuclear supply policy of the Soviet Union. The USSR supplied power reactors and fuel to client states, with a life-time assurance of fuel supply and the take-back of spent fuel. These countries were given the benefits of nuclear energy without the problems of spent fuel disposal – and with no need to develop sensitive stages of the fuel cycle. This is also the basis on which Russia is building the Bushehr reactor in Iran – Russia has undertaken to supply all fuel and take back spent fuel. This approach is now receiving attention as a model for an expanded global nuclear industry.

Multilateral approaches to sensitive stages of the fuel cycle were proposed by the 1980 International Fuel Cycle Evaluation (INFCE) report. This idea has been recently revived by the IAEA – in February 2005 an international experts' report recommended greater transparency of nuclear supply arrangements and development of international supply

6. The Group of Eight comprises Canada, France, Germany, Italy, Japan, Russia, the UK and the US. The Summits referred to were 2004, 2005 and 2006.

guarantees. Further, it proposed that sensitive facilities be placed under multilateral control, including regional arrangements based on joint ownership, rights to product or co-management. The IAEA is currently developing the outlines of a “new framework” focusing, in the first instance, on assurances of supply of nuclear fuel for power reactors.

In June 2006, France, Germany, the Netherlands, Russia, the UK and the US proposed a “Concept for a Multilateral Mechanism for Reliable Access to Nuclear Fuel” (RANF). Their proposal focuses on assurances for reliable supply of enrichment services or enriched uranium for states not pursuing national enrichment or reprocessing projects.

In January 2006 President Putin proposed a global infrastructure that would give all countries equal access to nuclear energy, while stressing the need for full compliance with non-proliferation requirements. He outlined a proposal to create a system of international centres providing fuel cycle services, including enrichment, on a non-discriminatory basis and under IAEA monitoring. Russia is now proceeding with an international fuel cycle centre based on the Angarsk enrichment plant.

In his February 2004 statement President Bush called on nuclear suppliers to ensure that states renouncing enrichment and reprocessing would have reliable access to fuel for civil reactors. In September 2005 the US announced the establishment of a nuclear fuel reserve, to be available for states that forgo enrichment and reprocessing capabilities.

Global Nuclear Energy Partnership (GNEP) GNEP, the most comprehensive initiative dealing with these issues, was launched by the US in February 2006. GNEP combines policy and technical elements, including fuel supply assurances and the development of proliferation-resistant fuel cycle technologies.

The technological aspects of GNEP had been anticipated by Russia’s **BREST reactor** concept. This proposes the use of a fast neutron reactor, in conjunction with “dry” processing of spent fuel, to enable recycle of plutonium without separation, and to transmute minor actinides and fission products. This has both non-proliferation and waste management benefits – the period high level waste must be isolated from the environment will be substantially reduced.⁷

These ideas are now finding wider resonance in GNEP. On the institutional side, the key features of the GNEP initiative are as follows:

- “**fuel supplier nations**” – currently envisaged as the P-5 (i.e. the NWS) plus Japan – would undertake to supply “user nations” with reactors, and to supply nuclear fuel on a “cradle-to-grave” basis. This would include **spent fuel take-back** – users could return spent fuel to a fuel supplier, which would recycle the fuel and treat the eventual high level waste;
- “**user nations**” would be given assurances of supply for power reactors and fuel. GNEP envisages that users will operate mainly light water reactors (LWRs), will obtain low enriched uranium (LEU) fuel from a supplier nation, and return the spent fuel to a supplier nation. Thus user nations would not need to develop national

7. The BREST reactor concept incorporates a number of proliferation-resistant features, such as use of a “hot” fuel (plutonium mixed with fission products as well as minor actinides), high burnup (so at all times plutonium from the reactor has an isotopic composition unsuitable for weapons), absence of a breeding “blanket” (all plutonium production occurs in the core), and an equilibrium core (no excess neutrons for undeclared irradiations), in addition to the use of a spent fuel treatment – probably pyro-metallurgical processing – that avoids any separation of pure plutonium.

enrichment or reprocessing capabilities – and would be given a major incentive not to do so;

- fuel supplier nations would operate fast reactors and advanced spent fuel treatment facilities, in order to recycle plutonium and to transmute longer-lived radioactive materials.

Another aspect of GNEP is the development of small-to-medium reactors suitable for developing countries with small power grids. These reactors would be designed for long refuelling periods, possibly a life-time core. Refuelling would be carried out by the supplier, or the reactor might be replaced (“nuclear battery” concept). These ideas will be very familiar to Russian specialists, who have been working along similar lines.

GNEP is a long-term project, which has only recently been launched, so it can be expected to evolve considerably over time. Some of the GNEP technologies are already well established, others require major development. A time frame for the establishment of new fast reactor models, advanced spent fuel treatment, and remotely handled fuel fabrication as envisaged under GNEP may be around 20-25 years.

The principal difference with the BREST concept is that under GNEP as currently envisaged, fast reactors would be operated as “burners” to consume plutonium and minor actinides and transmute fission products, and these burner reactors will be operated by a limited group of countries (the “supplier nations”). The BREST concept is for fast reactors to be operated in a sustainable mode for optimum resource utilisation, and because the reactors and spent fuel treatment process are inherently proliferation-resistant they would be suitable for deployment in a number of countries.

Russian and US officials are discussing cooperation on GNEP issues. Over time the GNEP focus may well evolve from “burning” undesirable materials to the sustainability of uranium use.

9. Upholding non-proliferation – acting to encourage compliance

As mentioned in the introduction, the greatest challenge to the non-proliferation regime is the issue of how to deal with a determined proliferator. This issue is being put to the test with Iran. Iran is defying Security Council resolutions⁸ and proceeding with nuclear programs which at the least will give it a nuclear weapon capability. In addition to the uranium enrichment program, which has received extensive international attention, Iran is also constructing a large heavy water reactor, ideally suited as a plutonium production reactor.

Although Iran claims its nuclear programs are exclusively peaceful, the facts suggest otherwise. These include:

- Iran’s secrecy and long history of safeguards violations – Iran pursued undeclared nuclear activities for 20 years, and engaged in denial and deception towards the IAEA;
- lack of any convincing peaceful rationale for its nuclear programs – Russia has offered a lifetime guarantee of fuel for Bushehr and future reactors, and EU countries have made a similar offer. The Natanz enrichment plant will not meet its stated aim of self-sufficiency, when completed it would take around three years to provide sufficient fuel for one reactor core, and Iran’s known uranium reserves would be exhausted in 15 reactor/years;

8. UNSC Resolutions 1696 and 1737 of 2006 and 1747 of 2007.

- Iran's lack of full cooperation with the IAEA, including "suspension" of its additional protocol and parts of the subsidiary arrangements under its safeguards agreement – the IAEA is still not able to say that Iran has declared all of its nuclear activities;
- activities with possible weapons application, e.g. production of polonium-210 (used in nuclear weapon triggers) and possession of documents on producing uranium metal hemispheres;
- Iran's determination to continue with its programs in defiance of the Security Council and international concerns;
- finally, statements by Iran's President about the annihilation of Israel are hardly reassuring.

How the Iranian case is resolved will have a major impact on the future of the non-proliferation regime. If Iran succeeds in developing a break-out capability, or worse still nuclear weapons, the regime will be under considerable strain. A two-stage approach is needed: to persuade Iran that compliance is in its best interest, and to also reassure other states that, whatever the outcome with Iran, their best interest is in staying within the regime.

The DPRK case illustrates the political complexities of dealing with proliferation cases. Not only is it difficult to dissuade a state once it has decided on a nuclear weapons program, it is also difficult to achieve unanimity of purpose within the international community. It was a serious concern in the DPRK case that the Security Council was unable to reach agreement on how to deal with the case. This impasse led eventually to the Six Party Talks, which now appear to have reached the basis of a solution – but this has been a lengthy process and the eventual outcome remains uncertain.

In the period before the IAEA's non-compliance finding, the EU "Trio" – UK, Germany and France – offered Iran a number of incentives to suspend the enrichment and heavy water reactor projects. The Trio were subsequently joined by China, Russia, the US and the European Commission. The proposals now include provision of power reactors, part ownership of a Russian enrichment facility, and a 5-year buffer stock of enriched uranium under IAEA supervision. Also included are proposals for economic cooperation and technology transfers, including support for Iran's accession to the World Trade Organisation and the modernisation of Tehran's telecommunications infrastructure. The package also proposes promotion of dialogue and cooperation on regional security issues.

In addition to incentives, persuasion also requires sanctions. The Security Council has been able to agree on a progressive approach, starting with sanctions under Resolution 1737 that were focused on the nuclear and ballistic missile programs, but with the prospect of more broadly-based sanctions if necessary. Under UNSCR 1747 sanctions were extended to shipments of arms from Iranian territory and to defined arms sales to Iran. In addition, a wider range of financial sanctions were imposed.

There is a considerable sense of pessimism felt by many, that if a state is sufficiently determined and is unconcerned about international isolation, there is little the international community can do to prevent proliferation. This is especially the case with Iran which is a major oil and gas producer, where a number of states are reluctant to impose sanctions that will restrict their access to these products.

There is no doubt this situation is a major challenge for diplomacy. Convincing Iran that compliance with the non-proliferation regime is in its best interest is difficult when Iran was able to avoid detection of its clandestine nuclear activities for two decades. With this record, Iran is not likely to have confidence in the effectiveness of safeguards in other countries –

though it is noteworthy that Iran has suspended the application of its additional protocol, suggesting it is nervous about the efficacy of the IAEA's new safeguards methods. Not only will rigorous verification in Iran – “additional protocol plus” – have to be part of an agreed outcome, but if Iran is genuinely concerned about the potential for proliferant programs in neighbouring states, there may be a need to develop a regional confidence-building system to complement IAEA safeguards.

Ultimately, it is necessary to identify Iran's real interests and motivations, and to try to address these effectively. If Iran is genuinely concerned about its security, it has to be persuaded that its security interests are best served by building relationships and alliances, not by isolation and confrontation. Pursuing nuclear weapons is counter-productive, by becoming a nuclear threat to others Iran will only increase the dangers to itself.

If Iran's motivation is “prestige”, it has to be persuaded that power and influence are best based on economic strength. Iran has to choose between two futures – currently it is on the path to becoming a pariah state, isolated and, despite its petroleum resources, impoverished, with increasing unemployment and lack of opportunity for its people. Alternatively, through normalising its relations with the world, it could become the economic powerhouse of the Middle East. Faced with similar choices, the Libyan leadership showed true wisdom. The Iranian leadership should reflect on this example.

Action against withdrawal from the NPT One aspect of upholding compliance is the development of an appropriate international response to discourage withdrawal from the NPT. There has been only one case of withdrawal, the DPRK which announced its withdrawal in 2003. The validity of the DPRK's withdrawal, in terms of the NPT's provisions, has not been determined. Australia for one does not accept that the DPRK met the NPT's withdrawal provisions.

It cannot be acceptable for a state to misuse the NPT by acquiring nuclear technology and materials for peaceful purposes and then abrogating the Treaty. The implication of withdrawal from non-proliferation commitments is that the state intends to pursue nuclear weapons. That has to be viewed as a threat to international peace and security. Australia considers that any notice of withdrawal from the NPT should result in automatic consideration and action by the Security Council.

10. Conclusions

An effective non-proliferation regime is of fundamental importance to every state. Far from outliving its usefulness, the NPT – the centre-piece of the regime – is as important today as it ever has been, even more so given current proliferation challenges.

As has been discussed, the non-proliferation regime comprises not just the NPT but a number of interacting and mutually reinforcing elements. This complexity is a major strength – the regime is not dependent on one treaty, but has a capacity for evolution and innovation to address emerging problems through a wide range of actions. In particular, the GNEP initiative and related proposals, developing new technological and institutional approaches to the fuel cycle, present a major opportunity to revitalise the non-proliferation regime.

Arguably, it is as much by good fortune as by deliberate action that the world has survived the last 60 years without nuclear war. This does not allow governments to be complacent about the dangers of proliferation. Limiting the number of nuclear-armed states has been an important factor – the more states with nuclear weapons, the greater the chance of nuclear

war, whether by intention, miscalculation, mistake, or ineffective control. Proliferation threatens the vital national interests of all states, “North” and “South” alike.

The non-proliferation regime can – and must – continue its vital role, but this requires the unqualified support of all states. An essential aspect of this, critical to the future of the regime, is for the members of the Security Council to accept their responsibilities and take compliance action where this is required. In contrast to the DPRK case, to date in dealing with Iran’s nuclear programs the P-5 have been able to maintain unanimity. It is vital that this unanimity continues, and that the Security Council is prepared to do whatever more is necessary to deflect Iran from its present course. All responsible states must do what they can to support the Council’s efforts and to encourage Iran towards engagement, not isolation.

Some papers by the author on related topics:

Experience and Challenges in WMD Treaty Verification: a Comparative View, Verifying Treaty Compliance, ed R Avenhaus et al, Springer 2006.

Five Decades of Safeguards, and Directions for the Future: An Australian Perspective, forthcoming Journal of Nuclear Materials Management.

Defining the Safeguards Mission, IAEA Safeguards Symposium, Vienna, 16-20 October 2006.

Nuclear Weaponisation Activities: What is the Role of IAEA Safeguards?, Annual Meeting of the Institute of Nuclear Materials Management, Nashville, Tennessee, 16-20 July 2006.

Developing Principles for Determining Non-Compliance, non-paper of 25 November 2004 circulated to members of the IAEA Board of Governors.