

Energy and Global Security: Towards a Cooperative Approach
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Multilateral Approaches to the Nuclear Fuel Cycle: Maintaining the Balance

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1. The global nuclear nonproliferation regime based on the NPT is founded on a simple proposition: that a state legally committed to not acquiring nuclear weapons should have the right (though not necessarily the ability) to access all peaceful uses of nuclear energy without discrimination.

2. It has been understood from the 1940s onwards that a global disarmament or non-proliferation regime for nuclear energy cannot be constructed in such a simple political manner. The nature of nuclear energy and the manufacturing processes associated with it, in particular the dual-use civil / military nature of both nuclear reactors and enrichment plants, makes this impractical. A key issue since that decade has therefore been what assurance mechanisms should exist to create trust that nuclear fuel cycle activities were not being used to create materials for military explosive purposes, or how to balance free access to the peaceful benefits of nuclear energy against the measures and mechanisms necessary to ensure this was not misused for / diverted to military explosive purposes.

3. Initially, the belief was that this issue could best be addressed through UN or multinational ownership of all nuclear facilities, or at least international regulation of their activities. Power reactors with their need for uranium fuel, enriched or otherwise, did not start commissioning in any numbers until the mid to late 1960s. In the meantime, the US had initiated the practice of selling reactors overseas with restrictive conditions attached, including a right to inspect their operations. The USSR for its part was building reactors overseas but supplying the fuel and taking it back after use. Also, the IAEA had initiated a system of international safeguards for materials it had supplied to states. This was then expanded through the US decision to transfer its bilateral inspection arrangements to the Agency.

4. The NPT text agreed in 1968 was in many ways a compromise between the two political requirements of access and assurances. On the one hand, Article IV affirmed the inalienable right of all NPT non-nuclear weapon states to have access to nuclear energy technologies, conditional only on the twin political commitments of the nuclear weapon states not to transfer nuclear weapon to them or assist in manufacturing them and their commitments not to acquire them. On the other it made it mandatory for them to accept IAEA safeguards arrangements which at that stage had yet to be defined in any detail. Indeed it was not until the Final Document from the 2000 NPT Review Conference (Article IV and preambular paragraph 6 and 7 para.2) that IAEA safeguards became directly linked to the inalienable right to use nuclear energy for peaceful purposes.

5. In the early 1970s, the link between access and assurances became the subject of much diplomatic activity following the surge in the ordering of nuclear plant following the 1973 oil crisis. A second stimulus was that the IAEA / NPT

safeguards system had several weaknesses, largely as a consequence of the US focussing on the need to get the potential proliferators into the Treaty at the expense of a rigorous safeguards system. These two factors, plus the fear that complete nuclear fuel cycles of enrichment and reprocessing plants plus reactors would be exported to potential proliferators, generated perceptions that the NPT / IAEA combination offered insufficient assurances against diversion of fissile materials to military explosive uses. The consequence was the convening of the London Club (later the Nuclear Suppliers Group) of technology holders to tackle the issue from the supply end. It arrived at a private agreement that would deny transfers of enrichment and reprocessing technology to other states. In short, the inherent practical weaknesses of the NPT based political regime were to be overcome by the practical denial actions of a “coalition of the willing”.

6. This did not provide sufficient assurances for the US governments of the period, however. It sought to go further by example. They launched what was known in Europe, who saw itself as the prime target, as the war on Plutonium. Domestic legislation was introduced to close down work on fast breeder reactors, abandon reprocessing of civil fuel and pressurise those states with Agreements for Co-operation with them to do likewise. This led to the International Fuel Cycle Evaluation (INFCE) which lasted from 1977-9 and sought, but failed, to gain agreement on an “acceptable” proliferation resistant fuel cycle which would enhance assurances through a technical fix. By the early 1980s US and others concerns over this were reduced as the global drive for nuclear power faltered (certainly in Europe and the US), the export control arrangements appeared to have blocked further development of complete fuel cycle transfers. The focus on preventing other states having reprocessing capabilities then began to shift to concerns over enrichment capabilities.

7. Following the 1991 Gulf War, the political opportunity arose to enhance IAEA safeguards mechanisms, especially through the 1997 additional protocol. This made safeguards mechanisms more comprehensive and robust, but at the price of having two different types of safeguards commitments, as the protocol remains a voluntary measure. Meanwhile, the NSG arrangements, although strengthened after 1991, were being outflanked by clandestine procurement activities, and ultimately by the activities of A.Q.Khan’s “commercial” network seeking to supply enrichment technology stolen from UNRENCO to states such as Libya and Iran. Finally, a “nuclear renaissance” appeared on the horizon, at a time when an increasing proportion of the global nuclear industry was no longer state owned, and global control via national legislation was increasingly difficult to impose.

8. The response has been that states have returned in their policy debates over nuclear power and proliferation to the basic issues of the 1950s and 1960s by focussing on two key questions:

- Is there a technical way of fixing the proliferation problem while yet allowing unconstrained access to potentially dual use nuclear technology? and
- If this is impossible, is the only way forward to either persuade non-nuclear weapon states, and particularly developing ones, to accept voluntary constraints to access technology through agreement on new global supply arrangements, or impose them via national export controls.

9. Technical solutions appear possible, but their time scale and costs are difficult to assess and in the main they are only going to offer partial solutions. Integrated reprocessing and MOX fuel facilities appear feasible. New generations of reactor are in the pipeline through the international Generation IV reactor programme, but will take some decades to reach operational status. They are claimed to offer greater proliferation resistance through higher burn-up of fuel and thus lower ^{239}Pu content, as well as a once through cycle to geological disposition, rather than reprocessing of used fuel. Small pebble bed reactors may also be a proliferation resistant solution for states with no electricity grids. However, such solutions are lacking in the enrichment area, given the dual-use nature of centrifuge enrichment. Thus while technology can make proliferation more difficult, it can offer few guarantees.

10. Voluntary constraints are the other option. Negotiating some type of code of conduct arrangement will not be easy. The core political problem is that for states with no aspiration to nuclear power, the temptation will always be to regard this issue as purely political, rather than economic or technical, and therefore to view it from a legalistic or rights based perspective. The wording of the NPT text makes it very attractive to adopt this position, and to some extent it reflects practical reality as it is always going to be difficult to permanently deny technology to a state through export controls. The more attractive way forward is to offer states a package which combines voluntarism with proliferation resistance, and which discourages national programmes.

11. What is this middle way which balances access and assurances? The optimal solution would appear to be to agree that the global standard for nuclear power production arrangements should be combine multilateral ownership and regulation of enrichment and fuel fabrication facilities to assure fuel supply; competitive supply of reactors through multinational commercial consortia; and repatriation of fuel to supplier states. These arrangements would have to be demonstrated to be much more economical in capital cost and operation than investing in a vertically integrated national industry, in order that Treasuries and Ministers of Finance could act as non-proliferation barriers. Moreover, if this concept was accepted, those who refused to utilise it would be automatically suspect as potential proliferators.

12. This type of approach also appears to be the basis for the US led GNEP concept, except that there security of fuel supply is to be guaranteed by competition between rival national entities.

13. Would this balanced, middle way between access and assurances work? Who knows, but it is interesting to note that the United Kingdom, the state which first implemented a national nuclear civil fuel and an integrated national industry has now abandoned and dismantled this and seems likely to be leading the move towards this potential international standard by purchasing both fuel and reactors from external vendors and closing down its reprocessing plants.