

Multilateral Nuclear Approaches: Do they provide a credible solution to non-proliferation challenges posed by the expected global expansion of the nuclear power sector?

Abordagens Nucleares Multilaterais: Será que elas provêm uma solução credível aos desafios de não-proliferação atômica devidos à expansão do setor de energia nuclear?

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The former Director-General of the International Atomic Energy Agency – Mohamed ElBaradei – once stated that the dissemination of sensitive parts of the nuclear fuel cycle is the *Achilles' heel* of the nuclear non-proliferation regime.¹ The vulnerability of the regime lies on the fine line between nuclear power plants and nuclear weapons. Both use the same raw materials. The fuel cycle behind peaceful uses can be diverted to feed military purposes.² At each stage of the cycle (otherwise, the production of fresh fuel, uranium enrichment, plutonium reprocessing and the ultimate disposal of nuclear waste) there is a breach where fissile material used for electricity can be diverted to build a warhead. This is behind the ambiguity between peaceful and military ends, where a “commercial fuel-making facility represents a latent nuclear bomb”.³ Therefore, the *Achilles' heel* of non-proliferation is the *dual-use* of nuclear materials. The dilemma is to maintain effective oversight over global fuel-cycles, whilst recognizing the right of countries to develop their own nuclear capacity.

Such oversight has been challenging already, but its prospects for the future might reserve even more daunting results. Considering the expected global

expansion of the nuclear power sector in the next few decades, the vulnerability of the non-proliferation regime tends to be more exposed. Safeguards and export control mechanisms are currently strained and have proven to have limited effectiveness against clandestine programmes – as the cases of North Korea, Iran and Libya demonstrate. Even more rigorous inspections established by IAEA's Additional Protocol face logistical constraints. Besides, the Protocol itself was ratified in less than half of IAEA member-States and still fails to be a strong international instrument.⁴ Hence, as Deutch argues, “there is the widespread concern that, even with such measures, proliferation risks will not be reduced to acceptable levels in face of substantial global growth in nuclear fuel-cycle deployment”.⁵

In order to strengthen the non-proliferation regime, there are renewed calls for establishing additional mechanisms such as *Multilateral Nuclear Approaches* (MNAs). Its concept involves multinational arrangements to control centres for the enrichment and reprocessing of nuclear fuel.⁶ In practice, MNAs can offer a variety of alternatives, ranging from multilateral assurances of fuel supply, joint owner-

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1 IAEA, 2005, p.17

2 Wolfsthal, 2004a, p.2

3 Ferguson, 2007, p.16

4 ‘Status of Additional Protocols’, http://www.iaea.org/OurWork/SV/Safeguards/sg_protocol.html, 07 Apr.2009.

5 Deutch et al., 2005, p.68

6 Wilson, 1979, p.252

ship of nuclear facilities, as well as comprehensive arrangements dividing global suppliers and costumers of nuclear fuel.⁷ However, despite the existence of concrete multinational arrangements so far, they face critical limitations to meet non-proliferation challenges. The current expansion of the nuclear power sector further strains the effectiveness of MNAs, and thus, their own credibility.

This article maintains that these limitations are particularly true regarding *comprehensive* MNAs – such as establishing closed groups of nuclear suppliers and proposals for fuel leasing (or ‘cradle-to-grave’ arrangements). By contrasting their benefits and limitations, this article concludes that comprehensive MNAs have restricted feasibility, thus lacking the necessary effectiveness against the risks associated with the global expansion of nuclear power. Instead, simpler, regional, multilayered and non-discriminatory arrangements could offer a more credible non-proliferation recourse in addition to existing mechanisms. This discussion proceeds in three parts. First, this article identifies the main proliferation risks associated with the expansion of the nuclear energy market. Second, comprehensive MNAs are assessed in light of their benefits and limitations to curb proliferation risks. And finally, the third part concludes on the lack of credibility of comprehensive MNAs vis-à-vis the non-proliferation regime and the global expansion of nuclear power.

Nuclear Energy Expansion: What are the challenges?

This decade has been witnessing a rebirth of nuclear energy. After the late 1970s, there was a sharp drop in the commissioning of nuclear power plants

(NPPs) as a negative response towards the accidents at Three Mile Island and Chernobyl. The political blow against nuclear energy influenced the U.S. not to order any new reactor for almost three decades since the late 1970s⁸. With the exception of France, Western Europe turned its back on nuclear power – most notably Italy, Sweden and Germany.⁹ Hence, it is not surprising to find that “about three quarters of all reactors in operation today are over 20 years old”.¹⁰ As of the end of 2007, “439 nuclear reactors were operating in 30 countries, corresponding to 14% of the global electricity generation”.¹¹ Nevertheless, according to the IAEA, at least 44 new NPPs are under construction, 64 have been commissioned and 158 have been proposed to meet long-term energy demands.¹² These numbers, even if in high projections, show a reversal of the downward trend of NPP commissioning.

Besides the growth in the number of reactors, more countries are adopting nuclear energy capability for the first time. New NPPs were announced in Turkey, Indonesia, Vietnam,¹³ and over 43 countries have formally expressed their interest to participate in IAEA technical cooperation projects for the introduction of nuclear power.¹⁴ Moreover, several other countries – including Argentina, Australia, Brazil, South Africa and Ukraine – are advancing their indigenous enrichment capability as a way to master the nuclear fuel-cycle in a commercial scale.¹⁵

Some explanations are offered to understand the possible drivers behind the expansion of the nuclear power sector and how such expansion could either favour or hinder multilateral nuclear approaches. Grimston suggests that any energy supply must meet at least four criteria: *security and reliability; low costs; manageable environmental impact; and social and*

7 AIEA, 2005, p.37

8 Braun, 2006, p.630

9 Grimston, 2005, p.13

10 IAEA, 2008, p.9

11 Id., p.1

12 IAEA, PRIS Database.

13 Braun, op.cit, p.631

14 IAEA, 2008, p.21

15 Ferguson, 2007, p.23

political acceptability. Compared to other sources, nuclear energy hardly managed to meet those criteria in the last decades of the 20th century. As mentioned before, two nuclear accidents affected social and political acceptability of NPPs, besides the popular perception on their environmental damage. In terms of costs, fossil fuels (particularly oil and natural gas) were more competitive due to low prices and to the discovery of new reserves. Therefore, in terms of *energy security*, the world of the 1990s faced a period of comfort even in face of a declining share of nuclear power in the global energy mix.¹⁶

The upsurge of nuclear power in the later years could be explained by how such variables have changed in light of Grimston's criteria. In terms of environmental impact, popular perception has focused more on global warming. Ironically, nuclear power has emerged as the apparent *solution* to the burning of fossil fuels, thus giving an alternative to countries – such as Canada – to meet carbon emission targets under the Kyoto Protocol.¹⁷ Moreover, relative costs and reliability of NPPs have changed. The volatility of oil and gas prices in the later years contributed to a degree of uncertainty. Dependency on Middle-Eastern and Russian reserves has proven to be politically costly and unreliable. Renewable sources, on their turn, have not managed to keep up with growing energy demands. Wind farming is intermittent and is facing declining cost-effectiveness and investment – as revealed by the withdrawal of Royal Dutch Shell and E.ON from major projects on the grounds of low profitability. These examples are some of the factors prompting nuclear energy to regain the centre of global energy security in the 21st century.

In contrast, it is true that there are counterarguments downsizing such *nuclear panacea*. Uranium

prices have shown volatility as well (as much as 1,350% between 2000 and 2007).¹⁸ Costs of key construction materials in nuclear reactors have risen considerably.¹⁹ The economic recession in the next years, although temporary, could have medium-term effects on commissioning new reactors. Nevertheless, the magnitude of new NPP commissioning – as expressed before – suggests the maintenance of the upward trend, even if in lower projections.

Hence, higher demands for nuclear reactors, nuclear fuel and human expertise in such field provide an extra strain on non-proliferation concerns. Squassoni suggests that the “expansion of nuclear power could have cascading effects on the nuclear non-proliferation regime (...); on the practical side, additional facilities will mean additional safeguards by IAEA inspectors”.²⁰ As Ferguson maintains, the IAEA is already “strapped for funds to pay for inspectors and near-real-time surveillance capabilities for all the current nuclear facilities”.²¹ Therefore, “as nuclear energy demand rises, the budget of the IAEA would have to match the rise to increase the probability of detecting diversion of weapons-usable nuclear materials.”²² An overstretched IAEA has called for alternative mechanisms to limit the processing of weapon-usable material “by agreeing to restrict these operations exclusively to facilities under multinational control”.²³ Nevertheless, the feasibility of MNAs – particularly those preaching a global division of fuel-cycle countries *versus* non-fuel-cycle countries – might prove to be limited to curb proliferation risks.

Comprehensive MNAs: are they credible at all?

In order to succeed, any multilateral arrangement in the nuclear domain has to reach equilibrium

16 Grimston, 2005, p.14

17 Deutch et al, 2005, p.66

18 Ux Consulting Company, <http://www.uxc.com/>, 7 Apr.2009

19 IAEA, 2008, p.29

20 Squassoni, 2007, p.6

21 Ferguson, 2007, p.18

22 Ibidem.

23 ElBaradei, *The Economist*, 16 Oct.2003

between *Assurance of Supply* and *Assurance of Non-Proliferation*.²⁴ On one hand, costumers must be assured that nuclear fuel will be available and reliable, without being disrupted on economical or – mainly – on political grounds. This is particularly relevant in terms of *energy security*, as countries must be assured that long-term domestic demands for electricity will be met. On the other hand, suppliers and the IAEA must be assured that peaceful uses of nuclear energy are not diverted to military purposes.

Safeguards and export controls have been some of the viable non-proliferation mechanisms so far. However, although they can reduce risks and slow-down the transfer of technology, those tools “cannot prevent a state building-up the competence to design and construct its own facilities.”²⁵ Furthermore, as Wolfsthal argues, inspectors cannot be everywhere at every time and “even under the safeguards, the possession of large stocks of highly enriched uranium and separated plutonium is permitted under the NPT.”²⁶ Agreeing with those critiques, a case can be made that safeguards and export controls are not enough.

At first sight, MNAs could be an additional non-proliferation mechanism in order to fill in the breaches and flaws of safeguards and export controls. By putting the nuclear fuel-cycle under international/multinational control, the non-proliferation regime could enjoy several benefits. As the number of national sites is reduced in favour of multinational facilities or multilateral arrangements, more frequent inspections are possible; overall security is raised; environmental procedures can be enhanced; cost-benefit is increased due to new economies of scale. More importantly, MNAs are confidence-building measures that override the polemic issuing from domestic fuel-cycle capacities.

Based on these apparent benefits, comprehensive MNAs have been suggested in order to curb proliferation risks. This is the case of the *Global Nuclear Energy Partnership* (GNEP) and the closed group of nuclear suppliers, otherwise known as the *Six-State Assurance of Supply* (involving the U.S., France, Germany, Russia, UK, and the Netherlands). The first MNA is a multilateral arrangement for fuel leasing, where suppliers provide nuclear fuel and are responsible to buy it back for disposal or reprocessing. In fact, the GNEP offers a front-end and back-end outsourcing of the fuel-cycle on behalf of non-fuel-cycle countries.²⁷ The second MNA involves the multilateral assurance from a closed group of six states, where a constant fuel supply is assured by at least one of the parties.²⁸ From the point of view of suppliers, these mechanisms would ensure that no sensitive technology is transferred, thus avoiding the *dual-use* of fissile materials and improving the non-proliferation regime. However, from the point of view of costumers, there is a *catch*: the condition of both comprehensive MNAs is that costumers promise not to develop any indigenous fuel-cycle capacity and to buy nuclear fuel exclusively from such suppliers. As Squassoni cleverly mentions, “the devil is in the details”.²⁹ Costumer countries have discounted such mechanisms “as the ‘haves’ still trying to block out the ‘have nots’”.³⁰ Arguably, such MNAs are in line with the traditional vision of technology denial. Also, there are increasing concerns of legitimizing a “nuclear cartel”³¹ using non-proliferation as pretext under an eye-catching multilateral umbrella.

A case can be made that comprehensive MNAs struggle to be viable because of the “increasing unwillingness of many non-nuclear-weapon states to accept additional restrictions to their right to peaceful nuclear technology under the NPT.”³² Article IV guarantees the

24 See IAEA, 2005, pp.13-14

25 Wilson, 1979, p.252

26 Wolfsthal, 2004a, p.2

27 Lindemeyer, 2009, p.80

28 Decker & Michel-Kerjan, 2007, p.30

29 Squassoni, 2007, p.5

30 Decker & Michel-Kerjan, 2007, p.30

31 Meier, 2006, p.43

32 Rauf & Simpson, 2004, p.4

inalienable right of countries to the production and use of nuclear energy for peaceful purpose, including the possibility of having a domestic fuel-cycle capacity under IAEA safeguards. Despite recent attempts to reinterpret the practical extent of such rights, the fact is that Article IV “was specifically crafted to preclude any attempt to reinterpret the NPT so as to inhibit a country’s right to peaceful nuclear technologies, as long as the technology is not used for nuclear weapons.”³³ Therefore, several countries feel that MNAs as such could lead to loss of sovereignty, fuel dependency and increasing technological asymmetry in the nuclear industry. These factors threaten the calculations made by costumer countries regarding their *own* energy security in the long-run. Growing energy demands and environmental issues can pressure countries further to defend their sovereign right to develop an indigenous fuel-cycle capacity. Therefore, as Rauf and Simpson put it, “countries with differing levels of technology, institutionalization, political relationships, economic development resources, or requirements might find multilateral approaches *inconvenient, unfeasible, restrictive, or simply not beneficial*”.³⁴

In line with Rauf and Simpson, Decker also suggests that some countries might decide not to be involved in multinational arrangements. Rather, they would prefer to develop a capacity on their own soil for the following reasons:³⁵ (a) a full fuel-cycle offers stability of supply; (b) an enrichment facility can provide commercial scale, placing the country amongst international nuclear fuel suppliers; and (c) a local enrichment capacity provides a perception of national prestige and regional power. Although Braun and May claim that multilateral arrangements restore the true intent of Article IV,³⁶ their misperception lies on the fact that ‘cradle-to-grave’ MNAs can mask

a discriminatory approach. Closed supplier groups can, on their turn, be perceived as ‘nuclear mercantilism’ when trying to secure foreign demand to the outputs of companies such as Areva, Atomprom or General Electric.³⁷ It is not surprising, therefore, to find that “all proposals to establish fuel reserves or other mechanisms emerged from current or potential nuclear fuel suppliers”.³⁸ By preventing new countries to *develop, research, and produce* nuclear fuel for peaceful purposes, ‘cradle-to-grave’ and closed supplier group arrangements may inhibit costumer countries to join in. The lack of substantial adherence to multilateral “partnerships” as such may threaten the long-term credibility of MNAs as effective non-proliferation mechanisms.

Credible MNAs: Limited, Regional and Non-discriminatory

Ferguson stresses that economics is as a major factor behind the growth of nuclear energy (“nuclear energy is a business, not a religion”³⁹). If economics is indeed the primary driver, some MNAs may help the expansion of the nuclear sector by offering attractive comparative advantages and economies of scale. This is probably why there are already examples of MNAs with limited scope. According to the IAEA, Baltic States are seeking a regional enrichment project based in Lithuania.⁴⁰ A similar approach is being considered by member countries of the ‘Cooperation Council for the Arab States of the Gulf’.⁴¹ Argentina and Brazil also plan to deepen cooperation towards a joint facility. URENCO and EURODIF consortiums, on their turn, are concrete MNAs that enjoyed relative success before declining in the face of economic vulnerabilities. These examples seem to share a common

33 Ibidem.

34 Rauf & Simpson, 2004, p.4 (*my italics*)

35 Decker & Michel-Kerjan, 2007, p.8

36 Braun & May, 2006, p.70

37 Decker & Michel-Kerjan, op.cit., p.34

38 Meier, 2006, p.43

39 Ferguson, 2007, p.6

40 IAEA, 2008, p.22

41 IAEA, 2008, p.22

denominator: economics, *not* non-proliferation. The perception of mutual economic and technological benefits in the fuel-cycle might be more attractive than non-proliferation arrangements that insist in the “division of the world into two classes: fuel supplier states and fuel client states”.⁴² As the IAEA itself has put it, a “multinational fuel-cycle strategy, just like a national one, must rest on a solid economic justification in order to be successful”.⁴³ Therefore, discriminatory arrangements with limited economic benefits and based on technology denial have struggled to prosper. The lack of attractiveness and feasibility from the start undermine the credibility of comprehensive MNAs as non-proliferation tools.

The GNEP and the *Six-State Assurance of Supply* are failing to gain acceptance and weight. According to Lindemeyer, the nuclear industry has led tepid support to GNEP, concluding that “the initiative is not a credible strategy for resolving either the radioactive waste or proliferation problem”.⁴⁴ Furthermore, it is not clear whether the Obama Administration will maintain the GNEP and under what terms. Moreover, the initiative suffered substantial drawbacks regarding the capacity of the main nuclear powers to be involved in the back-end of the fuel-cycle (reprocessing, storage and disposal). These include the delay in the activation of the U.S. nuclear repository in Yucca Mountain, besides Russia’s recent decision of no longer importing spent nuclear fuel for storage and ultimate disposal.⁴⁵ Without a concrete back-end capacity, ‘cradle-to-grave’ MNAs simply fall apart as non-proliferation tools. Concerning the *Six-State Assurance of Supply*, its cartel-like structure faces resistance from countries that invested massively in their own fuel-cycle capacity for either domestic needs or international commercial exports.⁴⁶

Therefore, the bargain between assurances of supply versus restraints in the use of sensitive technology has low probability to work as a global

non-proliferation Multilateral Nuclear Approach. The growing thirst for energy, public perceptions on global warming, desires for technological independency, as well as national prestige, are all factors behind the expansion of NPPs and domestic enrichment capacities. Despite calls from ElBaradei and major supplier countries, comprehensive MNAs lacking feasibility will not shield the *Achilles’ heel* of non-proliferation. Instead, limited, regional, multilayered and non-discriminatory multilateral arrangements might be the option ahead. They can be more economically attractive whilst minimizing the number of world-wide fuel-cycle facilities and improving the non-proliferation regime. Although such *limited* MNAs are not primarily designed as non-proliferation tools, they could add one more layer to the non-proliferation regime by minimizing some of the challenges posed by the growing nuclear energy market in the 21st century.

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42 Ferguson, 2007, p.23

43 IAEA, 2005, p.49

44 Lindemeyer, 2009, p.81

45 Braun, 2006, p.633

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Resumo: Apelos por ‘abordagens multilaterais ao ciclo do combustível nuclear’ (AMNs) têm sido cogitados devido ao crescente risco da expansão do setor de energia nuclear em contraponto ao regime internacional de não-proliferação. No entanto, AMNs baseadas em acordos globais carecem de viabilidade ao propor a divisão do mundo entre fornecedores e clientes de combustível nuclear. A sede crescente por segurança energética, além da necessidade de independência tecnológica e acesso soberano aos mercados internacionais de combustível nuclear são alguns dos fatores que prejudicam a credibilidade das AMNs como ferramentas de não-proliferação.

Abstract: Calls for Multilateral Nuclear Approaches (MNAs) have been raised due to growing risks that the expansion of the nuclear power sector poses to a strained international non-proliferation regime. However, MNAs based on comprehensive arrangements lacks feasibility when proposing to divide the world into nuclear fuel suppliers and fuel clients. The

growing thirst for energy security, besides the need for technological independency and sovereign access to international nuclear fuel markets are some of the factors undermining the credibility of MNAs as non-proliferation tools.

Palavras-chave: não-proliferação nuclear; regimes internacionais; abordagens nucleares multilaterais

Key words: nuclear non-proliferation; international regimes; multilateral nuclear approaches

