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THE NPT REVIEW PROCESS AND STRENGTHENING THE TREATY: PEACEFUL USES

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I. INTRODUCTION

According to the International Atomic Energy Agency (IAEA), by the end of 2011 a total of 435 nuclear power reactors were in operation worldwide. These reactors were operating in 31 different countries and had an aggregate net capacity of approximately 370 gigawatts electric (GW(e)). The IAEA estimates that this capacity will increase to at least 510 GW(e) in the next two decades. This would represent an increase of 40 per cent with respect to the current nuclear energy supply and would require the addition of more than a hundred large nuclear power reactors to the existing global nuclear reactor fleet.[1]

Most of these new reactors will be connected to the electricity grid in established nuclear energy countries such as China, India, Russia or the Republic of Korea (ROK, or South Korea). Some additional reactors will go online in emerging nuclear energy countries such as Argentina, Brazil, Iran and South Africa; but a substantial number of reactors are also planned for nuclear newcomers, most of them situated in South East Asia and in the Middle East and North Africa (MENA) region.

This expected growth of nuclear power poses a number of challenges to the three dimensions of nuclear security: (*a*) the physical security of nuclear installations and materials, (*b*) the safety of nuclear plants and (*c*) the non-proliferation regime. These challenges affect established, emerging and aspiring nuclear energy countries alike, but are particularly demanding for countries struggling with precarious

[1] These figures represent a conservative estimate of the 'nuclear renaissance', since the IAEA's 'high' projection foresees an increase in nuclear power of 120 percent by 2030. The OECD Nuclear Energy Agency provides similar figures in its recent 'low' and 'high' projections for the future of nuclear power.

SUMMARY

The peaceful use of nuclear energy, although at first glance a rather technical subject, is becoming an increasingly contested issue within the Non-Proliferation Treaty (NPT) context. This politicization can be traced back to a number of recent developments in the discourse on peaceful uses of nuclear energy. First, the growing interest of a number of countries in establishing domestic nuclear energy programmes has been met with scepticism in certain circles of the industrialized world. Second, and not surprisingly, these doubts have led to a new discussion on the correct interpretation of NPT Article IV on peaceful uses of nuclear energy; with one camp devoted to restricting the unfettered access to nuclear technologies and the other camp defending their inalienable rights to peaceful uses of nuclear energy.

This debate on nuclear energy cannot be reduced to a mere North–South divide, but cuts across established nuclear energy countries as well. With a changing nuclear energy map, some of these divisions are likely to increase unless a new consensus on Article IV is reached.

This paper discusses the current controversies over peaceful uses of nuclear energy and sketches some policy options that may bridge these divisions.

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security situations, fragile statehoods or domestic violence.

With the diffusion and growth of nuclear power, a number of states might also strive for domestic nuclear fuel-making capabilities, that is to master uranium enrichment and spent fuel reprocessing. Currently these technologies are used on a large scale only by a very limited number of advanced nuclear energy states (France, Germany, the Netherlands, Russia, the United Kingdom and the United States), which supply nuclear fuel to the rest of the world. Legitimate as the demand for domestic nuclear fuel production might be under economic and strategic (energy-security) points of view, from a non-proliferation standpoint they represent a fivefold challenge.[2] First, nationally owned enrichment and reprocessing (ENR) facilities give states a rapid breakout capability and allow the development of nuclear weapons in a short time frame. Second, safeguards applied to large reprocessing plants leave substantial uncertainty margins in the material balances. Third, clandestine enrichment plants have limited physical signatures and are therefore difficult to detect. Fourth, the spread of ENR plants might induce some non-nuclear weapon states to build standby capabilities of their own and thus engage in a virtual arms race. Fifth, ENR plants produce enriched uranium and separated plutonium; both products might become targets for terrorists, especially if the materials are in a direct-use form, that is if the uranium is highly enriched and the plutonium is not too contaminated by its most radioactive isotopes.

This paper discusses which options policymakers should explore to control the spread of nuclear fuel-making technologies without jeopardizing the 'grand bargain' enshrined in the NPT, which promises both access to peaceful nuclear technology to all its member states and the strict non-proliferation of nuclear weapons.

II. A CHANGING NUCLEAR ENERGY MAP

The total number of commercial nuclear power reactors has been relatively stable over the last two decades and short-term trends indicate a slight decline in the global nuclear energy supply for the coming years. However, indications of a medium-term 'nuclear renaissance' have been growing stronger over the last few years.[3] The drivers of this possible renaissance are manifold and range from an increase in the overall electricity demand to considerations of energy security and climate change.[4] Although there are valid arguments for questioning the credibility of a nuclear energy revival—economic constraints, human resources shortages, infrastructure deficits and regulatory deficiencies in a number of countries—the current declaratory policy of a growing number of developing countries is clearly geared towards including nuclear power as (one of) their major electricity supplies.[5]

The majority of the new nuclear power reactors will go online in already established nuclear energy countries (first and foremost in China, India, Russia and South Korea), but the nuclear energy club is likely to add a number of new entrants in the next decade. Most of these new entries will be developing countries. Among these newcomers, the most credible nuclear energy plans are being put forward by Algeria, Egypt, Indonesia, Jordan, Saudi Arabia, Turkey, the United Arab Emirates (UAE) and Vietnam.[6] They could join other countries from the Non-Aligned Movement (NAM) such as Argentina, Brazil, Iran or South Africa, who are already part of the nuclear energy club and who are aiming to develop domestic capabilities in the civilian nuclear fuel cycle in order to establish full-fledged national nuclear industries.

[2] For details see McGoldrick, F., *Limiting Transfers of Enrichment and Reprocessing Technology: Issues, Constraints, Options*, (Harvard Kennedy School, Belfer Center for Science and International Affairs: Cambridge, MA, May 2011), p. 1.

[3] Von Hippel, F. (ed.), *The Uncertain Future of Nuclear Energy* (The International Panel on Fissile Materials: Princeton NJ, 2010).

[4] World Energy Council, *Deciding the Future: Energy Policy Scenarios to 2050* (World Energy Council: London, 2007); Blix, H., *Geopolitical and Strategic Aspects of Present and Future Use of Nuclear Energy*, Lecture, Varenna, Italy, 12 Sep. 2011, <http://nsspi.tamu.edu/media/1274840/blix-15-sept-varenna.pdf>; and Goldston, R. J., 'Climate Change, Nuclear Power, and Nuclear Proliferation: Magnitude Matters', *Science & Global Security*, vol. 19, no. 2, 2011.

[5] Findlay, T., *Nuclear Energy and Global Governance: Ensuring safety, security and non-proliferation*, (Routledge: London, 2011), pp. 33–64. A number of nuclear aspirants also suffer from water shortages, especially in the Middle East. For these countries nuclear power is expected to provide both a reliable source of base load electricity and fresh water (through desalination of seawater). Franceschini, G. and Müller, D., 'Peaceful uses of nuclear energy in the Middle East: multilateral approaches', EU Non-Proliferation Consortium Background Paper presented at an EU seminar on the Middle East, Brussels, 6-7 July 2011, <http://www.nonproliferation.eu/documents/backgroundpapers/franceschini.pdf>.

[6] Findlay (note 5), pp. 92–99. Other developing countries that showed interest in nuclear electricity generation include: Bangladesh, Chile, Ecuador, Ghana, Libya, Morocco, Nigeria, Oman, the Philippines, Qatar, Thailand, Tunisia and Venezuela. Hibbs, M., *The Future of the Nuclear Suppliers Group*, Carnegie Report (Carnegie Endowment for International Peace: Washington, DC, Dec. 2011).

The general trend thus shows a slow decline in nuclear energy in the Organisation for Economic Co-operation and Development (OECD) world coupled with a renewed interest in nuclear energy by a growing number of non-Western countries (with Brazil, Russia, India, China (BRIC) and South Korea leading the field). Since nuclear power programmes have relatively long lead times, it can be expected that the overall nuclear reactor number will decrease slightly in the next decade—a dynamic mostly dictated by the nuclear energy stagnation in the OECD world—and that from 2020 this trend will be reversed.[7]

The nuclear energy map of the 21st century will then be characterized by a major shift in nuclear industry activities from the Global North to the Global South: the North will have few new-build reactors and nuclear power phase-out in some countries; the South will have more nuclear power-using countries and new suppliers of nuclear technology from emerging countries (BRIC, South Africa and South Korea). These trends will unfold in an increasingly globalized nuclear market, 'featuring complex transactions, electronic technology transfers, and greater participation by brokers and other intermediaries'.[8] In such a market, a typical power plant in China will be a transnational joint venture bringing together Chinese companies, which will build the plant using US (e.g. Westinghouse) technology owned by a Japanese company (e.g. Toshiba).

Hence, the number of stakeholders in nuclear trade will increase and will include a growing number of national, international, transnational and private actors. This change is already visible in the Nuclear Suppliers Group (NSG), which started with seven advanced and like-minded states in 1978 and now has a membership of 46 states. This figure is expected to increase further in the coming years with a number of developing countries being shortlisted to join the NSG.[9] Countries from the South will therefore play a larger role in the nuclear governance of the 21st century, both through the NSG, the NPT and their private industries.

III. NUCLEAR ENERGY AND THE NPT

The mainstream interpretation of the Non-Proliferation Treaty (NPT) describes it as a bargain between nuclear weapon states (NWS) and non-nuclear weapon states (NNWS) around three major provisions: (*a*) the prohibition of the transfer of nuclear weapon technology to NNWS (articles I and II), (*b*) the duty of the NWS to work towards nuclear disarmament (Article VI) and (*c*) the right of all states parties to share in the 'blessings' of peaceful nuclear energy (Article IV, and historically Article V).[10] The bargain enshrined in the NPT reflects two asymmetries in the treaty community, which persist today: the nuclear weapon monopoly of only five states (out of 188 NPT members) and the nuclear technology oligopoly (meanwhile) of about three dozen states vis-à-vis a majority of the treaty community with very limited domestic capacities in nuclear matters.

The NPT addresses these asymmetries and promises some compensation to the nuclear 'have-nots': a duty of disarmament in the military realm (Article VI) and a commitment to technological cooperation in the civilian realm (Article IV; see box 1) of nuclear power. This dual *quid pro quo* is seen as the best way to keep the 183 NNWS (more than 97 per cent of the NPT members) on their non-nuclear weapon paths.

Not surprisingly, both sides of the bargain are contested within the NPT community, in substance as well as in their practical implementation. The first contestation questions the very existence of a *quid pro quo* in the NPT and dismisses the representation of the treaty as a balance between the three pillars of non-proliferation, disarmament and peaceful use. Rather, it calls for an interpretation which, at first glance, seems straightforward: the NPT is, just as the name suggests, a treaty aimed at achieving non-proliferation of nuclear weapons—or as Albert Wohlstetter put it with respect to nuclear energy: 'The NPT is, after all, a treaty against proliferation, not for nuclear development.'[11] This interpretation of the NPT is still a minority position among the states parties, but it has had powerful advocates in recent years, the US administration of

[7] China alone is expected to increase its reactor fleet from its current 14 units to 75 nuclear power reactors by 2020. India's nuclear renaissance is expected to yield 63 GW of nuclear power by 2032, which would be an increase of more than an order of magnitude compared to Delhi's current output of nuclear power (5 GW). Hibbs (note 6), p. 11.

[8] Hibbs, M., 'Nuclear Energy 2011: A Watershed Year', *Bulletin of the Atomic Scientists*, vol. 68, no. 1, 2012, pp. 10–19.

[9] Hibbs (note 8).

[10] Joyner, D. H., *Interpreting the Nuclear Non-Proliferation Treaty* (Oxford University Press: Oxford, 2011), p. 20.

[11] Wohlstetter, A., Wohlstetter, R. and Jones, G., 'Part I: Why the Rules Have Needed Changing', eds Wohlstetter, A. et al, *Towards a New Consensus on Nuclear Technology*, Vol. 1, a report prepared for the Arms Control Disarmament Agency (Pan Heuristics: Los Angeles, CA, 1979), p. 35.

Box 1. NPT Article IV

Article IV

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

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

President George W. Bush first and foremost, and it is still present in certain circles of the policy discourse.[12]

The second contestation to the NPT bargain was raised by the NNWS, most vocally by those NNWS belonging to the NAM. The NAM critique focused on the implementation of the two sides of the bargain, which was unbalanced and unjust in its eyes, both in the military realm (Article VI) and the civilian realm (Article IV).

As the NAM countries represent the majority of the NPT member states (115 NPT states out of 188 belong to the NAM), it is no surprise that their frustration had a stronger impact on the outcome of the NPT Review Conferences (RevCons) than the revisionist forays of a limited number of Western countries. Hence, three NPT RevCons (1980, 1990 and 2005) ended without consensus, and the others ended with a consensual Final Document only after an intense struggle and some compromise between the NAM and the NWS (and their allies). Historically the NAM contestation was centred mainly on Article VI and—compared to the disarmament issue—its complaints about the implementation of Article IV (peaceful uses of nuclear energy) were marginal.[13]

This picture is nevertheless changing, and the 2010 NPT RevCon was a clear example of this change. In the Final Document—especially in the review part—the issue of peaceful uses of nuclear energy loomed large and took up more space than any other issue, including disarmament and non-proliferation. The new salience of Article IV in the NPT discourse has a material and an ideological root. On the one hand, nuclear energy is expected to migrate to a number of NAM countries that have a strong material interest in the fullest possible technology exchange with the incumbent nuclear energy states. On the other hand, the debate on nuclear energy also has a growing symbolic value for many NAM countries: their main focus is not the technology per se, but rather an appropriate recognition of their principle rights under the NPT and dignified treatment by the industrialized world—especially the Western states.

Both trends indicate that the debate on peaceful uses of nuclear energy could become more controversial within the NPT community unless new solutions are found to bridge the growing divide between the NAM and the NWS (and some of their allies) on the appropriate interpretation of NPT Article IV. The divide touches both provisions of Article IV: the practical meaning of 'inalienable rights' to the peaceful uses of nuclear energy (Article IV, section 1) and the extent of the technology cooperation imperative, which would bind advanced nuclear energy states to share technology and know-how with developing countries (Article IV, section 2). A clarification of these Article IV provisions is needed in order to avoid the controversy on nuclear energy becoming as extreme as the Article VI debates. The 2010 NPT RevCon was able to mitigate some of the most virulent grievances on nuclear disarmament. In order to avoid another large divide within the NPT community, it is of the utmost importance to keep confrontations on the issue of peaceful uses of nuclear energy at the lowest possible level.

[12] Krause, J., 'Enlightenment and Nuclear Order', *International Affairs*, vol. 83, no. 3, 2007; H. D. Sokolski (ed.), *Falling Behind: International Scrutiny of the Peaceful Atom* (Strategic Studies Institute, U.S. Army War College: Carlisle, PA, 2008); Ford, C. A., *Nuclear Technology Rights and Wrongs: The NPT, Article IV, and Nonproliferation* (Hudson Institute: Washington, DC, 2009).

[13] In the early days of the NPT the Article IV divisions were rather present between Western NWS and Western NNWS. This discussion nevertheless died out over the years.

IV. NUCLEAR ENERGY COUNTRIES AND THE NPT

NPT Article IV discussions touch a number of current nuclear programmes, both in established and emerging nuclear energy countries, the most prominent controversy being the Iranian nuclear programme. As a matter of fact, when confronted with strong accusations of violating its IAEA Safeguards Agreement and sometimes of violating NPT Article II, Iran has regularly recurred to NPT Article IV. When discussing IAEA and United Nations Security Council resolutions, which call for a suspension of the Iranian enrichment and heavy-water programme, Iran has questioned the very legitimacy of such resolutions, as they would collide with the inalienable rights of all NPT parties to pursue peaceful uses of nuclear energy. When confronted with its record of acquiring sensitive technology on the nuclear black market, Iran reminded critics that it was forced onto such a procurement path, as advanced nuclear energy states would not live up to their obligation to share nuclear technology. Both arguments put forward by Iran reflect not just a specific Iranian difficulty in complying with the NPT norms, but a generic discomfort among the NAM countries with the practice of nuclear energy cooperation and technology transfers and with what they see as the problematic interference of the international community in the sovereign decisions of NPT members on their energy policies.

Today's Article IV debate affects not just the developing world, as represented by the NAM, but also touches established, emerging and aspiring nuclear energy countries, as the three following examples illustrate.

In 2011 South Korean diplomats started discussing the prospect of reprocessing spent fuel and recycling the transuranic waste for domestic fuel production with their US partners. South Korea, an established nuclear power user, already has 21 atomic reactors attached to its power grid, but no domestic fuel-making capability. The US administration of President Barack Obama is, however, not inclined to support South Korea's fuel-making ambitions and maintains its traditional policy of restraining the diffusion of sensitive nuclear technologies. At the time of writing, it is not clear if US non-proliferation preferences will trump South Korea's calls for nuclear sovereignty as in past decades.[14] If South Korea acquires the capability to reprocess nuclear fuel on an industrial scale, it could develop simple nuclear weapons within a relatively short time frame. It could then become the second virtual nuclear weapon state in East Asia after Japan, which is due to start full-fledged commercial reprocessing in 2012.

At the same time, Brazil, an emerging nuclear energy country with only two nuclear power reactors (and one unit under construction), has already acquired an enrichment capability, which it plans to use both for its nuclear reactor programme and for its military submarine programme. The Brazilian enrichment plant in Resende is subject only to limited IAEA inspections, since Brazil refuses the intrusive safeguards as foreseen by the IAEA's Additional Protocol. With a limited number of nuclear power reactors, a domestic uranium enrichment capability and no Additional Protocol inspections, the Brazilian nuclear infrastructure—physically—is not too distant from the Iranian programme. However, Brazil's non-proliferation credentials have been impeccable over the last few years, whereas the Iranian example shows how destabilizing such a nuclear configuration can become under certain circumstances such as IAEA safeguards violations or geopolitical tensions.

Finally, there is the issue of ambitious nuclear newcomers. In June 2011 Saudi Arabia announced its plans to bring 16 nuclear power reactors online by 2030. The announcement came amid the ongoing international crisis regarding Iran's nuclear programme and was met with some reservation by the non-proliferation community. Concerns grew stronger a few weeks later, when former head of Saudi Arabia's intelligence agency Prince Turki al-Faisal, while discussing the Iranian nuclear challenge, openly pondered a Saudi Arabian nuclear weapon option for the future.[15] Since it is at the beginning of an ambitious civilian nuclear programme, Saudi Arabia could claim to acquire—together with its nuclear reactor fleet—the capability to produce nuclear fuel domestically. With such a capability, Saudi Arabia would be able to

[14] Global Security Newswire, 'South Korea Pushing U.S. to Allow Atomic Fuel Reprocessing', 6 Dec. 2011, <http://www.nti.org/gsn/article/south-korea-pushing-us-allow-atomic-fuel-reprocessing/>.

[15] Burke, J., 'Riyadh will build nuclear weapons if Iran gets them, Saudi prince warns: Prospect of a nuclear conflict in the Middle East is raised by senior diplomat and member of the Saudi ruling family', *The Guardian*, 29 June 2011, <http://www.guardian.co.uk/world/2011/jun/29/saudi-build-nuclear-weapons-iran>.

break out of the NPT and develop nuclear weapons in relatively short time.

These three examples show that with the expansion of nuclear power a new demand for fuel-making capabilities could emerge in a number of NNWS members of the NPT. These NNWS could be either established (e.g. Japan or South Korea) or emerging (e.g. Argentina, Brazil or Iran) nuclear energy users, or even highly ambitious nuclear newcomers (e.g. Saudi Arabia), which have the financial means to become large nuclear energy countries within two decades.

V. THE DEBATE ON NPT ARTICLE IV

The expansion of nuclear power comes amid a debate within the NPT community and the Nuclear Suppliers Group on how to trade in sensitive nuclear technologies in the future. In this debate, there is widespread consensus that with the increasingly global diffusion of nuclear technology some regulation must be found to control the spread of the most sensitive elements within a nuclear fuel cycle: the enrichment of uranium and the reprocessing of spent fuel. Both ENR technologies can be used to produce reactor fuel or weapon-grade material. As the NPT does not mention ENR explicitly, but addresses matters of nuclear energy in a more generic way in Article III (safeguards), Article IV (peaceful uses) and historically in Article V (peaceful nuclear explosions), different points of view on the appropriate interpretation of the NPT provisions on nuclear energy have been raised in recent years by a number of NPT states parties. Since the discussion has not yet yielded a common understanding of 'Nuclear Technology Rights and Wrongs', it might be helpful to sketch the breadth of the debate and to start by delineating the two extreme positions within it.[16]

Technology denial

At one end of the spectrum on interpreting Article IV, there is a school of thought that proposes an extremely restrictive policy on nuclear transfers and nuclear energy rights, which gained some visibility under the last US administration. Christopher Ford, who served as US Special Representative for Nuclear Nonproliferation under the US administration of President George W. Bush, proposed labelling the supporters of this approach as 'non-proliferators'. Although this term does not fully capture the core message of its proponents, it is used in contrast to 'non-proliferation', which is a widely shared norm. The 'non-proliferators' endorsed a highly controversial way of technology governance, which would deny most NPT members access to specific elements of the nuclear fuel cycle.

In its most true and radical form, this proposal was already abandoned by the USA in the second term of the George W. Bush administration and it has not been resuscitated by the US administration of President Barack Obama. Nevertheless, the message of the 'non-proliferators' has not disappeared from the global discourse on nuclear energy and it informs the current debate in three ways. First, the proposal of technology denial is still present in the policy discourse of influential think tanks and scholars, especially in the US.[17] Second, although the 2004 proposal on technology denial no longer represents US official policy on nuclear energy, the aftershocks of this proposal are still palpable in the current NAM discourse on nuclear energy. Third, although the US administration already toned down its rhetoric on peaceful nuclear energy rights during George W. Bush's second term, it continued to pursue a restrictive policy on ENR transfers within the NSG and continues to push its nuclear cooperation partners—with differing success—to accept strict limitations on their domestic fuel cycles.[18]

The intellectual starting point of the 'non-proliferators' is the posit that the NPT should not be viewed—as most of its members view it—as a treaty resting on three 'juridically equal' pillars.[19] Rather, the treaty text and the negotiation history suggest a clear priority of the non-proliferation dimension over the disarmament and peaceful use provisions

[16] Ford (note 12).

[17] In the US, it is not uncommon for policymakers to 'hibernate' in a non-governmental think tank after leaving office and wait for the next election. In the run-up to the US presidential elections, one Republican candidate (Newt Gingrich) proposed John Bolton, a major advocate of technology denials during the George W. Bush administration, as future Secretary of State. At the same time, the favourite Republican candidate (Mitt Romney) assembled a team of foreign policy advisers, which included George W. Bush's Under Secretary of State for Arms Control and International Security (Robert Joseph) and his Assistant Secretary of State for International Security and Nonproliferation (Stephen Rademaker). Hence, it is not excluded that some policies of the former US administration might be back on the agenda in the coming years.

[18] McGoldrick (note 2), p. 14. While the UAE accepted restrictive US non-proliferation clauses in its bilateral nuclear agreement, Jordan and Vietnam did not. Whether South Korea will continue to accept restrictions on its domestic fuel cycle is not clear at the time of writing.

[19] Ford (note 12), p. 11; and Joyner (note 10), p. 75.

of the NPT.[20] In light of this, the right to use nuclear energy for peaceful purposes cannot be interpreted as a fundamental right of all states parties, but should be granted on a case-by-case basis, if a number of specific non-proliferation conditions are met. These conditions may even sometimes be beyond the sphere of influence of a potential recipient state. For example, if a NNWS, which is fully compliant with its non-proliferation obligations, envisages the use of nuclear technologies where the implementation of safeguards would be challenging (e.g. in bulk handling facilities for the industrial reprocessing of spent nuclear fuel), the USA proposed denying the country access to such technology, since 'The Treaty provides no right to such sensitive fuel cycle technologies'.[21] Access to nuclear technology thus hinges on the 'safeguardability' of the technology as well as the credibility and good standing of a country vis-à-vis its non-proliferation commitments.[22] Hence, the official US position in 2004 claimed that 'the Treaty's "right" to develop peaceful nuclear energy is clearly conditioned upon parties complying with Articles I & II. If a state party seeks to acquire nuclear weapons and thus fails to conform with Article II, then under the Treaty that party forfeits its right to develop peaceful nuclear energy'.[23]

A year earlier, a US representative at the 2003 NPT Preparatory Committee made an analogous statement and claimed that 'The inalienable right to develop nuclear energy is not an entitlement, but rather flows from demonstrable and verifiable compliance with Articles I, II and III of the Treaty'.[24] Hence, NNWS should view peaceful uses of nuclear energy not as their fundamental right, but rather as a reward for their compliance with the NPT provisions.

This restrictive view on the access rights of NNWS to nuclear energy was not only discussed within the context of nuclear transfers from advanced nuclear energy states to the developing world, but also with regard to the rights of NNWS to develop certain nuclear technologies domestically. Christopher Ford showed his sympathy for this most extreme interpretation of the NPT and endorsed statements such as: 'the NPT may be understood as prohibiting non-nuclear-weapon signatories from unsafeguardable nuclear materials, technologies, and activities'.[25] Hence, 'certain capabilities are simply not able to be possessed safely by non-nuclear weapon-states at all—even for "peaceful" purposes'.[26]

In practical terms, the George W. Bush administration called for limiting ENR to those states that already had ENR plants in 2004.[27] The states with ENR would then ensure a reliable supply of nuclear fuel to all NPT members in full compliance with their non-proliferation obligations, if they agree to forgo ENR themselves.[28]

Unfettered access to nuclear technology

The NAM is at the other end of the spectrum in the NPT debate. It upholds the interpretation of most NPT members of the grand bargain between non-proliferation, disarmament and peaceful uses of nuclear energy.[29] On matters of nuclear energy, it is not surprising that the NAM does not emphasize issues such as safeguardability, credibility or good standing, but rather stresses two different aspects found in the NPT text (both in the preamble and in Article IV). First, the inalienable right of NPT states parties to pursue peaceful uses of nuclear energy (Article IV, section 1). Second, the cooperation imperative binding

[20] Zarate, R., 'The NPT, IAEA Safeguards and Peaceful Nuclear Energy: An "Inalienable Right", but Precisely To What?' ed. H. D. Sokolski, *Falling Behind: International Scrutiny of the Peaceful Atom* (Strategic Studies Institute, U.S. Army War College: Carlisle, PA, 2008); and Ford (note 12), p.24.

[21] Bolton, J. R., 'The NPT: A Crisis of Non-Compliance', Statement by the US Under Secretary of State for Arms Control and International Security to the Third Session of the Preparatory Committee for the 2005 Review Conference of the Treaty of the Non-Proliferation of Nuclear Weapons, New York, 27 Apr. 2004, <http://www.reachingcriticalwill.org/legal/npt/prepcom04/usa27.pdf>.

[22] Ford (note 12).

[23] Bolton (note 21).

[24] Semmel, A. K., 'Peaceful Nuclear Cooperation: NPT Article IV', Statement by the Alternative Representative of the USA to the Second Session of the Preparatory Committee for the 2005 NPT Review Conference, Geneva, 7 May 2003, <http://www.reachingcriticalwill.org/legal/npt/prepcom03/statements/7May_US.pdf>.

[25] Zarate (note 20), p. 226, quoted in Ford (note 12), p. 24.

[26] Ford (note 12), p. 3.

[27] Bush, G. W., 'President Announces New Measures to Counter the Threat of WMD', Remarks by the President on Weapons of Mass Destruction Proliferation, National Defense University, Fort Lesley J. McNair, Washington, DC, 11 Feb. 2004, <http://georgewbush-whitehouse.archives.gov/news/releases/2004/02/20040211-4.html>.

[28] Bolton (note 21). Note the analogy with the NPT, which 'allowed' nuclear weapon possession in countries that had carried out a nuclear explosion by a certain deadline (1 Jan 1967) and closed the door to other states ever entering the nuclear weapon club. A similar 'ENR club'—with the deadline of 2004—was envisaged by the George W. Bush administration.

[29] All NPT states might endorse the 'grand bargain' in their declaratory policies, but in their practical policies NWS clearly prioritize the non-proliferation dimension over the other two pillars of the NPT.

the advanced nuclear energy states, and especially the NWS, to facilitate the exchange of nuclear technology to the fullest extent possible with the 'non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world' (Article IV, section 2).

Whereas on the issue of inalienable rights the NAM has a relatively uniform and uncompromising position, the NAM approach to the issue of nuclear technology exchange is more nuanced. This is due to the fact that a number of NAM states have become part of the NSG over the last few years, and only the most intransigent fringes of the NAM still contest the very existence of the NSG and its practice of nuclear export controls. Hence, the NAM mainstream acknowledges that the fullest possible exchange of nuclear technology might entail some restrictions in technology transfers in exceptional cases. However, the norm should be represented by 'the full access to nuclear material, equipment and technological information' and therein a preferential treatment of NNWS, 'taking the needs of developing countries, in particular into account', towards whom 'Transfers of nuclear technology ... are to be encouraged'.[30]

Nevertheless, no compromise can be found in the NAM interpretation of 'inalienable rights'. These rights are tightly coupled to the NAM understanding of state sovereignty and thus cannot be negotiated. Hence, energy policies of all NPT states parties are sovereign decisions and 'each country's choices and decisions in the field of peaceful uses of nuclear energy should be respected without jeopardizing ... its fuel cycle policies'.[31] These statements clearly dismiss the interpretation of the 'non-proliferators' that the right of a NNWS to pursue peaceful uses of nuclear energy hinges on such conditions as the credibility of its energy policy or the safeguardability of its technology choices.

The NAM countries have also dismissed any proposal to forgo their rights to pursue ENR technologies. They have turned down a number of proposals that were tabled in the discussion on Multilateral Nuclear Assurances (MNAs), even if most of these schemes would only require a non-legally binding renunciation of ENR.[32] The impact of the 2004 George W. Bush proposal (calling for an effective prohibition of ENR for most NAM states) lead to great distrust on the side of the NAM towards all MNA proposals, which the IAEA and the international community would table in the following years. The unfortunate legacy of the George W. Bush proposal was that, among the NAM states, the idea of obtaining access to nuclear fuel through an appropriate multilateral setting was associated with a master plan by the industrialized world to circumscribe their rights under Article IV of the NPT.[33] Hence, the NAM rejects 'in principle, 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 that are used as a pretext to prevent the transfer of such technology are inconsistent with the objectives of the Non-Proliferation Treaty'.[34]

Furthermore, Egypt, a leading NAM country, criticized the 'attempts by some to reinterpret Article IV of the Treaty in a manner that aims to restrict the ability of non-nuclear weapon states to benefit from their rights by creating artificial categories of "sensitive" and "non-sensitive" nuclear technologies or "responsible" and "irresponsible" states'.[35]

VI. ENTITLEMENTS, JUSTICE AND FAIRNESS: THE META-DEBATE ON ARTICLE IV

Attentive observers of the NPT debate have highlighted how the grievances of the NAM with respect to the Article IV clearly go beyond the material interest of these states to pursue peaceful uses of nuclear energy.[36]

[30] This statement as well as the following quotations stem from the 2010 NPT Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, Volume 1, NPT/CONF.2010/50, 2010, p. 7, <http://www.reachingcriticalwill.org/legal/npt/revcon2010/FinalDocument.pdf>. Many of the Article IV statements in this document display the handwriting of the NAM.

[31] NPT/CONF.2010/50 (note 30), p. 9.

[32] Yudin, Y., *Multilateralization of the Nuclear Fuel Cycle: Assessing the Existing Proposals* (United Nations Institute for Disarmament Research: New York and Geneva, 2009).

[33] Joyner (note 10), p. 59.

[34] Working paper submitted by the members of the Group of Non-Aligned States parties to the Treaty on the Non-Proliferation of Nuclear Weapons at the 2010 NPT Review Conference, NPT/CONF.2010/WP.46, 2010, <http://www.reachingcriticalwill.org/legal/npt/revcon2010/papers/WP46.pdf>.

[35] Aziz, A., 'Statement by H.E. Ambassador / Maged Abdel Fatah Abdel Aziz, Permanent Representative of The Arab Republic of Egypt before the Third Session of the Preparatory Committee to the 2010 NPT Review Conference', 2009, <http://www.un.org/disarmament/WMD/Nuclear/NPT2010Prepcom/PrepCom2009/statements/2009/04May2009/04May2009AMSpeaker-9-Egypt.pdf>.

[36] Müller, H. and Wunderlich, C. (eds), *Norm Dynamics in Multilateral Arms Control* (Georgia University Press: Athens, GA, forthcoming 2012).

Egypt illustrates this well: it defended the inalienable rights of all NNWS to peaceful uses of nuclear energy with unaltered passion even during a prolonged period when it had no tangible interest in a domestic nuclear power programme.[37] Similar considerations hold for Indonesia and other leading NAM states.

Egypt's recent dedication to defending the provisions of Article IV, which it saw as under attack by the initiatives of the George W. Bush administration, is particularly remarkable as it provided little material benefit to Egypt.[38] In fact, Egypt's activism regarding Article IV clearly runs counter to its geopolitical interests: Egypt's defence of the inalienable rights helped its regional rival, Iran, which—unlike Egypt—had a sizable nuclear programme and had come under international scrutiny after a series of safeguards breaches in the last decade.[39]

Hence, qualifying the NAM position on Article IV as the interest-driven policy of a group of 'technology seekers' overlooks an important aspect of NAM identity and political culture that regularly comes to the fore in international diplomatic settings.[40] That aspect is the demand for justice and fairness, the imperative of equal and non-discriminatory treatment, and the recognition of all actors as equal and endowed with the same fundamental rights.[41] In light of this, much of the NAM commitment to NPT Article IV is not dictated by a material interest in nuclear power (which sometimes does not even exist), but rather by a symbolic demand for recognition and dignified treatment. As shown by the example of Egypt above, this demand for justice can sometimes even overwrite geopolitical concerns.

These considerations show how unfortunate the 2004 US initiative on ENR was. The NAM perceived it as a direct attack by a NWS and an advanced nuclear technology holder against the developing world—and more precisely against its sovereignty and its right to development. As most NAM countries had suffered under colonial rule in the past, it was of no surprise that a proposal from the developed world, which imposed restrictions on the Global South on technologies that industrialized countries had been using for decades, would be unacceptable to NAM countries.

A further NAM grievance was represented by the NSG waiver issued to allow nuclear trade with India. Since India would benefit from nuclear transfers without being subject to full-scope safeguards (as ordinary NNWS members of the NPT), a number of NNWS, especially from the South, complained about this preferential treatment. In the eyes of the NAM, this waiver went against the provisions of the grand bargain and against basic principles of fairness and equal treatment. Again, these complaints cannot be reduced to the material interests of individual countries, since they were also endorsed by countries without nuclear energy ambitions.

VII. IN PURSUIT OF A MIDDLE GROUND

Finding a viable compromise on Article IV is of paramount importance for the future of the NPT, which is already under strain because of the unresolved disarmament question. The juxtaposition of the NAM and the NWS (and some of their allies) has already lead to a partial paralysis of the NPT community on a number of issues. Since 2000 no advancements have been achieved on the acceptance of the Additional Protocol as the verification standard of NPT member states. The same stagnation can be observed in the call for the substitution of national ENR with appropriate multilateral arrangements. Further, the appeals to the NAM to accept the NSG guidelines as export control standards go widely unheard.

This blockade is largely dictated by NAM frustration over the implementation of the grand bargain within the NPT. While it is outside the scope of this paper to address the disarmament question, some reflections on how to mitigate the row over Article IV should be discussed in this section.[42]

[37] The Egyptian nuclear power programme was abandoned at the end of the 1980s after the Chernobyl disaster and only restarted in 2008 with a government announcement to build a 1000 MW(e) reactor at El-Dabaa. The current political unrest in the region and the global financial crisis put some doubts on this second 'nuclear awakening', as does Egypt's history of big announcements and modest achievements in the nuclear sector. Fitzpatrick, M., *Nuclear Programmes in the Middle East: In the Shadow of Iran*, International Institute for Strategic Studies (IISS) Dossier (ISSS: London, 2008).

[38] A possible interpretation of Egypt's opposition to the George W. Bush proposal would highlight Israel's ENR capabilities and hence the prospect of finding Israel within the ENR club and Egypt outside of it. Nevertheless, Cairo's overall engagement on Article IV goes far beyond its opposition to this proposal and has been constant throughout the NPT history.

[39] For a detailed account see the case study by Müller, D. in Müller, H. and Wunderlich, C. (note 36).

[40] Ford (note 12), p. 8.

[41] Albin, C., *Justice and Fairness in International Negotiation* (Cambridge University Press: Cambridge, 2001).

[42] On the disarmament question, see Müller, H., 'The NPT review process and strengthening the treaty: disarmament', Non-Proliferation

First, the experience shows that a large majority of the NPT member states uphold the vision of a grand bargain between the three pillars of the NPT. Attempts to deny or weaken this grand bargain have regularly lead to NPT RevCon failures and have weakened the overall regime, in all of its pillars. Hence, a pragmatic way forward on non-proliferation, disarmament and peaceful uses can only be achieved through the acknowledgement that these three principled pillars represent the object and the purpose of the NPT:

> They are inherently linked and interdependent upon each other in their meaning, and must be viewed in a balanced manner. When conducting that balancing, the three pillars should be understood as presumptively juridically equal, i.e. none of the pillars should be presumed to be of higher prioritization in legal interpretation of the NPT's provisions than any other.[43]

Second, pragmatism and realism should also govern the discussion of a possible diffusion of ENR in the slipstream of a nuclear renaissance. As it is in no one's interest to witness an uncontrolled diffusion of large-scale ENR facilities, it should not be too difficult to find some common language within the NPT community on the necessity to regulate and control the spread of these potentially dangerous technologies. Such a declaration does not have to contradict the principle right of all NPT members to pursue peaceful uses of nuclear energy, but should indicate a common need to address a growing challenge to the NPT regime. This challenge affects all NPT parties and all have a common interest in finding a solution for the uncontrolled spread of ENR. Hence, regulating the diffusion of ENR is not contested in substance as much as some verbal exchanges between the NAM and the NWS might suggest. The North–South division was rather of procedural nature (the North as the rule maker and the South as the rule taker) and was amplified by the lack of tact that accompanied some Western statements on the issue.

Third, there is no immediate threat of a worldwide spread of ENR. History shows that only a fraction of all planned nuclear energy programmes are actually implemented. Therefore, the many announcements of a global revival of nuclear energy should be taken with a pinch of salt. Some developing countries will not dispose of the financial or technological prerequisites to join the nuclear energy club.[44] Further, a number of countries in the Middle East that are short-listed for entry are in the midst of a difficult and uncertain political transition process, which might delay (or derail) their efforts to join the nuclear energy club. At the point of writing, ENR is not an issue for those countries which will enter the nuclear energy club: they are mainly interested in producing nuclear power for their electricity grids (and to a minor extent in the desalination of seawater) and thus bringing online large (1 GW(e)) commercial light water reactors (LWR). Since these reactors do not represent an excessive proliferation risk, a number of nuclear supplier countries have already committed themselves to helping the new nuclear energy aspirants in their LWR programmes.[45] This very concrete act of technology transfer could diffuse many NAM grievances related to Article IV, section 2.

The construction and commissioning of a large-scale LWR is a complex and time-consuming business, which typically takes more than a decade. The nuclear awakening in the developing world will not materialize overnight, but will be a lengthy and difficult process, fraught with uncertainty and possible setbacks. Embarking on a domestic fuel-making endeavour (and thus an ENR programme) in this context would only make sense once a sizeable LWR fleet is online in an emerging nuclear energy country, and experience shows that such a scenario typically takes decades to materialize.[46] In the few nuclear energy countries (Japan, South Korea and, maybe in future, Australia, Brazil and South Africa) where economies of scale could justify a national ENR programme, wider economic considerations might encourage some restraint, since the global nuclear fuel market seems

[43] Joyner (note 10), p. 75.

[44] Goldemberg, J., 'Nuclear energy in developing countries', *Journal of the American Academy of Arts and Sciences*, vol. 138, no. 4, 2009.

[45] See 'Strengthening the nuclear non-proliferation regime', Working paper submitted by France to the Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2005/PC.III/WP.22, 4 May 2004, <http://www.iaea.org/newscenter/focus/fuelcycle/france_npt2004.pdf>.

[46] For a short discussion, see Anthony, I., Ahlström, C. and Fedchenko, V., *Reforming Nuclear Export Controls: The Future of the Nuclear Suppliers Group*, SIPRI Research Report no. 22 (Oxford University Press: Oxford, 2007), p. 80.

sufficiently diversified and well equipped to meet the future nuclear fuel demands.[47]

Furthermore, countries pondering the establishment of a closed fuel cycle and thus the reprocessing and recycling of spent fuel (currently India, Japan, Russia and South Korea) will face an uphill battle when comparing this technology option with the classic once-through nuclear fuel cycle. Plutonium recycling has not yet proven its economic and environmental benefits, neither in its limited form (one-time recycling of spent fuel and returning it to the LWR as mixed oxide fuel) nor in its more visionary form (breeding plutonium and other transuranics (TRUs) in fast breeder reactors and using these TRUs as fuel in the subsequent fast reactor cycles).[48] The commercial reprocessing plants that already exist are also operating under their capacity limit, as the global demand for reprocessing services is in decline. Hence, within ENR, the spread of reprocessing technologies might be less of an issue than the diffusion of uranium enrichment plants.

Fourth, attitudes towards nuclear power in the developing world are somewhat over-optimistic and do not mirror the mixed balance industrialized states would strike after more than half a century of experience with this technology. It is remarkable how even the recent Final Document of the 2010 NPT RevCon—with the NAM's clear handwriting on Article IV—emphasizes the importance of nuclear energy for development: 'to meeting energy needs, improving health, combating poverty, protecting the environment, developing agriculture, managing the use of water resources and optimizing industrial processes, thus helping to achieve the Millennium Development Goals'.[49] This language resembles the nuclear euphoria of the 1950s when nuclear power was predicted to be 'too cheap to meter' by the US Atomic Energy Commission and nuclear energy was seen as the panacea leading to 'peace, health and prosperity' in the developing world.[50] The reality for established nuclear energy countries was, however, much more sobering: nuclear power is generally not cheaper than other electricity sources, the financial and regulatory aspects of nuclear programmes are complex and challenging, the safety record and the social acceptance of nuclear power are mixed, the waste management issue is largely unresolved and the proliferation resistance of civilian nuclear technology (especially ENR) is still not satisfactory. For some developing states struggling with domestic unrest and terrorism, the challenge would even include the physical security of nuclear installations and materials, which could soon turn a nuclear adventure into a nightmare.[51] In short, the launch of the first nuclear power reactors might be a sobering experience for a number of developing states and their current nuclear euphoria could soon be replaced by a more pragmatic and disenchanted look at the costs and benefits of nuclear power. As alternative sources such as solar thermal power plants lend themselves to future electricity supply—especially for countries in the MENA region—a number of countries may limit nuclear power to providing a bridge from the fossil to the solar era and thus bring online only a limited number of LWRs, without developing any further ambitions in the front end or back end of the nuclear fuel cycle.

In summary, moderate and well-meaning NPT members can easily agree on two central points: first, that the NPT, which rests on three interrelated pillars of equal weight, grants each member state the fundamental right to pursue peaceful uses of nuclear energy; and second, that it is in the interest of states parties to control the spread of the most sensitive nuclear technologies (ENR) and hence find some appropriate self-regulation. These two statements

[47] Iran and Saudi Arabia's plans to bring online more than a dozen LWRs in the coming decades are not deemed credible by this author. As a rule of thumb, a national enrichment plant can compete on the global enrichment market once about 10 LWRs of 1 GW(e) are online. So far, there is no convincing economic rationale for spent fuel reprocessing. See e.g. von Hippel, F., *Managing Spent Fuel in the United States: The Illogic of Reprocessing* (The International Panel on Fissile Materials: Princeton NJ, 2007); Schneider, M. and Marignac, Y., *Spent Nuclear Fuel Reprocessing in France* (The International Panel on Fissile Materials: Princeton, NJ, 2008); and Forwood, M., *The Legacy of Reprocessing in the United Kingdom* (The International Panel on Fissile Materials: Princeton, NJ, 2008).

[48] Needless to say, large reprocessing plants additionally represent a twofold proliferation risk. First, material accountancy can only be carried out with very limited accuracy, raising doubts about the 'safeguardability' of these plants. Sokolski, H. D. (ed.), *Falling Behind: International Scrutiny of the Peaceful Atom* (Strategic Studies Institute, US Army War College: Carlisle, PA, 2008). Second, 'plutonium economies' entail serious diversion risks of separated plutonium, both at the reprocessing sites and during shipments; these proliferation risks are significantly larger than the risks inherent to nuclear once-through cycles. Goldston (note 4).

[49] NPT/CONF.2010/50 (note 30), p. 7.

[50] International Atomic Energy Agency (IAEA) Statute, Article II: Objectives, <http://www.iaea.org/About/statute_text.html>.

[51] In January 2012 Egyptian newspapers reported on a case of theft of radioactive material from Egypt's Al-Dabaa nuclear power plant, which is still under construction. The plant was poorly guarded and has been the target of several demonstrations in recent months.

are not mutually exclusive, but rather reinforce each other, since there will be little progress on the non-proliferation and disarmament fronts if the spread of ENR is not controlled. Concerning the regulation of ENR, both the NSG and the nuclear industry are already following a de facto moratorium on the transfers of these technologies to most countries, leaving only two regulatory gaps: the (covert) transfer of nuclear technology by non-NSG parties to NNWS and the domestic development of ENR capabilities within NNWS.[52] Regarding these two loopholes, time is still on the side of the NPT community, as the nuclear power expansion has not started to gather pace yet and a number of nuclear aspirants will probably have to scale down their nuclear ambitions for financial, technical, regulatory or security reasons, or because of the availability of alternative energy sources. In any case, the spread of ENR will represent the exception for nuclear newcomers, the rule being the construction and commissioning of (relatively proliferation-resistant) 1 GW(e) LWRs. The global nuclear fuel market has enough capacity for this first wave of LWRs. Constructing new ENR plants for fuel making will therefore be economically unattractive.

VIII. OPTIONS FOR THE EUROPEAN UNION

In a working paper prepared for the 2010 NPT RevCon, the European Union (EU) stated:

> The Treaty on the Non-Proliferation of Nuclear Weapons, based on the three mutually reinforcing pillars of non-proliferation, disarmament and the peaceful uses of nuclear energy, represents a unique and irreplaceable framework for maintaining and strengthening international peace, security and stability. Given the current challenges in the field of international security [...] we are convinced that the Treaty is more important now than ever. It is our duty to maintain and strengthen its authority and integrity, [...]. To this end, the European Union will continue to promote all the objectives contained in the Treaty.[53]

In Council Decision 2010/212/CFSP, the EU also pledged to underwrite all three pillars of the NPT by setting up measures which are 'concrete, effective, pragmatic and consensual'.[54]

Despite the ongoing divisions in the NPT community over articles IV and VI, the 2010 NPT RevCon ended with a consensual Final Document, which contained some substantive proposals (especially on the Middle East). It is, therefore, of utmost importance that the constructive spirit of the 2010 NPT RevCon be maintained. As the two EU documents mentioned above indicate, this entails two imperatives: first, to reaffirm the grand bargain of the three pillars of the NPT, and second, to address challenges to the regime in a consensual manner. For Article IV, this concretely means a positive endorsement of the rights of all NPT members to peaceful uses of nuclear energy (Article IV, section 1) and strong support for the IAEA Technical Cooperation Programme and other bilateral assistance programmes (Article IV, section 2). On the unequal access to sensitive nuclear technology, a bold move by the EU would be to acknowledge that asymmetries on the access to ENR exist and that these inequalities should be removed in the long term.

The second recommendation calls for consensus when addressing future NPT challenges. The experience of Western forays into Article IV—especially during the George W. Bush administration—proved that such unilateral moves do not lead anywhere. They are met with resistance by the NAM and create collateral damage to the other pillars of the NPT, especially to the non-proliferation toolbox, where several NAM countries are currently obstructing the way forward on, for example, the universalization of the Additional Protocol, multilateral fuel arrangements and the acceptance of NSG export control standards.[55]

The EU is therefore well advised to follow a precautionary 'do no harm' policy both in its

[52] Scheinman, L., 'Article IV of the NPT: Background, Problems, Some Prospects', Weapons of Mass Destruction Commission, paper no. 5, 2004.

[53] European Union, 'Working Paper on forward-looking proposals of the European Union on all three pillars of the Treaty on the Non-Proliferation of Nuclear Weapons to be part of an action plan adopted by the 2010 Review Conference' submitted to the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2010/PC.III/WP.26, 2009, p. 1, <http://www.reachingcriticalwill.org/legal/npt/prepcom09/papers/WP26.pdf>.

[54] Council Decision 2010/212/CFSP of 29 March 2010 relating to the position of the European Union for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Official Journal of the European Union*, L6, 10 Apr. 2010, Article I.

[55] This blockade does not involve the whole NAM camp: Bangladesh, Mexico, Nigeria, Singapore, South Africa and the UAE endorsed the Additional Protocol at the 2010 NPT RevCon; and Morocco, Namibia, Thailand and the UAE showed great interest in the proposals on multilateral fuel arrangements at the conference.

declaratory and in its concrete governance proposals. This principle entails resisting interpretations of the NPT that might upset the treaty mainstream and refraining from policy proposals that touch on the rights of third parties to peaceful uses of nuclear energy, if these parties are not included in the deliberations.

The bitter experience of multilateral approaches to the nuclear fuel cycle shows that NAM countries do not like regulations that are crafted by third parties 'above their head' and that have a direct impact on their nuclear energy options. Political tact and common sense suggest that these reservations—especially in light of the colonial past of many NAM states—are both understandable and legitimate.

These insights do not mean that matters of ENR regulation should lie idle, rather they should in future be pursued with due consideration for two principles. First, NAM countries should be involved from the beginning in deliberations over ENR control and not confronted with a *fait accompli* (as has been the case in the past). Second, the justice argument mentioned above suggests that regulations on ENR can only be reached within a context that satisfies the basic expectations of justice and fairness of all the stakeholders, including the NAM. This, of course, disqualifies the 2004 US proposal, but it also puts a question mark over most of the other multilateral proposals to regulate ENR.[56] Most of these proposals only address future ENR facilities and fail to address ENR plants that already exist. Hence, from a sceptical NAM perspective, these proposals aim to lock developing countries into an internationally controlled fuel-making scheme, whereas the industrialized world would be free to participate in this new scheme or to continue to retrieve its fuel from its traditional supply chain, which often includes nationally owned fuel-making facilities.

The only way out of this conundrum has been sketched by an Austrian proposal to the IAEA in 2007, which elaborated on ideas former IAEA Secretary General ElBaradei put forward while in office: in the long term, all nuclear fuel transactions should be placed under the auspices of an appropriate international fuel bank to 'enable equal access to and control of the most sensitive technologies, particularly enrichment and reprocessing'.[57]

What sounds like a 21st century Baruch Plan may be the only sustainable way to disconnect the spread of nuclear energy from the spread of nuclear weapons.[58] Hence, nationally owned ENR facilities, according to the Austrian proposal, should either be shut down or converted to international fuel banks in the long term. Difficult as it may seem and unrealistic as it may sound, the EU would be well advised to explore this requirement for the four large commercial ENR facilities that are currently operating on its soil: the two reprocessing plants in the UK (Sellafield) and France (La Hague), and the enrichment plants run by the trinational URENCO consortium and the European Gaseous Diffusion Uranium Enrichment Consortium (EURODIF) in France (Tricastin). As URENCO and EURODIF already operate two different multinational schemes, the EU could benchmark these two models and explore whether either of them could serve as a blueprint for future multilateral ENR facilities.[59]

The aim of such explorative research would be to identify a model for multilateral ownership of ENR facilities, which the EU would be ready to accept and implement in its own fuel-making facilities in the long term. Once EU members had accepted such a standard, the EU would be well placed to reach out to third parties to put its fuel bank vision forward for discussion. Such an approach would be more credible than most other MNAs, since it would show a clear commitment by an important global player to do justice to the NAM and its claims for equal and non-discriminatory treatment.[60]

In practical terms, these discussions should involve the European Atomic Energy Community (Euratom),

[56] Yudin (note 32).

[57] International Atomic Energy Agency (IAEA), Communication received from the Federal Minister for European and International Affairs of Austria with regard to the Austrian proposal on the Multilateralization of the Nuclear Fuel Cycle, INFCIRC/706, 31 May 2007, <http://www.iaea.org/Publications/Documents/Infcircs/2007/infcirc706.pdf>.

[58] The 1946 Baruch Plan foresaw putting all nuclear materials and technologies under the strict control of an appropriate body within the UN. Proposed by the USA to the UN, it failed to materialize due to US–Soviet differences on its practical implementation.

[59] For details see Franceschini and Müller (note 5).

[60] It is not completely unrealistic to restructure the domestic nuclear industry to advance non-proliferation goals, as the US example shows: during the Jimmy Carter administration, the USA abandoned its reprocessing programmes to discourage other nuclear energy countries from setting up closed fuel cycles and plutonium economies. The domestic suspension of reprocessing was believed to give the administration a stronger credibility vis-à-vis its partners.

ideally supported by European think tanks on energy policy and non-proliferation. The Euratom Supply Agency is responsible for the supply of ores and nuclear fuels within the EU, as well as being the legal owner of these fuels. The European Commission's 'Energy Roadmap 2050' foresees that 'nuclear energy will remain in the EU power generation mix' for at least another four decades.[61] Therefore, drafting a long-term vision on nuclear fuel making in the EU is a prerequisite for further discussion on multinational ownership of nuclear fuel making facilities.[62] In this context, Euratom should address two questions:

1. Which European ENR facilities will play a role in the EU's (long-term) nuclear fuel supply?
2. How could they be transformed into a multinational consortium according to a standard of multinational ownership that the EU would propose for all ENR facilities worldwide?

A visionary idea as discussed above will, of course, meet resistance from a number of stakeholders, especially in the reprocessing industries which—so far—have not witnessed any multinational involvement in their operations. Furthermore, the multilateralization of reprocessing plants—at first glance—creates more problems than it solves: it opens up a number of practical questions on high-level waste and separated plutonium shipments, which are far from resolved and could result in increased proliferation risks.[63] Therefore, the issue of how to handle reprocessing facilities within the EU should in future be addressed with the overarching question of whether spent fuel reprocessing should have a future at all in the EU and elsewhere.

Once the EU has developed a clear model for how to multilateralize ENR, and once it has shown its readiness to retrofit its own ENR facilities according to this standard, it can reach out and put its vision to discussion. It is likely to meet resistance from non-European fuel makers (especially in the reprocessing segment), which produce fuel in majority nationally owned facilities, but it is also likely to be appreciated by the NAM as a non-discriminatory and fair arrangement, which puts equal burdens on all parties.[64] In return, the EU can hope that the NAM will be more amenable in discussing some open issues like the Additional Protocol, export control standards, multilateral fuel arrangements and NPT withdrawal issues.

What the EU can do already now—and is already partially doing—is to reach out to selected countries in its neighbourhood on issues of nuclear safety and security. Unlike the safeguards issue, nuclear safety and security are relatively uncontroversial issues and international cooperation in these fields was widely endorsed at the 2010 NPT RevCon.[65] In the Final Document there are repeated calls to strengthen international cooperation in the physical protection of nuclear materials, in the combat of trafficking in nuclear and other radioactive materials, in the safe and secure management of spent fuel and, in general, in the establishment of a sustainable nuclear safety culture.[66]

The EU can engage a number of nuclear energy aspirants via targeted Council decisions, its two ongoing programmes within the Instrument for Nuclear Safety Cooperation (INSC) or the chemical, biological, radiological and nuclear (CBRN) Centres of Excellence, which are being established within the Instrument for Stability (IFS) framework in a variety of regions.[67] Some of these future CBRN Centres of Excellence will be established in new nuclear energy countries, especially in Northern Africa and the Middle East. While INSC missions are already operative in Egypt and Jordan, CBRN Centres of Excellence have been operational in Algeria, Jordan, Morocco and the UAE only since the end of 2011, and the programme priorities for these centres have not been defined yet.[68] It would be advisable for the EU to do the utmost to

[61] European Commission, 'Energy Roadmap 2050', Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 885/2, 2011, p. 13.

[62] European Commission (note 61), p. 8.

[63] McGoldrick (note 2), p. 48.

[64] Two exceptions being Argentina and Brazil, who are planning a joint uranium enrichment plant but are not nuclear fuel suppliers today.

[65] Nuclear safety and security are not only uncontroversial issues within the NPT community, they also represent a common denominator for all EU states on matters of nuclear energy. Hence, whereas a number of (anti-nuclear) EU members would object if Brussels openly promoted nuclear energy to third parties, they would certainly endorse the promotion of a healthy nuclear safety and security culture in their neighbourhood.

[66] NPT/CONF.2010/50 (note 30), pp. 5–9.

[67] Grip, L., 'Mapping the European Union's institutional actors related to WMD non-proliferation', Non-Proliferation Papers no. 1, May 2011, <http://www.nonproliferation.eu/documents/nonproliferationpapers/01_grip.pdf>.

[68] Hautecouverture, B., 'The CBRN centres of Excellence of the EU: an Interview with Bruno Dupré', *The Non-Proliferation Monthly* (Cesim), no. 64, Oct. 2011, p. 3, <http://www.cesim.fr/fichiers/onp64-octobre.pdf>.

help these countries in the development of resilient safety and security cultures by sharing its best practices on nuclear safety and security. Algeria, Egypt, Jordan, Morocco and the UAE all have ambitious plans in the nuclear power sector and some of them are going through turbulent political times (and some might still be affected by the Arab Spring in the future). The recent incident at the Egyptian Al-Dabaa site is illustrative of the dangers that can result when nuclear power meets fragile statehood and domestic unrest.[69] Hence, it is of paramount importance to foster a domestic nuclear safety and security culture in the MENA region that can withstand possible political turmoil in the future. This competence building could either be directed to selected states (as the INSC and CBRN Centres of Excellence programmes do) or it could target the region as a whole, if the Arab Atomic Energy Agency (a largely dormant institution in the MENA region) was the subject of a competence transfer. Helping selected countries in the establishment of a robust safety and security culture in the nuclear realm can be a pragmatic contribution by the EU to enhancing security and stability in its neighbourhood, without prejudicing the energy choices of relevant target countries. With pro- and anti-nuclear member states, the EU is in no position to advocate a specific energy option, but it can offer a broad dialogue on nuclear economics, security, safety and the regulatory challenges of nuclear power, based on the experiences of its member states. This information might encourage some EU partners to explore alternative energy options and scale down or abandon their nuclear energy ambitions.

IX. CONCLUSIONS

All economic forecasts for the 21st century predict the strong growth of emerging markets and the relative decline of Western economies.[70] In the Citigroup projection for 2050, only two Western economies—the US and Japan—are listed among the ten largest economies in the world[71]. The other countries in this top ten list are the BRIC countries and four large NNWS from the South: Egypt, Indonesia, Mexico and Nigeria.

With a shifting balance of economic power, multilateral regimes such as the NPT and the NSG will inevitably come under pressure; they were drafted by the hegemonic powers of the cold war, with limited consideration for the needs of the developing world. The massive entry of emerging countries into the NSG expected in the coming years will certainly represent a great challenge for future decision making on rules for nuclear trade, especially as the NSG takes decisions by consensus.[72]

At the same time, as the last NPT RevCon and the latest NSG discussions clearly showed, the diplomatic weight of emerging countries from the South is growing: their demands for nuclear disarmament, especially in the Middle East, and their claims for unfettered access to peaceful uses of nuclear energy cannot be overlooked any longer.

A prudent policy will try to engage these emerging powers at an early stage, accommodate some of their demands and search for common ground on new nuclear energy governance. Finding a new consensus on nuclear energy 'rights and wrongs' could then be the first step towards a more just 21st century nuclear order.

ABBREVIATIONS

BRIC	Brazil, Russia, India, China
CBRN	Chemical, biological, radiological and nuclear
ENR	Enrichment and Reprocessing
Euratom	European Atomic Energy Community
IAEA	International Atomic Energy Agency
INSC	Instrument for Nuclear Safety Cooperation
LWR	Light water reactor
MENA	Middle East and North Africa
MNA	Multilateral Nuclear Assurance
NAM	Non-Aligned Movement
NNWS	Non-nuclear weapon state(s)
NPT	Non-Proliferation Treaty
NWS	Nuclear weapon state(s)
NSG	Nuclear Suppliers Group
OECD	Organisation for Economic Co-operation and Development
TRU	Transuranic waste

[69] Miller, S. E. and Sagan, S. D., 'Nuclear power without nuclear proliferation?', *Journal of the American Academy of Arts and Sciences*, vol. 138, no. 4, 2009, pp. 7–18. See also note 51.

[70] Dadush, U. and Shaw, W., *Juggernaut: How Emerging Markets are Reshaping Globalization* (Carnegie Endowment for International Peace: Washington, DC, 2011).

[71] CitiGroup. 'Global Growth Generators: Moving Beyond "Emerging Markets" and "BRIC"', Global Economics View, 1 March 2011.

[72] Hibbs (note 8).

EU Non-Proliferation Consortium

The European network of independent non-proliferation think tanks

A EUROPEAN NETWORK

In July 2010 the Council of the European Union decided to create a network bringing together foreign policy institutions and research centres from across the EU to encourage political and security-related dialogue and the long-term discussion of measures to combat the proliferation of weapons of mass destruction (WMD) and their delivery systems.

STRUCTURE

The EU Non-Proliferation Consortium is managed jointly by four institutes entrusted with the project, in close cooperation with the representative of the High Representative of the Union for Foreign Affairs and Security Policy. The four institutes are the Fondation pour la recherche stratégique (FRS) in Paris, the Peace Research Institute in Frankfurt (PRIF), the International Institute for Strategic Studies (IISS) in London, and Stockholm International Peace Research Institute (SIPRI). The Consortium began its work in January 2011 and forms the core of a wider network of European non-proliferation think tanks and research centres which will be closely associated with the activities of the Consortium.

MISSION

The main aim of the network of independent non-proliferation think tanks is to encourage discussion of measures to combat the proliferation of weapons of mass destruction and their delivery systems within civil society, particularly among experts, researchers and academics. The scope of activities shall also cover issues related to conventional weapons. The fruits of the network discussions can be submitted in the form of reports and recommendations to the responsible officials within the European Union.

It is expected that this network will support EU action to counter proliferation. To that end, the network can also establish cooperation with specialized institutions and research centres in third countries, in particular in those with which the EU is conducting specific non-proliferation dialogues.

http://www.nonproliferation.eu

FONDATION pour la RECHERCHE STRATÉGIQUE

FOUNDATION FOR STRATEGIC RESEARCH

FRS is an independent research centre and the leading French think tank on defence and security issues. Its team of experts in a variety of fields contributes to the strategic debate in France and abroad, and provides unique expertise across the board of defence and security studies.
http://www.frstrategie.org

PRIF Peace Research Institute Frankfurt — HSFK Hessische Stiftung Friedens- und Konfliktforschung

PEACE RESEARCH INSTITUTE IN FRANKFURT

PRIF is the largest as well as the oldest peace research institute in Germany. PRIF's work is directed towards carrying out research on peace and conflict, with a special emphasis on issues of arms control, non-proliferation and disarmament.
http://www.hsfk.de

IISS

INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES

IISS is an independent centre for research, information and debate on the problems of conflict, however caused, that have, or potentially have, an important military content. It aims to provide the best possible analysis on strategic trends and to facilitate contacts.
http://www.iiss.org/

sipri

STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

SIPRI is an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. Established in 1966, SIPRI provides data, analysis and recommendations, based on open sources, to policymakers, researchers, media and the interested public.
http://www.sipri.org/