

International Security on the Road to Nuclear Zero

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In meetings among like-minded states and advocacy organizations trying to reduce nuclear risks, optimism generated by influential endorsements of the idea that everybody would be safer in a world without nuclear weapons is tempered by intense frustration about the difficulty of inching forward toward that goal.¹ It is tempting to blame all the obstacles on somebody else—states that cling to the power and prestige associated with nuclear weapons, or special interest groups that prevent national leaders from acting for the greater good. A more constructive response might include examining whether some strategic choices made by those who want to reach domestic and international agreement on major nuclear risk reduction measures might be having unintended, and counter-productive effects, because these choices are within our direct control.

If we in the broad community of international arms control and nonproliferation are honest, we will admit that deep ambivalence exists, not only among those who doubt the possibility or desirability of eliminating all nuclear weapons, but also among many who wholeheartedly support that goal, but are uncomfortable about the larger changes to security policy that would be necessary to reach it. Uniting around the vision of “no nuclear weapons” obscures important, but highly divisive, questions about the kind of alternative security arrangements that will be needed as we reduce, and then eliminate or fundamentally transform the role of nuclear weapons and the institutions built around them.

I want to highlight four main areas of ambivalence among members of the arms control and nonproliferation community. The first involves strategic stability on the road to zero, especially among Russia, China, and the United States. The second involves alliance relations, particularly how to ensure NATO cohesion and preserve extended deterrence as nuclear arsenals decline. The third involves global governance at a time when states care more about preserving flexibility and minimizing short-term costs than they do about the long-term benefits of cooperation. The fourth involves peaceful nuclear technology, now and if global use expands dramatically to avert catastrophic climate change.

Disagreements about how to handle these four areas of ambivalence reflect real and current concerns, not just misperceptions or outmoded Cold War mindsets. Failure to address them will make the diplomatic and political environment progressively less favorable even for incremental arms control or nonproliferation advances, let alone for truly transformational leaps. Mishandling them by making domestic and allied support for nuclear cooperation contingent on moves that will predictably increase international opposition, or vice versa, will make it impossible to get the multi-level support required to move forward.²

A more productive strategy involves confronting our own ambivalence, then considering how individuals, nongovernmental organizations, analysts, and national representatives can practice systematic mutual reassurance not only among those considered part of their like-minded group, but including everybody whose cooperation is needed to fulfill the long-term objectives of the

Non-Proliferation Treaty (NPT). It is daunting to contemplate broadening the agenda of challenging issues that must be simultaneously addressed to make sure that the level of nuclear cooperation rises faster the growing risks from residual arsenals, proliferators, and catastrophic terrorists. But pursuing this broader cooperative security agenda is essential to build winning coalitions needed to secure domestic and international agreement on practical measures that will eliminate, not perpetuate, nuclear risks.

Strategic Stability

During the Cold War, the primary function attributed to both nuclear weapons and arms control was to preserve strategic stability—to minimize incentives for a disarming first strike, for pre-emption in a crisis, for escalation from a limited conflict to a general nuclear war, and for wasteful or dangerous arms racing.

A common question asked of those working for a nuclear weapon-free world is how to keep the risk of deterrence failure from going up as the number of U.S. and Russian nuclear weapons goes down. In theory, strategic stability might be harder to preserve at very low numbers for many reasons, including concerns about ensuring the survivability of a sufficient retaliatory force; fears that low-level cheating on arms control would be more militarily significant; and worries that a second-tier nuclear weapon state might be more tempted to challenge a first-tier state that no longer had overwhelming nuclear superiority.

The typical response is that overwhelming U.S. conventional military superiority will ensure strategic stability on the road to zero nuclear weapons. This builds off the logic behind the Bush administration's new strategic triad, in which reductions in offensive nuclear weapons are offset by increases in precision conventional offense, missile defense, and a responsive infrastructure that could rapidly build new nuclear weapons if future U.S. policymakers decided they were needed.

This answer is an effective way to reduce American and allied concerns about strategic stability because it assumes that their side would have far more overall strategic capability than potential rivals in a world with few or no nuclear weapons. Furthermore, this conventional superiority could be used without breaking the nuclear taboo, generating radioactive fallout, or causing disproportionate civilian casualties. The responsive infrastructure would also provide a much larger hedge against nuclear uncertainty and a greater ability to exploit future technological developments for non-nuclear strategic advantages.

From the perspective of Russian and Chinese strategic planners, though, using international cooperation to reduce nuclear weapons without corresponding constraints on other U.S. strategic capabilities looks highly destabilizing. It would validate a security paradigm in which security relations among the big three remain fundamentally competitive while changing the rules and the tools of the game in ways that further favor the side that is already in the strongest position.

Much as the United States might like to keep nuclear arms control completely separate from missile defense and space weapons, the three are inextricably linked for Russia and China. The July 2009 Joint Understanding between presidents Obama and Medvedev specified that a new

START accord should include “the situation regarding the relationship of strategic offensive and defensive weapons.”³ Disagreement about that topic was a prime impediment to replacing START I before it expired in December 2009. The resulting treaty mentions the offense-defense relationship in its pre-ambule but places no legal limits on missile defense, a compromise that only intensified opposition from treaty opponents in both countries’ ratification debates. Russian and Chinese diplomats have also consistently underscored that putting dedicated weapons in space, especially missile defense interceptors, or using any type of capability as an anti-satellite weapon would undermine existing strategic stability, impede nuclear arms reductions, and generate a new strategic competition as dangerous and expensive as the Cold War.⁴

To avoid reinforcing foreign arguments against arms control, we must find a way to address domestic and allied concerns about strategic stability on the road to zero without inadvertently intensifying insecurity for other countries. Of course, it would be equally counterproductive to answer Russian and Chinese concerns by making further nuclear reductions depend on first equalizing or eliminating U.S. advantages in conventional offense and missile defense because that would generate blocking opposition from U.S. domestic and allied interests.

A more realistic and effective strategy would accept the existing imbalance of strategic capabilities as a basic feature of the global security environment that is not going to change dramatically anytime soon, given the huge disparity in defense spending and technology development over the past two decades. But instead of assuming that overwhelming U.S. military superiority automatically enhances security for us and anyone else who does not want to challenge the status quo, we should treat it as a mixed blessing—like nuclear weapons themselves—that needs to be carefully managed to have net positive effects on security rather than to stimulate dangerous counter-reactions.

If the primary function of Cold War arms control was to stabilize mutual deterrence between two roughly equal powers, now the primary function should be to provide mutual reassurance among many diverse states with widely differing capabilities and complex interdependent relationships. As part of our strategy to convince Russia and China to do more on nuclear reductions and nonproliferation, we should be trying to provide more concrete and credible reassurance about how the United States and its allies intend to use their current non-nuclear strategic advantages, and how we intend to develop them in the future. This means using our current advantages in information, advanced technologies, and military capabilities in ways that improve the security and well-being of all countries. It also means supporting equitable rules about access to, and use of, these twenty-first century sources of power, so that other countries do not feel that we are trying to keep them in a perpetually subordinate position.

Since space and missile defense are two strategic realms where the Russians and Chinese have been most pointedly asking for reassurance, it makes sense to consider what the United States could do there to improve the prospects for nuclear cooperation. It is not realistic to reinstate the Anti-Ballistic Missile Treaty, so we need others way to provide reliable reassurance that any future missile defense system will be designed and operated in a way that provides protection against a small number of missiles from proliferators or terrorists, but that does not undermine the Russian or Chinese nuclear deterrent so long as it is central to their security strategy vis-à-vis the United States.

So far, the Obama administration has responded to Russian concerns by reviving old proposals for increased missile defense transparency, early warning data exchanges, and unspecified possible future joint missile defense activities.⁵ The most it currently offers China is “strategic dialogue.” These kinds of confidence-building measures pale in comparison to the administration’s open-ended plans to keep enhancing long-range missile defense capabilities in the United States while working harder to build and integrate increasingly capable regional missile defense systems in Europe, Asia, and the Middle East.

If the Obama administration wanted to provide more meaningful strategic reassurance, it could start by ruling out the testing and use of space-based missile defense interceptors, the basing mode that is technologically least mature and most expensive, but that (theoretically, at least) would be uniquely capable of boost-phase intercepts against launches from internal locations of large countries. This move could be taken unilaterally or multilaterally, alone or in conjunction with a comparable norm or legal prohibition on the testing and use of hit-to-kill anti-satellite weapons. The Obama administration should also shift from passively supporting discussions about space codes of conduct and transparency measures to actively promoting serious negotiations over stronger steps to prevent weapons from being tested or used in space and to protect peaceful satellites from both deliberate and inadvertent threats.

Alliances

It will be equally important to address American allies’ ambivalence about nuclear reductions not primarily by building up non-nuclear strategic military capabilities, but by undertaking political actions to demonstrate that relationships among traditional U.S. allies will be as strong, cohesive and important as ever in a world without nuclear weapons and with more inclusive security arrangements.

A politically potent argument against deep U.S. nuclear reductions is the assertion that unless the United States keeps more nuclear capability than it needs to deter Russia or China from attacking the United States, its allies will lose confidence that the U.S. nuclear umbrella has extra room to shelter them, and they will develop their own nuclear weapons. This logic is faulty: Keeping extra U.S. nuclear weapons does not make it correspondingly more likely that the United States would risk Los Angeles to retaliate for a nuclear attack on Tokyo. The evidence of allied propensity to proliferate is also extremely weak. But because of the symbolic role that nuclear weapons have played in alliances formed during the Cold War, there are senior officials from some allied countries who are concerned that a more restrictive U.S. nuclear-use doctrine, the removal of tactical nuclear weapons from Europe, or other changes to U.S. nuclear weapons policy would have a negative political effect on a relationship that is critical to their security policy. This amorphous concern about the political effect of changes to U.S. nuclear weapons policy is then used in U.S. policy debates by those who oppose change as an altruistic reason for retaining larger numbers and more diverse types of nuclear weapons at higher levels of operational readiness than could be justified by an objective assessment of what the United States actually needs to address any plausible nuclear threats from Russia, China, regional proliferators, or terrorists.⁶

Those who want to reduce the role of nuclear weapons in U.S. security policy typically respond to these concerns about alliance politics in one of two ways, depending on whether their preferred long-term goal is to keep a smaller nuclear deterrent or to eliminate all nuclear weapons. Both responses start by affirming that regional threats confronting U.S. allies are real and growing, and that increasing allied military capability is the appropriate response. Minimal deterrence proponents then argue that by planning to use nuclear weapons only in response to a nuclear attack on the United States or its allies, the United States is reserving nuclear threats for the two scenarios where they would be most credible and is acknowledging the need for non-nuclear options to address all other cases. Advocates for elimination go a bit further, suggesting progressive steps to de-nuclearize NATO and reconfigure the alliance relationship between the United States and Japan by replacing the U.S. nuclear guarantee with closer and more active cooperation on missile defense and advanced technologies for precision conventional offense.

These strategies for addressing allied ambivalence about U.S. nuclear reductions compound Russian and Chinese unease about their own security in a world where nuclear weapons have less salience by reaffirming the continued centrality of exclusive alliances whose purpose, cohesion, capabilities, and budgets all benefit from worst-case depictions of external threats. This is not what either country expected would happen after the Cold War ended, and it makes it much harder to get their cooperation on North Korea, Iran, or any other Twenty-first Century security challenge.

After the end of the Cold War, Russia had hoped that the nascent cooperative security institutions in Europe would evolve to replace bilateral alliance confrontation as the dominant mode of security organization. China had begun to engage more actively and constructively in numerous multilateral security fora in the expectation that they would become progressively more important for managing global security.

Instead, the George W. Bush administration saw the huge disparity in global military power that developed in the decade after the Cold War as a reason why the United States should do whatever might increase its own security, unilaterally if necessary, without being unduly constrained by international law, multilateral organizations, or objections from other states. It initiated a war against Iraq without Security Council approval; it rejected or blocked any new multilateral constraints on U.S. military capabilities; it supported NATO membership for former Soviet states; and it forged a new strategic partnership with India as a counterweight to China. The Obama administration has returned to a more multilateral orientation, but so far it has done more to reaffirm multilateral organizations that exclude Russia and China, and that are at least partially directed against them, than it has to rebuild organizations where they could have an equal voice and receive equitable security benefits.

One of the strongest arguments for the global elimination of nuclear weapons, accepted as self-evident by those who would like to denuclearize U.S. alliance relations, is that discriminatory rules for nuclear weapons are self-defeating and unsustainable. But how can we expect all NPT nuclear weapon states to give up the perceived security and prestige benefits of membership in that exclusive club when some see no prospect of either joining or disbanding the world's other most powerful and prestigious security club, the U.S. alliance system?

In posing this question, I am not proposing that alliance relationships which have stood their members in good stead for decades should be weakened as a quid pro quo for gaining more Russian and Chinese help on nonproliferation. That would only increase U.S. domestic and allied opposition to the nuclear risk reduction agenda. Instead, I am suggesting that we find ways to reassure current members of the U.S. alliance system about their security on the road to zero that have a positive, or neutral, rather than a negative effect on the security of those outside the alliance system. At the same time, we should be strengthening existing regional cooperative security institutions and creating new ones so that we have efficient, effective, and inclusive options available for addressing a progressively wider array of regional security challenges.

A good place to begin would be by replacing regional threat assessments with more comprehensive joint evaluations of regional security conditions by military, diplomatic, and economic experts. Such evaluations would evaluate how different kinds of security risks have increased or decreased since the end of the Cold War, considering not only the changing distribution of military capabilities but also the intensifying patterns of economic interdependence, information flows, and non-military security challenges such as pandemic disease and environmental degradation. They would also survey the full range of options for managing risks, minimizing conflict, and maximizing cooperation on regional security problems, weighing the net effects of building up national or alliance military capabilities against the net effects of other options.

Even if these comprehensive joint security assessments were conducted only among countries that are already members of the U.S. alliance system, the effort could have reassuring effects for both insiders and outsiders. Exaggerated threat perceptions could be corrected, while well-grounded concerns could be more widely acknowledged and more effectively addressed with fewer unintended consequences on military, economic, and political relationships with others in the region. Even more mutual reassurance could be provided by including countries outside the U.S. alliance system in such comprehensive joint regional security assessments and by using the results to build support for strengthening inclusive cooperative security organizations.

Institutional Capacity for International Governance

The need to build up more inclusive cooperative security institutions to complement, and someday perhaps, to replace exclusive military alliances raises a third common cause of ambivalence about progressive nuclear risk reduction—the weaknesses of existing international organizations. It is fair to ask how anyone can talk seriously about the verified elimination of nuclear weapons when the Conference on Disarmament (CD) has not negotiated anything for over a decade and the Security Council cannot decide on a coherent response to Iranian non-compliance with its existing nuclear obligations.

More effort has been devoted by states and nongovernmental actors to building the global nuclear restraint regime than to developing principles, norms, rules, joint decision-making procedures, and compliance mechanisms for any other security issue. Given the enormity of the stakes, countries were often reluctant to compromise with each other or to cede much power to an implementing organization. But knowledge of the vast devastation caused by a single fission

bomb and of the likely consequences of a thermonuclear war spurred negotiators and activists to keep working against strong resistance.

The end of the Cold War brought major advances in both the constraints and the compliance mechanisms that states were willing to accept on their nuclear programs. Instead of building on this progress, though, some states and non-governmental actors who had historically been the strongest supporters of legally binding agreements and effective verification decided they were no longer worth the trouble. The Bush administration's attitude represented the most dramatic reversal from earlier U.S. leadership in building the nuclear restraint regime. But a number of countries and advocacy organizations that still favored denuclearization of security policies also shifted their emphasis. Some decided that the likelihood of large-scale nuclear war was now low enough that they should concentrate on land mines, small arms, and other weapons that kill many innocent civilians on an annual basis. Others continued to view nuclear proliferation and terrorist acquisition as urgent security priorities. But they hoped that the end of the Cold War would make it possible to gain the requisite cooperation through "innovative" instruments: political declarations, codes of conduct, transparency and confidence-building measures, and cooperative threat reduction.

Ironically, now that the Obama administration wants to lead a global effort to achieve the verified elimination of nuclear weapons, we have fewer governance tools and less ability to create new ones than we did during the Cold War. Many of the most critical legacy agreements no longer exist or are in jeopardy; vital organizations like the International Atomic Energy Agency (IAEA) are under-staffed and under-resourced; the United States and other key countries have lost much of their relevant diplomatic and technical expertise; and the main multilateral disarmament negotiating forum has forgotten how to function after a decade of disuse.

The arms control and nonproliferation community is internally divided about the appropriate response to this serious problem. Some members want to invest more heavily in trying to strengthen state capacity to do governance activities that only states can do—such as negotiate and implement legally binding agreements and operate inter-governmental organizations with substantial authority, budgets, and staff. Others prefer to shift more attention and resources towards informal policy coordination and nongovernmental cooperative initiatives in hopes that they can accomplish more for less in a shorter period of time.

The Obama administration is clearly ambivalent about this question, as are many other governments of large and small countries. Part of their ambivalence reflects the difficulty of deciding whether the benefits of legal agreements that constrain others' behavior, reduce misperceptions, and increase predictability outweigh the costs of future constraints on one's own flexibility and freedom of action. Another part stems from difficulty deciding whether the long-term value of building the strongest possible mechanisms to eliminate nuclear risks outweighs the short-term costs of negotiating, ratifying, and implementing legally binding agreements with effective verification, compliance management, and enforcement provisions.

The governance dilemma is even sharper for nongovernmental analysts and advocates. They may understand intellectually that of all the global governance challenges, nuclear weapons are—and should remain—at the end of the issue spectrum where governments have the most control over

outcomes. But nongovernmental actors often have little insight into why governmental efforts to reduce nuclear risks move as slowly as they do. They also know that the more state-centric the nuclear risk reduction strategy is, the less directly they can contribute.

To make progress on the governance problem, a first step is to start thinking about some transaction costs of security cooperation as prudent investments, not something to be avoided or minimized whenever possible. While voluntary confidence and transparency building measures may be sufficient for low-risk, low-consequence security problems, it will be impossible to persuade all states to reduce or eliminate their nuclear weapons without clear-cut legal obligations, unprecedented verification arrangements, and highly evolved implementing organizations. Even on low-risk, low-consequence security cooperation, it may make sense to put the agreement in legal form, to include some joint verification measures, and to demonstrate high levels of compliance as a way to build the institutional infrastructure and the trust that will become increasingly important as the world moves towards nuclear elimination.

To take an example favored by fans of voluntary cooperation, parallel presidential nuclear initiatives (PNIs) were the fastest way to address urgent concerns about control of tactical nuclear weapons during the break-up of the Soviet Union. But the non-binding pledges could have had much greater value over time if the two leaders had followed their public announcements by directing teams of diplomats, lawyers, and technical experts to develop a more detailed accord specifying what each side had committed to do, how they would document that they had done it, and whether or not they were obligated not to undo it in the future. There would be less uncertainty, and fewer unsubstantiated accusations. We would have a bigger pool of governmental and nongovernmental experts with more shared knowledge about all kinds of non-strategic nuclear weapons. And we would have a stockpile of precedents, including definitions, monitoring technologies, and dismantlement procedures, which could be used now that some of the same people who insisted that we did not need formal controls on tactical nuclear weapons in the 1990s believe that we cannot have further strategic reductions without them.

A second recommendation is to use the institution-building resources that we have more efficiently and effectively. After a decade during which arms control was belittled as an outmoded relic of the Cold War, the Obama administration and other governments, as well as numerous independent entities engaged in nuclear analysis and advocacy, have started trying to rebuild and expand their capacity to negotiate, ratify, and implement arms control and nonproliferation accords. But no matter how much renewed energy and additional funds we can bring to this project, it will be a long time before the combined assets on the side of cooperative security come anywhere close to those on the side of competitive security. Therefore, we must be much smarter and more creative, doing our best to cooperate rather than compete amongst ourselves.

The problem of counterproductive competition among groups advocating for nuclear arms control, nonproliferation, and elimination is unfortunate. On paper, each group is committed to working synergistically with other initiatives. But in practice, competition for a larger share of limited funding and policy attention can lead groups working on the same issue to withhold

information that might be more usefully shared, and to build up the perceived value of their group by putting down the others.

There is another counterproductive division within the nuclear arms control and nonproliferation community. The word “academic” is often used as a pejorative by diplomats and activists who want to suggest that their analysis is realistic and results-oriented, in contrast to work by scholars in ivory towers. Such a sweeping dismissal of everything academic can have unintended consequences. It undermines the professional standing of those in universities who are doing policy-oriented research, making it harder for officials and advocacy groups to use academic research to inform debates and influence outcomes. That plays into the hands of anti-arms control ideologues who do not want contrary facts to complicate their agendas. It impedes the flow of ideas and individuals between universities and organizations doing day-to-day policy work, with damaging effects now and on the training and career aspirations of potential future nuclear experts. It also provides a convenient way to avoid uncomfortable questions about whether “practical” plans for eliminating nuclear weapons have a comprehensive and realistic enough understanding of the problem to achieve the desired results.

Some steps to strengthen nuclear governance require governments to confront their own ambivalence about the associated costs and risks. Getting the CD functioning smoothly again or replacing it with one or more negotiating bodies that would be more effective involves both strong and weak states deciding that the ability to negotiate new multilateral security agreements is more important than maintaining veto power over anything that might be proposed for negotiation in the future. All states still need strong assurances that their concerns will be considered carefully and that they will not be expected to sign any agreement that does not serve their security interests. But those positive functions of the consensus process can still be accomplished without allowing any one member to block initiation of work on a topic of great interest to the rest of the community, or to prevent the rest of the members from reaching an agreement that would serve their security interests well.⁷

In addition to showing skeptics that the international community is capable of negotiating new agreements to reduce nuclear risks, governments who support this objective must also demonstrate that they can cooperate to ensure compliance with existing nuclear agreements. This is usually termed an “enforcement” problem, with attention focused on the level of punishment needed to compel compliance by a law-breaking state and to deter future violations. But given the complexities and ambiguities of security cooperation, we need a broader spectrum of options to address non-compliance, along with a greater ability to get international agreement about which option is best suited for fixing a given problem and for ensuring full compliance in the future.⁸ When the rules are unclear or a state lacks the capacity to fulfill its obligations, the international community needs the diplomatic, legal, technical, and financial resources to provide clarification or capacity-building assistance. If non-compliance is a bargaining strategy to increase attention to unresolved security concerns, then other states should show that it is easier to address those concerns through cooperation than through adversarial bargaining. Economic carrots and sticks can be helpful or counterproductive, depending on the circumstances, but increased trade or tighter sanctions will not change behavior if the underlying motives involve security, rather than economics or prestige.

Peaceful Nuclear Programs and the Challenge of Global Warming

The current international standoff over Iran's nuclear program raises another source of ambivalence within the nuclear nonproliferation community—the fact that the NPT is designed to facilitate the peaceful use of nuclear energy as well as to stop proliferation and promote disarmament. The treaty places no limits on states' "inalienable right" to develop and use nuclear energy for purely peaceful purposes without discrimination. It also specifies that all members have an obligation to facilitate, and a right to participate in, the fullest possible exchange of equipment, materials, and information for the peaceful use of nuclear energy. The problem, of course, is that some of the same equipment, materials, and information used for peaceful nuclear purposes could be used clandestinely, or openly after treaty withdrawal, for weapons applications.

The NPT's solution to this dilemma is to use IAEA safeguards to confirm the accuracy and completeness of non-nuclear weapon states' claims that all their nuclear materials and facilities are being used purely for peaceful purposes. The basic safeguards obligations were deliberately designed to be low-cost, non-intrusive, cooperative, and nondiscriminatory because most countries using nuclear energy when the treaty was negotiated either already had nuclear weapons, and thus were exempt from the safeguards, or were democratic states expected to keep their nonproliferation commitments even without close international scrutiny. The NPT safeguards regime has been strengthened in recent decades, but it still rests on the basic principle that any state can have its own advanced nuclear capabilities, including enrichment and reprocessing facilities capable of producing weapon-grade fuel, as long as those national facilities are subject to IAEA oversight.

The Iranian case makes nonproliferation experts especially uncomfortable due to the unusual nature of that regime, its failure to fully cooperate with the IAEA, and its rejection of Security Council demands that it stop enriching uranium. But rather than treat Iran as a unique case, we should see it as the leading example of a dilemma that will only intensify as more countries that do not already have nuclear weapons and are not deemed inherently trustworthy want to use nuclear energy.

The nonproliferation community's current response is to put more money into the IAEA safeguards system, to encourage more countries to accept the Additional Protocol and expand IAEA oversight of their programs, and to establish fuel banks or suppliers' consortium that offer fuel for power plants at an attractive enough price that it does not make economic sense for most countries to build their own enrichment or reprocessing facilities. These incremental measures can help at the margins, especially if the global use of nuclear energy remains relatively flat, as it has for decades. But the countries of greatest concern right now are not likely to give up advanced nuclear capabilities for purely economic reasons. Furthermore, the whole system of international safeguards on national nuclear programs will be overwhelmed if, as looks likely, the global use of nuclear energy needs to expand dramatically in coming decades in order to avert catastrophic climate change.⁹

The way to avoid an unpalatable choice between nuclear disaster and catastrophic climate change was foreshadowed by the 1946 Acheson-Lilienthal Report.¹⁰ It argued that the only

realistic way to enjoy the benefits of peaceful nuclear energy without the risks posed by competitive national nuclear weapons programs would be to establish an international agency with direct operational control over all dangerous nuclear materials and activities. The Acheson-Lilienthal logic was compelling then, and remains so today. Political circumstances should be more favorable now that the dominant security concern involves keeping nuclear capabilities away from outlaw states and terrorist groups, not balancing major powers' nuclear forces to deter attack and minimize coercion. Technological developments are also underway that could be used to keep tight control over sensitive materials, facilities, technologies, and expertise without internationalizing the entire global nuclear energy generation system.

Nuclear power is currently generated by very large light water reactors (100-1600 MWe) that are extremely expensive and time-consuming to build, difficult to site appropriately, and challenging to operate safely. Researchers around the world have been working for several decades on designs for much smaller reactors (under 300 MWe) with advanced safety features and sealed cores containing enough fuel to last for multiple years. They can be used individually for niche applications where only a small amount of power is needed or can be handled by the local electrical grid, or they can be hooked together to generate as much power as a large reactor.

Current efforts to develop small modular reactors could be redirected to prioritize designs that offer the most proliferation-resistance even if they are not the designs that are closest to becoming commercially available. Technically sound designs exist for small reactors with sealed cores that would not require refueling for multiple decades. Regional fuel-cycle centers could produce these light weight, passively safe reactors; transport them by rail, road, or barge to the desired location; then return them to the regional center for spent fuel management. Implementing this hub-and-spoke arrangement on a large enough scale to help avert catastrophic climate change would require both nuclear disarmament and subordination of national and commercial advanced fuel cycle operations to international control. That is hard to envision under current conditions, but it is even harder to figure out how we can simultaneously avert global warming and prevent proliferation in a less radical way.

Conclusion

Negotiating, ratifying, and implementing nuclear risk reduction measures have never been easy. It may be even harder to admit, therefore, that some of the strategies adopted to build support for arms control and nonproliferation in like-minded countries have had the unintended effect of decreasing support for nuclear cooperation outside of the U.S. alliance system. Likewise, some of the "innovative" ways to make nuclear cooperation easier have ended up neither providing as much direct security benefit as their proponents originally hoped, nor helping to develop the institutional infrastructure needed for more ambitious and effective forms of cooperation.

Acknowledging these counter-productive patterns illuminates things about our own attitudes and strategic choices that can be changed to get more productive results. For each of the four areas of ambivalence, I have tried to give concrete suggestions for steps that are within our own control and that could provide both internal and external reassurance, rather than addressing our own concerns at a potential cooperative partner's expense. By thinking about nuclear risk reduction as a two-level game where the only realistic way to get the desired result is to find moves that

increase the prospects for both domestic and international agreement, it becomes easier to identify practical things that governments and organizations can do that would enjoy support not only with their own policy elites, publics, and allies, but also with other countries whose participation is key to the success of cooperative security arrangements.

Recognizing the complex connections between the nuclear risk reduction agenda and other types of global challenges also makes it easier to work productively with people who do not share an intense concern with nuclear policy, but do share our broader commitment to building equitable and inclusive governance arrangements that enhance mutual security and well-being. Rather than complaining when global warming receives more media coverage and policy attention than nuclear weapons do, or arguing about where nuclear weapons should rank as a security priority compared with ending civil violence and building sustainable peace in Iraq and Afghanistan, we should look for potential synergies among these disparate issues. Seen in this way, the number of national, intergovernmental, and nongovernmental actors working on cooperative responses to global challenges far outnumbers the people and resources devoted to purely military solutions. Having the power of numbers on our side is not enough to counteract the disproportionate role that nuclear weapons and competitive military programs have come to play in the world today, but it should make it easier to find partners, combine resources, and choose effective strategies for the hard, but vitally important, work ahead.

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ENDNOTES

¹ This essay is based on an address delivered at the Middle Powers Initiative's "Atlanta Consultation III: Fulfilling the Promise of the NPT," The Carter Center, Atlanta, GA, January 20-22, 2010. It reflects themes from the Advanced Methods of Cooperative Security program, a research, education, and outreach initiative originated by the John D. and Catherine T. MacArthur Foundation. For more on this research agenda, see: www.cissm.umd.edu.

² The image of arms control as a two-level game requiring both domestic and international agreement comes from Peter B. Evans, et al., *Double-Edged Diplomacy* (Berkeley, CA: University of California Press, 1993).

³ The White House fact sheet released about the joint statement did not mention missile defense, but the Russian government posted the text of the understanding on its website and Pavel Podvig's translation includes the language about the relationship between offensive and defensive weapons. See http://www.whitehouse.gov/the_press_office/FACT-SHEET-The-Joint-Understanding-for-the-START-Follow-on-Treaty/ and http://russianforces.org/blog/2009/07/good_progress_at_the_moscow_su.shtml.

⁴ For recent examples, see the statement by Sergey Lavrov at the CD on February 12, 2008 at: http://www.un.int/russia/new/MainRoot/docs/off_news/120208/newen1.htm and the statement by H.E. Mr. Cheng Jingye at the Third Session of the Preparatory Committee for the 2010 NPT Review Conference, 4 May 2009, at: <http://www.china-un.org/eng/hyyfy/t560530.htm>.

⁵ When the Obama administration announced in September 2009 that it would pursue the Phased Adaptive approach to missile defense rather than the Bush administration's plan to build a missile interceptor field in Poland and a radar facility in the Czech Republic, it insisted that the change reflected intelligence assessments and enhanced technology, not an effort to allay Russian concerns. The initial phases of the Obama administration plan are focused on defense against short- and medium-range Iranian missiles, but if subsequent phases are pursued as scheduled, both the technical capabilities and the political ramifications will again pose problems for Russia unless it is participating in substantial joint missile defense activities by then.

⁶ Shortly before the Obama administration completed its nuclear posture review, the Japanese Foreign Minister sent his U.S. counterpart a letter repudiating claims made by members of the bipartisan Congressional Commission on the Strategic Posture of the United States that the Japanese government had told them that for the sake of extended deterrence, Japan opposed retirement of the TLAM/N and favored development of a Robust Nuclear Earth Penetrator. See Hans Kristensen, "Japanese Government Rejects TLAM/N Claim," *FAS Strategic Security Blog*, January 24, 2010, at: <http://www.fas.org/blog/ssp/2010/01/japanrejects.php>.

⁷ Rebecca Johnson, "Unfinished Business: Lessons from the CTBT Negotiations," *Disarmament Diplomacy* 91 (Summer 2009), at: <http://www.acronym.org.uk/dd/dd91/91ctbt.htm>.

⁸ On the need to think in terms of "compliance management rather than enforcement, see Abram Chayes and Antonia Handler Chayes, *The New Sovereignty* (Cambridge, MA: Harvard University Press, 1995).

⁹ Most thinking about managing the proliferation implications of increase nuclear energy use has assumed an incremental increase that could be addressed through incremental changes to existing safeguards arrangements. If concerns about energy independence remain the major motivation, the IAEA projects that global nuclear power use will increase 70% by 2050. If governments make a more concerted effort to build up nuclear capacity in order to develop enough carbon-free energy sources to mitigate climate change, the IAEA projects a 400% increase by 2050. Undertaking a global nuclear expansion of this magnitude without increasing proliferation or terrorist access to nuclear materials would require much more significant changes to the technologies used for generating nuclear power, the international control arrangements, and the role of nuclear weapons in security policy. See "Energy, Electricity and Nuclear Power

Estimates for the Period up to 2050, International Atomic Energy Agency, Reference Data Series No. 1, 2010 edition and Harold Feiveson, et al., “Can Future Nuclear Power Be Made Proliferation Resistant?” CISSM working paper, July 2008, at: http://www.cissm.umd.edu/papers/files/future_nuclear_power.pdf.

¹⁰ “A Report on the International Control of Atomic Energy,” Prepared for the Secretary of State’s Committee on Atomic Energy, (Washington, DC: March 16, 1946).