

APPROACHING ZERO: THE CASE FOR A GLOBAL NUCLEAR DISARMAMENT FUND

Jasmine Chen
Jonathan Moch
Jay Parikh
Alex Peerman
Rebecca Scharfstein

Peter Tzeng
Yin Liang
Alexander Glaser (Director)



Contents

Executive Summary	2
1 Background	3
2 Building a Foundation for Nuclear Disarmament	6
3 The Global Nuclear Disarmament Fund	7
3.1 Areas of Interest	7
3.2 Financing	14
3.2.1 Startup Framework	15
3.2.2 Development Framework	15
3.3 Organization	15
3.3.1 Secretariat	16
3.3.2 Technical Review Panel	16
3.3.3 Governing Board	17
3.3.4 Funding Decision Process	18
4 The Way Forward	19
A Safeguards Expansion Cost Estimate	24
B Interview Sources	25

Executive Summary

In April 2009, President Obama reaffirmed America's commitment to work towards a world without nuclear weapons—a vision that began to attract new attention in public and political debates with two articles published by distinguished U.S. statesmen in 2007 and 2008.¹ As of September 2009, the United States had already reduced its nuclear warhead stockpile by 84 percent from its maximum at the end of fiscal year 1967.² Nevertheless, the Obama administration has continued to push towards a world without nuclear weapons. The Nuclear Security Summit and the U.S. ratification of New START in 2010 have built momentum for further international action on nuclear security, nonproliferation, and disarmament in coming years.

However, as we approach a world with much fewer nuclear weapons, security concerns could make further progress towards disarmament more difficult. In addition, the expansion of nuclear energy is creating new proliferation risks: civilian stockpiles of separated plutonium are growing and sensitive nuclear fuel cycle capabilities are spreading.³ These proliferation risks are likely to increase significantly over the next decade: sixty-five countries have expressed interest in launching nuclear power programs and several other countries have expressed interest in launching or expanding enrichment or reprocessing programs.⁴ In a scenario of nuclear power expansion, disarmament could become even less practical.

Nevertheless, projects that facilitate and support progress towards the disarmament of nuclear weapons could help diminish the proliferation risks that stem from the expansion of nuclear energy. In particular, projects that promote the expansion of safeguards in weapon states, the advancement of safeguards and verification measures, and the pursuit of multilateral approaches to the nuclear fuel cycle could lower the security threats posed by fissile materials, while encouraging progress towards disarmament.

A principal obstacle to the realization of such projects, however, is financial. As we approach a world with much fewer nuclear weapons and as nuclear power continues to expand, we must ensure that these projects have the financial support that they need. Therefore, we propose the establishment of the Global Nuclear Disarmament Fund.

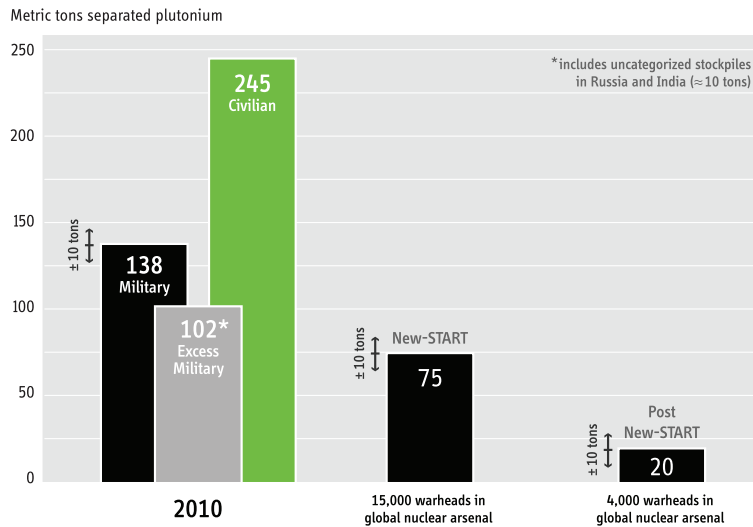
1 Background

Since the end of the Cold War, the United States and Russia have steadily pursued the reduction of nuclear warheads and the dismantlement of nuclear weapons, declaring about 700 tons of highly enriched uranium (HEU) and 90 tons of separated plutonium excess to military purposes. In April 2010, President Obama and President Medvedev signed New START, lowering limits on the total number of strategic nuclear warheads in both countries' arsenals,⁵ and placing a significant focus on nuclear materials verification and transparency.⁶

Nevertheless, on the whole fissile materials still pose a proliferation risk in both weapon states and non-weapon states. In 2010, the estimated global stockpiles of HEU and separated plutonium were about 1475 ± 125 tons and 485 ± 10 tons, respectively.⁷ The stockpile of HEU has been decreasing because of U.S. and Russian reductions in their excess military HEU, and because of a worldwide movement away from HEU-fueled research reactors. On the other hand, the stockpile of separated plutonium has been increasing. Although weapons programs in Israel, India, and Pakistan contribute to this trend, civilian reprocessing programs are responsible for most of the increase. In fact, civilian stockpiles of separated plutonium accounted for the majority of stocks of separated plutonium in 2010.

The projected expansion of nuclear power will likely put upward pressures on global stockpiles of HEU and separated plutonium. As of January 2011, 441 nuclear reactors are operating across 29 countries⁹ and generating 374.7 GWe. Another 66 units adding 63.8 GWe are under construction.¹⁰ Nevertheless, worldwide concerns over energy security and climate change have revived interest in acquiring new nuclear power capacities and enlarging current nuclear programs. Sixty-five countries have expressed interest in acquiring their first nuclear power plant,¹¹ although large capital investment requirements and weak electricity grid infrastructures are preventing many countries from seriously pursuing nuclear energy in the short term. The IAEA estimates an increase in global nuclear generating capacity by 139–435 GWe by 2030, with much of the projected increase in China and Russia.¹²

Under the context of increasing demands for nuclear fuel and increasing needs for nuclear waste management, efforts to acquire sensitive nuclear fuel cycle



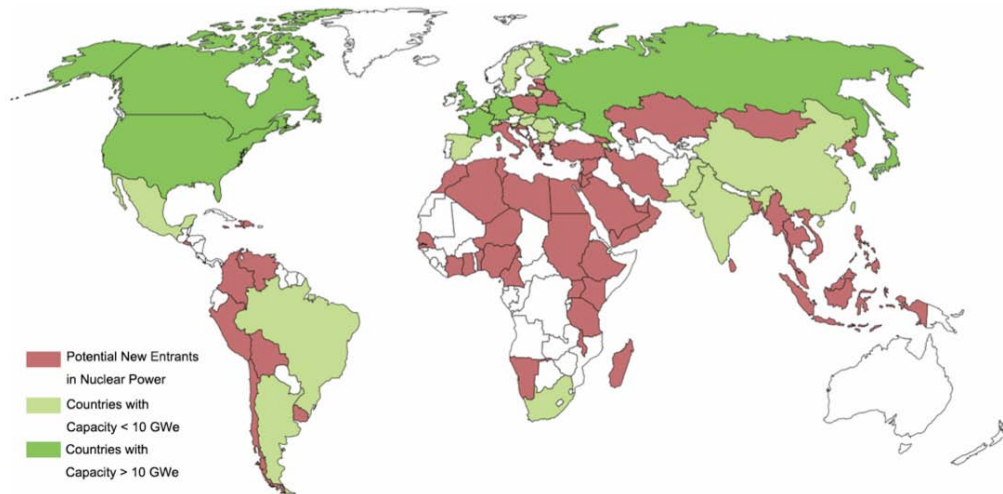
Stocks of separated plutonium today and in a world with fewer nuclear weapons⁸

facilities present additional proliferation challenges. On the front end, several new centrifuge enrichment plants are being constructed to replace older gas diffusion plants, and laser enrichment has gained significant attention from the nuclear industry.¹³ Despite the promise of greater energy efficiency and lower investment costs, these advanced enrichment technologies would offer rapid “breakout” capabilities and make the detection of clandestine facilities a more difficult task.¹⁴ On the back end, growing worries over the management of spent fuel have led to an increased interest in reprocessing.

Today, eight countries have civilian enrichment programs,¹⁵ and another four have civilian reprocessing programs.¹⁶ These countries, along with some others now considering nuclear power, are reluctant to forgo such sensitive activities in light of Article IV of the NPT, especially as long as others carry them out under national control. Moreover, several new members have expressed interest in acquiring enrichment and reprocessing capabilities over the past few years. In addition to the existing facility at Natanz, Iran began constructing a pilot enrichment facility in 2007. In 2009, Brazil began enriching uranium at Resende; and in 2010, Argentina reactivated its gas diffusion enrichment plant at Pilcaniyeu after two decades’ halt of operations. Meanwhile, South Korea has been negotiating for its right to enrich and reprocess

after its nuclear cooperation agreement with the United States expires in 2014. Similarly, Jordan and Vietnam have refused to follow the U.A.E. “gold standard” by signing away their rights to enrich and reprocess in their nuclear cooperation agreements with the United States. Above all, China has taken strong steps towards developing civilian reprocessing capabilities, as marked by its recent agreement with AREVA to construct fast breeder reactors.¹⁷

The projected expansion of nuclear power heightens the risk of nuclear weapons proliferation, as it would likely result in an expansion of enrichment and reprocessing capabilities worldwide. These security concerns could discourage weapons states from pursuing disarmament, especially in a world with much fewer nuclear weapons. Nevertheless, further progress towards nuclear disarmament could be the solution for discouraging the spread of sensitive technologies and effectively managing the expansion of nuclear power.



Worldwide distribution of nuclear power including “newcomer” countries

2 Building a Foundation for Nuclear Disarmament

The nonproliferation regime has relied on key institutions like the International Atomic Energy Agency (IAEA) and the Non-Proliferation Treaty to achieve its nonproliferation objective. The IAEA in particular allocates financial resources from Member States towards safeguards, the principal verification tool for nonproliferation. However, there exists no parallel institution to financially support projects that further progress towards disarmament.

Nevertheless, these projects would become increasingly important for continued progress towards disarmament in a world with much fewer nuclear weapons, and for the management of proliferation risks in a scenario of nuclear power expansion. For example, projects that promote the expansion of safeguards in weapon states, the advancement of safeguards and verification measures, and the pursuit of multilateral approaches to the nuclear fuel cycle would facilitate and support progress towards disarmament while managing proliferation risks. The expansion of safeguards in weapon states would enhance disarmament verification while strengthening the nonproliferation regime. Advanced safeguards and verification measures would provide greater confidence in the non-diversion of nuclear materials in both weapon and non-weapon states. Finally, the projected expansion in nuclear power would naturally make the management of fissile materials a greater challenge, such that multilateral approaches to the nuclear fuel cycle could become a critical component of the nonproliferation regime.

Unfortunately, there is currently no institution that financially supports the realization of such ideas or the continuity of such projects. Although the United States and Russia have already made considerable progress in reducing their Cold War arsenals,¹⁸ as we approach a world with much fewer nuclear weapons, continued progress will need additional activities that properly address security concerns, particularly those arising from the projected growth in nuclear power. We must ensure that ideas for projects that promote disarmament and ultimately enhance U.S. interests in years to come do not lack financial support. To that end, we propose an independent financing mechanism for this very purpose: the Global Nuclear Disarmament Fund.

3 The Global Nuclear Disarmament Fund

The Fund would seek to fill this very gap. It would financially support the realization of new ideas and the continuity of existing projects that could facilitate and support progress towards nuclear disarmament. The Fund would be guided by three principles: (1) The Fund's sole mission is to finance projects that facilitate and support progress towards nuclear disarmament; (2) the Fund is a financing entity, not an implementing entity; and (3) the Fund is an independent entity.

3.1 Areas of Interest

The Global Nuclear Disarmament Fund would financially support practical and politically feasible ideas and projects. As previously mentioned, three areas of interest for these projects are: the expansion of safeguards in weapon states, research on safeguards and verification technologies and approaches, and multilateral approaches to the nuclear fuel cycle. The Fund, however, is by no means limited to financing projects in these three areas.

A. Expansion of Safeguards in Nuclear Weapon States

Background. The mission of the IAEA is to promote the peaceful use of nuclear energy and to ensure that nuclear materials under its supervision are not diverted to military purposes. Under Article III of the NPT, the Agency has the mandate to verify the non-diversion of nuclear materials in non-weapon states, but it has no parallel obligation in weapon states. Although the IAEA has Voluntary Offer Agreements with the NPT weapon states to govern safeguards on their nuclear materials, the Agency only implements safeguards on a very small portion of their civilian facilities. One reason for this limit is financial: more than 94% of the IAEA safeguards budget of \$121 million per year goes towards the required safeguards on non-weapon state facilities,¹⁹ leaving less than \$7.3 million per year for weapon state safeguards. Safeguards on all weapon state civilian facilities, however, would require on the order of \$70-80 million every year (see Appendix A). Another obstacle for complete safeguards in weapon states is that not all weapon states have

China:	Some civilian facilities are not open to safeguards
France:	Some materials within civilian facilities are not open to safeguards
India:	Six of fourteen civilian reactors are under safeguards
Israel:	Practically, no civilian facilities
North Korea:	One civilian power reactor is under construction
Pakistan:	Civilian facilities are under Type-66 safeguards
Russia:	Some civilian facilities are not open to safeguards
United Kingdom:	All civilian facilities are open to safeguards
United States:	All civilian facilities are open to safeguards

Weapon State Policies on IAEA Safeguards on its Civilian Nuclear Facilities²⁰

an agreement with the IAEA that allows the Agency to safeguard all of its civilian materials.

Nevertheless, there still exist hundreds of nuclear facilities in weapon states that are open to safeguards but are not safeguarded for financial reasons. The Fund could begin by financing safeguards on a small number of enrichment and reprocessing facilities.

Disarmament Benefits. An expansion of safeguards in weapon states would provide credible assurances that civilian nuclear material is not diverted to weapons purposes. The expansion would support disarmament in multiple ways. First, it would strengthen the safeguards culture in some weapon states, which would contribute to material accountancy and security. Second, it would help establish the basis for verifying a Fissile Material Cutoff Treaty (FMCT) and other future arms-control treaties. Depending on the scope of the treaty, a verified FMCT would require safeguards on all enrichment facilities, all reprocessing plants, and possibly on some stocks of separated fissile materials in the civilian nuclear fuel cycle. A financed expansion of safeguards in weapon states would also allay concerns over the costs of a verified FMCT that could later prevent some states from joining and actively supporting the negotiations of the treaty. Finally, if safeguards are expanded to excess weapons materials, they would effectively make disarmament measures irreversible. Such an expansion would verify progress in disarmament, and detect non-compliance should it occur. A stronger safeguards culture, a verified FMCT, and verification of excess weapons materials would be increasingly necessary for further progress towards disarmament in a world with much fewer nuclear weapons.

Nonproliferation Benefits. An expansion of safeguards in weapon states would also be critical to supporting the nonproliferation regime. More safeguards in weapon states would narrow the perceived discrimination between weapon states and non-weapon states, a criticism of the nonproliferation regime that could worsen as new nuclear power programs in non-weapon states come online. Also, financing the safeguards in weapon states would relieve some financial pressure from the IAEA,²¹ whose budget will become increasingly tight with the projected expansion of nuclear power. Moreover, support for IAEA inspectors (through recruitment and training programs) and the experience they would gain from safeguarding advanced weapon state facilities would enhance their safeguarding practices in non-weapon states.

Potential Projects. The Fund could provide financial support to independent projects that promote the expansion of safeguards to weapon states. The following are two examples.

- *Restricted Voluntary Contribution to the IAEA.* The Fund could make an annual voluntary contribution to the IAEA restricted for weapon state safeguards. Since the IAEA can only accept restricted voluntary contributions if the Board of Governors approves,²² such a project would require the support of a coalition of both weapon states and non-weapon states. Certain non-weapon states may have concerns with this contribution given a traditional IAEA practice of only increasing funds to safeguards if funds for technical assistance also increase. However, given that safeguards in weapon states would be a key step towards disarmament and towards reducing the discriminatory nature of the NPT regime, non-weapon states on the whole would likely not express much opposition. Weapon states should also welcome this contribution since the safeguards would only apply to facilities that they have already opened to safeguards, and they would not be directly paying for the new safeguards.
- *IAEA Inspector Recruitment and Training.* The Fund could finance the recruitment and training of new IAEA inspectors. The extent of the Fund's involvement could vary depending on the project. Some projects could be IAEA outreach programs that target students at technical universities and recruit them to work as inspectors for the IAEA. Other projects could work to finance or improve the IAEA's inspector training programs. The Fund could also finance other entities

that support the recruitment and training of IAEA inspectors, such as Russia’s Safeguards and Security Education Program, or the U.S. Next Generation Safeguards Initiative.

Cost. Safeguards on all weapon state civilian facilities currently offered for safeguards would require on the order of \$40–50 million per year, while safeguards on all weapon state civilian facilities would require on the order of \$70–80 million per year (see Appendix A). The IAEA currently spends less than \$7.3 million per year on weapon state safeguards,²³ meaning that the Fund could eliminate the financial obstacle to full weapon state safeguards by making an annual restricted voluntary contribution of approximately \$60–70 million to the IAEA. The contribution could be less if other new mechanisms for financing weapon state safeguards are proposed in tandem with the expansion of weapon state safeguards. For example, some have proposed a very small surcharge on nuclear energy in some of the weapon states to partly finance an expansion. Financing IAEA inspector recruitment and training programs would be a much lower expense, depending on the size of the programs.

B. Research on Safeguards and Verification Technologies and Approaches

Background. The IAEA Safeguards Department constantly updates its safeguards and verification technologies and approaches to ensure that they are as effective and efficient as possible. As the IAEA Secretariat lacks its own R&D capabilities, Member States provide extra-budgetary funding to support such initiatives. As of June 2009, there were twenty-one Member State Support Programs conducting over 300 tasks costing over \$20 million per year.²⁴ Nevertheless, there are still many technical limitations to the accuracy and scope of safeguards and verification measures.

Disarmament Benefits. In a world with much fewer nuclear weapons, verification technologies and approaches need to be strengthened because margins of error would become increasingly significant, and could ultimately inhibit continued progress towards disarmament. Research could help develop politically acceptable technologies and approaches that minimize these margins of error. Advanced verification technologies are particularly necessary for disarmament because weapon states often have relatively advanced nuclear facilities that inspectors do not usually deal with in non-weapon states.

Nonproliferation Benefits. If nuclear power continues to expand, the IAEA will inevitably have an increasingly difficult task of safeguarding all nuclear facilities in non-weapon states. The expansion of nuclear power would require more efficient safeguards, which verification technologies research can support. In fact, the very technologies that bolster verification in nuclear weapon states would be just as applicable to non-weapon states. For example, new research on safeguards approaches for detecting clandestine facilities would be critical for the verification of non-diversion in non-weapon states, especially since clandestine facilities have already created problems for the IAEA in the past, and would likely create even more problems in a scenario of nuclear power expansion.

Potential Projects. The Fund could finance research projects in a variety of venues to improve safeguards and verification technologies and approaches. Such projects include the following.

- *Research on Safeguards for Upstream Uranium Activities.* An upstream expansion of safeguards would provide more confidence over verification of the absence of parallel, undeclared nuclear programs. IAEA verification activities have begun moving in this direction, with the Additional Protocol requiring states to report more information on upstream uranium activities. The Fund could finance research projects on safeguards technologies and approaches for detecting these activities. As technologies advance over time, the potential for the production of cleaner products earlier in the fuel cycle that could be diverted for weapons purposes before safeguards are applied become more of a possibility.
- *Research on Safeguards for Clandestine Facilities Detection.* More advanced safeguards technologies and approaches could provide greater assurance of the absence of clandestine facilities. As disarmament proceeds, clandestine facilities will pose a greater security threat, and as nuclear power expands, verifying the absence of clandestine facilities will naturally become more difficult. Eventually, further disarmament, a verified FMCT, and other future arms-control treaties will require a strong capability to detect such facilities. The Fund could thus finance research projects to overcome technological barriers. For example, in 1999 an international study of Wide Area Environmental Sampling

(WAES) found that the key barrier to carrying out WAES was technological: the cost of operating a WAES network would be too high and its effectiveness would be too low.²⁵ Also, some environmental monitoring technologies cannot be applied near weapons facilities in weapon states because they would reveal too much national security sensitive information. These technologies also have serious accuracy limitations in terms of false alarms and their inability to link a positive reading with a specific source.

- *Research on Technologies for Fissile Material Inventory Verification.* More advanced technologies and approaches are necessary for the verification of fissile material inventories. In weapon states, on-site verification of these inventories must be intrusive enough to minimize the margin of error, but not too intrusive to the extent national security-sensitive information is revealed. The Fund could finance research on technologies and approaches that can improve disarmament verification accuracy without significantly harming national security. For example, the United Kingdom and Norway are currently working with VERTIC to improve information barrier technology and standard on-site inspection methodologies for this very purpose.²⁶

Cost. Research costs would vary greatly depending on the project. Annual contributions from Member State Support Programs to the IAEA for safeguards research exceed \$20 million,²⁷ with \$14.4 million coming from the U.S. Support Program.²⁸ As the IAEA regards these contributions as “crucial”²⁹ to its safeguards system, an annual \$20 million allocation from the Fund to research on safeguards and verification technologies and approaches would likely make a substantial difference. However, depending on the demand of such research, this cost could be increased if necessary.

C. Multilateral Approaches to the Nuclear Fuel Cycle

Background. Multilateral approaches to the nuclear fuel cycle shift control of sensitive nuclear materials from individual states to groups of states. Depending on the specific arrangement, they can provide a strong degree of peer scrutiny and transparency that hinders the diversion of nuclear materials and encourages cooperation with IAEA safeguards. Furthermore, multilateral approaches for weapon state sensitive facilities would increase mutual trust

among nations and narrow the dichotomy between supplier states and non-supplier states. Discussions over multilateral approaches for nonproliferation, however, have virtually deadlocked for decades. Nevertheless, the opportunity for multilateral approaches for disarmament have some potential, given that the weapon states host most of the enrichment and reprocessing plants.

Disarmament Benefits. As weapon states continue to achieve progress in disarmament, their capacity to produce significant amounts of fissile material and develop a nuclear weapons in a “breakout” scenario will pose a more significant security threat. Multilateral approaches to the operation of sensitive nuclear facilities would provide greater reassurance over such “virtual nuclear arsenals” by providing a level of international oversight over these capacities to produce fissile materials. They could also help facilitate the management and elimination of excess weapons materials.

Nonproliferation Benefits. Multilateral approaches that facilitate and support disarmament could also advance non-proliferation. On the one hand, multilateral approaches in weapon states could include non-weapon states, as the assurances against diversion and breakout are applicable to both disarmament and nonproliferation. In addition, multilateral approaches in weapon states could serve as a model for the non-weapon states, discouraging the development of new national sensitive facilities and building the foundation for a norm of multilateralization of all sensitive facilities. The establishment of multilateral approaches in weapon states could also serve as technical models for new multilateral facilities in both weapon states and non-weapon states. For example, they could develop and demonstrate viable approaches to black-boxing sensitive technologies.

Potential Projects. The Fund could provide financial incentives to encourage multilateral approaches, although the realization of a multilateral project would be very difficult. Three examples of such multilateral approaches are described below.

- ***Multilateral Sensitive Facilities.*** Although the multilateralization of existing sensitive facilities and the creation of a multilateral sensitive facility have always been significant challenges, the Fund could provide financial incentives to encourage the realization of these projects. Russia has taken the lead in multilateralization by establishing the International Uranium Enrichment Center in May 2008 with Kazakhstan. The

project opened up Russia's enrichment facility at Angarsk to multinational management, and since its opening, Ukraine and Armenia have joined the Center. The Fund could also support new multilateral approaches to sensitive facilities, such as Paine and Cochran's recent proposal to create an organization that would provide international oversight over enrichment facilities.

- *Multilateral Repositories.* The Fund could incentivize the establishment of a multinational repository project for spent nuclear fuel or for military wastes, which could include efforts to jointly pursue non-reactor-based plutonium disposition options. The Fund would not have primary responsibility over the costs, but its financial support could help diffuse some of the political obstacles that often obstruct the realization of a repository. For example, the Fund could compensate the host state of a multinational repository project.
- *Black-box Support.* The Fund could either finance research on black-box methods and technologies for multinational sensitive facilities, or directly finance the implementation of such methods and technologies on sensitive facilities that are under construction. Supporting the implementation of black-box provisions would better assure against the diversion of certain information and technologies from sensitive facilities, such as the new laser enrichment technology being developed by SILEX in the United States.

Cost. The cost of supporting multilateral approaches would vary significantly depending on the project. In most cases, the Fund would not finance the project itself, but rather provide financial incentives to encourage its realization by covering incremental costs that arise from additional arrangements and activities.

3.2 Financing

The Fund will not be able to finance projects without substantial funds. In the long run, an annual budget on the order of [\$250 million]³⁰ could make a significant difference in building and sustaining projects that facilitate and support disarmament. Nevertheless, the Fund can start financing projects

with [less than \$10 million]. In any case, reliable startup financing is necessary to begin the Fund’s operations and to establish the Fund’s credibility.

3.2.1 Startup Framework

To initiate the Fund, the United States should 1) make an initial contribution of [at least \$50 million]; and 2) identify states that have expressed a strong interest in disarmament and invite them to be co-founders of the Fund by also making initial voluntary contributions to the Fund. Candidates include the ten states whose foreign ministers issued the joint statement on disarmament and nonproliferation in September 2010.³¹ To ensure representation from both weapon states and non-weapon states, the Fund should only begin operations when [at least four other states, at least two of which are non-weapon states,] pledge to make a significant initial contribution to the startup of the Fund.

3.2.2 Development Framework

The Fund will rely on voluntary contributions from governments, businesses, organizations, and individuals. We recommend that the United States pledge a contribution of [\$20 million] to the Fund every year.

The Secretariat of the Fund will encourage donors to pledge regular contributions to the Fund, with special efforts to mobilize contributions from charitable individuals and the nuclear energy industry. The Fund should remain open to and encourage innovative funding mechanisms.

3.3 Organization

One proposed structure for the organization of the Fund is to have a Secretariat, a Technical Review Panel (the “Panel”), and a Governing Board (the “Board”).

3.3.1 Secretariat

Functions. The Secretariat would be the administrative body of the Fund. Potential responsibilities of the Secretariat would include: 1) working directly with the Fund's implementation partners and potential donors; 2) screening applications of new project proposals on a continuous basis and processing funding distribution; 3) overseeing the monitoring and evaluation of projects; and 4) executing international public relations campaigns and mobilizing voluntary contributions. In general, the Secretariat would be responsible for implementing decisions and policies made by the Board, and providing financial, legal, and administrative support.

Appointment and Structure. The set of responsibilities held by the Secretariat would require a team of professionals in financial accounting, legal affairs, policy drafting, administrative management, and public relations. The Secretariat would be led by a Secretary General, who would be appointed by the Board for a renewable four-year term.

3.3.2 Technical Review Panel

Functions. The Technical Review Panel would be the technical advising group to the Fund. The Panel would meet regularly to review project proposals based on technical criteria and would provide recommendations to the Board. The Panel would consider technical feasibility, potential impact, and required costs and implementation facilities in its review of project proposals. The Panel would be responsible for providing the Board with objective, scientific information on the project proposals. This information would allow the Board to assess potential projects and would provide the Secretariat with technical metrics for evaluating the success of ongoing projects.

Appointment and Structure. The Panel would include a distinguished group of nuclear scientists and technology policy experts. The Board would be responsible for appointing members of the Panel and inviting them to join it for an unlimited term.

3.3.3 Governing Board

Functions. The Governing Board would be the decision-making body of the Fund. Potential responsibilities of the Board would include: 1) establishing the Fund's strategies and policies, making funding decisions, and setting the annual budget; and 2) appointing the Secretary General of the Secretariat and the members of the Technical Review Panel. The Board could operate on a two-thirds majority voting system for its decision-making processes, in which each member of the Board would have exactly one vote on all decisions. The Board would meet on a biannual basis, similar to the IAEA's current practice. In addition, the Board could also meet out of session if the Secretary General calls for a Special Project Meeting, for situations where key decisions are required for project startup, project termination, or unexpected project changes.

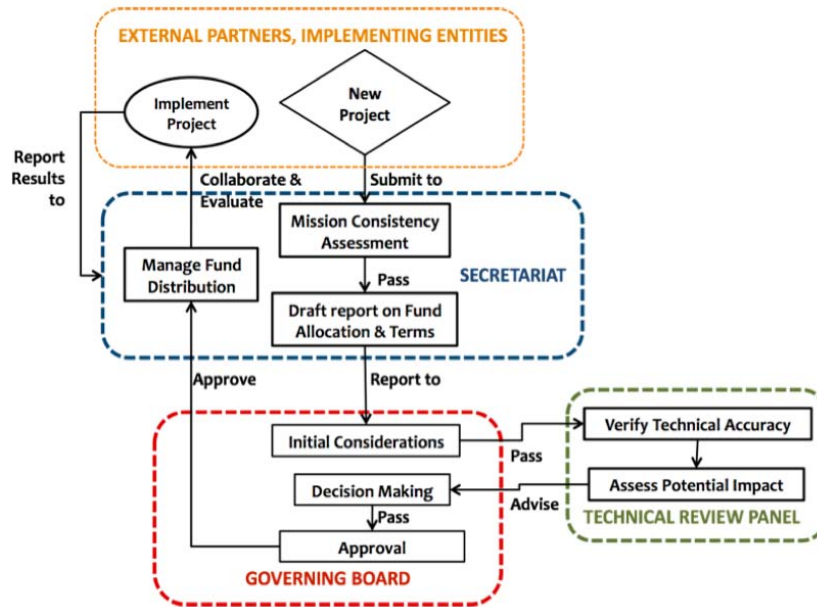
Appointment and Structure. The Board would be comprised of representatives of donor institutions or individual donors who have made a significant contribution to the Fund. The eligibility and term length of a Board member could be determined by the accumulative contribution made by the donor entity that the member represents.

- For government donors, one year's Board eligibility would require a contribution amount calculated by multiplying the country's U.N. assessed contribution ratio by [\$100 million]. For example, the United States, with a U.N. assessed contribution ratio of 22.0%, would need to donate \$22 million to receive one year's Board eligibility. Countries with U.N. assessed contribution ratios below [2.0%] would need to donate [\$2 million] to receive one year's Board eligibility.
- For business, organization, or individual donors, one year's Board eligibility would require a contribution of [\$2 million].

3.3.4 Funding Decision Process

The Fund should permit maximum flexibility and ensure efficiency in project execution. Funds distributed to implementing partners need not be expended in the fiscal year in which they are appropriated. However, the impact and efficiency of all funded projects should be monitored continuously, and funding renewals, if necessary, would be granted based on the results of these evaluations.

The chart below outlines the proposed funding decision process. The Secretariat would receive project proposals from external parties or individuals, and would perform the initial screening of the proposals, including verification of the proposals' consistency with the Fund's missions. The Secretariat would draft an initial report of funding allocation and terms for each project that has passed the initial assessment, and present these reports to the Board during its biannual meetings. The Board would select proposals for further consideration and would pass on these proposals to the Technical Review Panel for technical evaluation. The Panel would return to the Board a recommendation summary for each proposal, including objective assessments of the project's technical accuracy and potential impact. The Board would then use this information as a reference in the process of making its final decision on the proposal. A proposal approved by the Board would be returned to the Secretariat, which would manage the subsequent fund distribution and collaboration with the project's implementing partners. The Secretariat would also be responsible for monitoring the progress and impact of the project, and it would report these results to the Board on a regular basis.



Proposed Funding Decision Process³²

4 The Way Forward

We propose that the United States first identify a few key weapon and non-weapon states on a bilateral basis that would be interested in co-founding the Fund. We then propose that representatives of the U.S. government announce the Fund alongside representatives from the co-founding states at a global Nuclear Disarmament Summit. The Summit could be organized in a similar fashion as the Nuclear Security Summit, but with the sole agenda of establishing the Global Nuclear Disarmament Fund and mobilizing support from the international community. We recommend that a figurehead representing the interests of non-weapon states deliver a keynote address in support of the Fund.

After introducing and describing the Fund, the Summit should: 1) welcome donations from the international community to support the Fund; and 2) invite ideas for projects that the Fund could undertake. The Summit would be open to all parties with an interest in nuclear disarmament: representatives of governments, businesses, organizations, and individuals.

In the long run, the Global Nuclear Disarmament Fund would be a symbol and a platform. It would symbolize a worldwide endeavor to safeguard world peace and security, and it would offer all members of the international community a platform to demonstrate their commitment to this course.

So today, I state clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons. I'm not naive. This goal will not be reached quickly—perhaps not in my lifetime. It will take patience and persistence. But now we, too, must ignore the voices who tell us that the world cannot change.

President Barack Obama
Prague, Czech Republic, April 2009

Notes

¹George P. Shultz, William J. Perry, Henry A. Kissinger, Sam Nunn, “A world free of nuclear weapons,” *Wall Street Journal*, 4 January 2007; “Toward a nuclear-free world,” *Wall Street Journal*, 15 January 2008.

²The stockpile figure does not include the several thousand weapons retired and awaiting dismantlement.

³The sensitive parts of the nuclear fuel cycle are uranium enrichment and spent fuel reprocessing.

⁴These countries include Argentina, Brazil, China, Iran, and reportedly Jordan, South Korea, and Vietnam.

⁵United States Department of State, “Senate Approval of New START: Remarks by Secretary of State Hillary Rodham Clinton,” 22 December 2010.

⁶The White House, “Key Facts About the START Treaty,” 26 March 2010.

⁷International Panel of Fissile Materials, “Global Fissile Material Report 2010,” www.ipfmlibrary.org/gfmr10.pdf, p. 9.

⁸Personal communication, Alexander Glaser, based on International Panel of Fissile Materials, “Global Fissile Material Report 2010,” Princeton, NJ, 2010, www.ipfmlibrary.org/gfmr10.pdf.

⁹Taiwan’s six nuclear power reactors are included in the reactor count but not in the country count. In addition, the number of countries will be thirty once Iran brings its reactor at Bushehr online.

¹⁰International Atomic Energy Agency, *Power Reactor Information System*, www.iaea.org/programmes/a2/.

¹¹International Atomic Energy Agency, “International Status and Prospects of Nuclear Power,” 2 September 2010.

¹²*Ibid.*

¹³In 2008 General Electric and Hitachi (later joined by Cameco) developed a joint venture in the United States to commercialize laser enrichment.

¹⁴The gas centrifuge technology, for example, enables rapid HEU production because of high separation factors. The technology's low energy requirements and physical compactness furthermore make detection of a clandestine centrifuge facility difficult. H. G. Wood, A. Glaser, and R. S. Kemp, "The Gas Centrifuge and Nuclear Weapons Proliferation," *Physics Today*, September 2008, pp. 40–45.

¹⁵The eight countries with civilian enrichment programs are China, France, Germany, Japan, the Netherlands, Russia, the United Kingdom, and the United States.

¹⁶The four countries with civilian reprocessing programs are France, India, Japan, and the United Kingdom.

¹⁷Russia has also supported China's reprocessing program.

¹⁸The United Kingdom and France have also made substantial progress towards disarmament, cutting their Cold War nuclear arsenals by at least half.

¹⁹Jill Cooley, "Nonproliferation, Disarmament, and the IAEA in Tomorrow's World," 9 September 2008.

²⁰Based on: International Panel on Fissile Materials, "Global Fissile Material Report 2007," www.ipfmlibrary.org/gfmr07.pdf, p. 69; World Nuclear News, "India's nuclear safeguards deal," 10 July 2008; and Nuclear Threat Initiative, "Pakistan Selected to Lead IAEA Governing Board," 27 September 2010.

²¹Although currently only 6% of the IAEA budget goes to safeguards in nuclear weapon states. This amount would be much greater if other disarmament initiatives (such as an FMCT) require the expansion of safeguards in weapon states.

²²International Atomic Energy Agency, INFCIRC/13.

²³Jill Cooley, "Nonproliferation, Disarmament, and the IAEA in Tomorrow's World," 9 September 2008.

²⁴IAEA, "Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System Including Implementation of Additional Protocols," 7 August 2009, p. 5.

²⁵Ned Wogman. “History of STR-321,” Pacific Northwest, November 2010.

²⁶Verification Research, Training and Information Centre, “Verifiable Multilateral Nuclear Disarmament,” April 2009.

²⁷International Atomic Energy Agency, “Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System Including Implementation of Additional Protocols,” 7 August 2009, p. 5.

²⁸International Safeguards Project Office, “The U.S. Support Program to IAEA Safeguards,” www.bnl.gov/ispo/ussp.asp.

²⁹International Atomic Energy Agency, “Staying Ahead of the Game,” p. 26.

³⁰Numbers in brackets can be adjusted as necessary.

³¹The ten countries are Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Poland, Turkey, and the United Arab Emirates.

³²The decision-making structure is built on the structure used by the Global Fund to Fight Aids, Tuberculosis and Malaria.

A Safeguards Expansion Cost Estimate

Reactors

Reactors			
	Reactors	Offered for Safeguards	Currently Safeguarded
China	13	2*	2*
France	58	58	2*
Russia	32	6*	2*
U.K.	19	19	2*
U.S.	104	104	2*
India	14	6	6
Pakistan	2	2	2
TOTAL	242	197	10

Reactor Safeguards Costs (\$1,000s)			
	Full Safeguards	Offered for Safeguards	Currently Safeguarded
China	780	120	120
France	3480	3480	120
Russia	1920	360	120
U.K.	1140	1140	120
U.S.	6240	6240	120
India	840	360	360
Pakistan	120	120	120
TOTAL	14520	11820	1080

*These figures are estimates.

Enrichment Facilities

Enrichment Facilities			
	Enrichment Facilities	Offered for Safeguards	Currently Safeguarded
China	3	2	1
France	1	1	1
Russia	4	0	0
U.K.	1	1	1
U.S.	4	4	0
India	0	0	0
Pakistan	0	0	0
TOTAL	13	8	3

Enrichment Safeguards Costs (\$1,000s)			
	Full Safeguards	Offered for Safeguards	Currently Safeguarded
China	2700	1800	900
France	900	900	900
Russia	3600	0	0
U.K.	900	900	900
U.S.	3600	3600	0
India	0	0	0
Pakistan	0	0	0
TOTAL	11700	7200	2700

Reprocessing Plants

Reprocessing Plants			
	Reprocessing Plants	Offered for Safeguards	Currently Safeguarded
China	1	0	0
France	2	2	2
Russia	3	0	0
U.K.	2	2	2
U.S.	0	0	0
India	0	0	0
Pakistan	0	0	0
TOTAL	8	4	4

Reprocessing Safeguards Costs (\$1,000s)			
	Full Safeguards	Offered for Safeguards	Currently Safeguarded
China	6000	0	0
France	12000	12000	12000
Russia	18000	0	0
U.K.	12000	12000	12000
U.S.	0	0	0
India	0	0	0
Pakistan	0	0	0
TOTAL	48000	24000	24000

Total

Total Costs (\$1,000s)			
	Full Safeguards	Offered for Safeguards	Currently Safeguarded
TOTAL	74220	43020	27780

B Interview Sources

James Acton, Analyst, Carnegie Endowment for International Peace, Princeton, NJ, 4 October 2010.

Christine Wing, Senior Research Fellow, Center on International Cooperation, New York University, Princeton, NJ, 18 October 2010.

Seth Grae, Chief Executive Officer, Lightbridge Corporation, Princeton, NJ, 25 October 2010.

Yuri Yudin, Senior Researcher, United Nations Institute for Disarmament Research, Phone Interview, 28 October 2010.

Kirk Schnoebelen, President, URENCO, Washington, DC, 29 October 2010.

Lawrence Scheinman, Professor, James Martin Center for Nonproliferation Studies, Washington, DC, 29 October 2010.

Sharon Squassoni, Director and Senior Fellow of Proliferation Prevention Program, Center for Strategic and International Studies, Washington, DC, 29 October 2010.

Steve Fetter, Assistant Director, Office of Science and Technology Policy, Executive Office of the President, Washington, DC, 29 October 2010.

Mark Goodman, Technical Advisor, U.S. Department of State, Washington, DC, 29 October 2010.

Joyce Connery, Senior Advisor for National Security, U.S. Department of Energy, Washington, DC, 29 October 2010.

Tom Cochran, Senior Scientist, Natural Resources Defense Council, Washington, DC, 29 October 2010.

Olli Heinonen, Former Deputy Director General and Head of Safeguards, International Atomic Energy Agency, Senior Fellow, John F. Kennedy School of Government, Harvard University, Princeton, NJ, 8 November 2010.

Steve Isakowitz, Chief Financial Officer, U.S. Department of Energy, Washington, DC, 12 November 2010.

Mary Beth Nikitin, Analyst on WMD Nonproliferation, Congressional Research Service, Phone Interview, 12 November 2010.

Peter Lyons, Assistant Secretary for Nuclear Energy, U.S. Department of Energy, Phone Interview, 12 November 2010.

Patrick Holman, Director, Office of Budget and Planning Office of Nuclear Energy, U.S. Department of Energy, Phone Interview, 15 November 2010.

Jill Cooley, Director, Division of Concepts and Planning, International Atomic Energy Agency, Phone Interview, 20 November 2010.

Edward McGinnis, Deputy Assistant Secretary, International Nuclear Energy Policy and Cooperation, U.S. Department of Energy, Phone Interview, 8 December 2010.

Thomas Shea, TomSheaNuclear Consulting Services, E-mail Communication, 8 December and 21 December 2010.

Tatiana Vinichenko, Senior Strategy and Policy Officer, The Global Fund to Fight AIDS, Tuberculosis and Malaria. Phone Interview, 9 December 2010.

Allison Macfarlane, Participant on the Blue Ribbon Commission for America's Nuclear Energy Future, Phone Interview, 15 December 2010.