# BRAVE NEW WORLD OF NUCLEAR POWER

**By Rose Gottemoeller**

*Brave New World of Nuclear Power*

The Bush Administration has launched a new nuclear energy initiative, the Global Nuclear Energy Partnership (GNEP) which, if it takes off, will completely transform the attitude of the United States to nuclear power. Since the Three-Mile Island reactor accident in 1979, the U.S. has had an ambivalence toward energy provided by the atom. Although about twenty percent of total electricity in the United States comes from nuclear power plants, no new U.S. plants have been licensed since Three-Mile Island.

What is more, since the 1970s, the United States has not engaged in the separation of plutonium through reprocessing. This way of dealing with spent fuel from nuclear power plants is pursued in advanced nuclear fuel cycle countries such as Russia and France as a way to gain further material for nuclear fuel—thus it is commonly called the "closed fuel cycle." The plutonium so acquired can also be used in nuclear weapons, however, so the United States halted reprocessing in the hope that other countries would follow its "proliferation-resistant" path.

As a result, the United States for over twenty-five years has avoided the plutonium economy—any technologies or processes that would result in the acquisition of plutonium or its utilization. This included not only reprocessing methods—Purex, for example; also certain power plant designs that could be used to produce plutonium—fast burner reactors, for example, operating in a breeder mode. Throughout this time the U.S. was helped by the fact that plutonium was not an economical way to generate electricity. Natural uranium was relatively abundant and cheap, so it was the preferred source of nuclear power plant fuel.

Because it has not been reprocessing, the United States has acquired a large amount of spent nuclear fuel, which it has planned to store in a geological repository at Yucca Mountain, in the state of Nevada. However, the Yucca Mountain facility has been plagued by uncertainties. Among other questions, scientists have been concerned about the amount of heat that could be generated by the spent fuel stored there, and whether heat accumulation might create the potential for accidents. This uncertainty has created a significant degree of local resistance to the facility. Moreover, the amount of spent nuclear fuel that the United States will be responsible for storing is already outstripping Yucca Mountain's total capacity of 70,000 tons.

The Global Nuclear Energy Partnership arrived on the scene as a kind of "three-cornered billiard shot" that would help the United States to solve these problems with nuclear power and then push an expansion, to answer the burgeoning demand for energy. As Secretary of Energy Samuel Bodman said in announcing the initiative, "GNEP brings the promise of virtually limitless energy to emerging economies around the globe, in an

environmentally friendly manner while reducing the threat of nuclear proliferation. If we can make GNEP a reality, we can make the world a better, cleaner, safer place to live."[1]

Bodman's "if" is important, because the new program is complicated and multi-layered. It includes seven elements: building a new generation of nuclear plants in the U.S., developing and deploying new recycling technologies for spent nuclear fuel, designing advanced reactors that would burn the nuclear fuel that would come out of that recycling process, working to effectively manage spent fuel in the U.S., developing small reactors for developing countries, improving nuclear safeguards to enhance the proliferation-resistance of expanding nuclear power activities, and establishing an international fuel services program.

If the United States is able to pull off all of these steps, then it will indeed arrive at the golden nuclear energy future that Bodman described. It will not be able to do so without international partners, however, a fact that the Bush administration recognized early on. Just before the new initiative's launch, Deputy Secretary of Energy Clay Sell and Undersecretary of State Robert Joseph did a lightening tour of the four main nuclear energy powers, France, the United Kingdom, Russia, and Japan, with the goal of soliciting their early support for the initiative. The result was generally positive—French officials, for example, said that France "is happy" that the Bush administration has finally reversed U.S. policy against reprocessing, recycling and fast reactors.[2]

The Global Nuclear Energy Partnership thus is an opportunity for the countries that have stuck with these technologies and processes to bring the United States up to speed again after a twenty-five year hiatus. Russia and France are the most mature in that regard, having sustained reactor and fuel cycle work throughout the period. Even after the Chernobyl disaster and the breakup of the Soviet Union a few years later, Russia managed to keep up research and development work in its nuclear energy complex.

*Pluses and Minuses for GNEP*

Before examining the potential for a GNEP partnership with Russia in more detail, it is worth focusing on the big plus that the program represents in U.S. policy. Most importantly, through GNEP, the Bush administration is finally acknowledging that global warming and climate change are a problem. Although the Bush team rejected the Kyoto Protocol and refused to accept the science of climate change, they are in fact coming at the issue through the back door, by advancing GNEP. One of their prime reasons for the program is that it will produce emissions-free energy and the cleaner future that Bodman promised.

Another key argument is that a new focus on nuclear energy will help to cure the U.S. addiction to oil from the Middle East. Interestingly, the cooperation envisioned under the

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[1] See "Department of Energy Announces New Nuclear Initiative," DOE News Release, February 6, 2006, found at http://www.gnep.energy.gov, accessed May 6, 2006.

[2] Ann MacLachlan, "U.S. plan for reprocessing welcomed, questioned by France," *Nuclear Fuels*, January 30, 2006, p. 6.

program does not create the same kind of dependency that the U.S. chafes under in pursuit of oil and gas. Instead, nuclear power is seen as part of a bright technological future with a degree of equality and mutually beneficial dependence among the partners.

Whether this vision will ever correspond with reality is a worthy question—but the point is that the Bush team is pushing a concept of mutual advantage for all countries participating in the initiative. This could be an important selling-point for countries such as Iran, who have been assuming that new international approaches to nuclear energy would close them out of the acquisition of important technologies.

For the Department of Energy, GNEP has a very specific advantage in that it addresses the concerns about Yucca Mountain. DOE has stressed in its budget documents that the use of a reprocessing facility plus fast reactors would ease the burden on the repository by reducing waste volumes and heat. According to DOE, a fast reactor would "destroy transuranics" in its burn-up process, thus removing "the need to accommodate this radioactive, radiotoxic, and heat-producing material in a geological repository for hundreds of thousands of years while it decays."[3] In this way, GNEP could prove to be the savior for the geologic repository in the United States.

In some quarters, the Global Nuclear Energy Partnership also has significant minuses. The U.S. nuclear industry, for example, has been focused on completing the licensing procedures for building a new nuclear power plant in the United States, the first since Three-Mile Island. Industry has even been sharing costs with the U.S. government to advance this process. In a program called Nuclear Power 2010, government-industry funding goes to projects that demonstrate the process for new reactor licensing in construction and operation as well as reactor design certification.[4]

Industry representatives fear that GNEP will undermine this effort, taking attention away from the short-term goal of getting a new reactor licensed. A company official, quoted anonymously, recently said that the proposal is "irrelevant" to electricity companies except in a negative way, if it "distracts" from the construction of new reactors. In his view, the new initiative "does nothing to promote near-term reactor construction in the United States."[5]

A related concern is that there is no legal or policy infrastructure in place for licensing the types of facilities that GNEP would encompass. Soon after the new initiative was announced, Edward McGaffigan, Commissioner of the U.S. Nuclear Regulatory Commission, said that current NRC regulations are not well-suited to licensing reprocessing plants. He proposed that the NRC staff begin "to provide a conceptual

[3] Daniel Horner, Elaine Hiruo and Ann MacLachlan, "DOE releases details on nuclear initiative, spurring little excitement in industry," *Nuclear Fuels*, February 13, 2006, p.1.
[4] Rick Michal and E. Michael Blake, "GNEP rollout means big jump for fuel cycle," *Nuclear News*, March 2006, p. 64.
[5] Horner, Hiruo, MacLachlan, *Nuclear Fuels*, February 13, 2006.

design of a licensing process for a reprocessing facility (and possibly associated co-located facilities) by the end of 2006."[6]

McGaffigan stressed that it would be important to address early on "thorny issues" peculiar to the facility's design, such as safeguard techniques, security, ease of decommissioning, handling of waste streams, and safety issues. Otherwise, he said, the U.S. was likely to repeat the mistakes of the past: "national experience in operating large-scale reprocessing facilities…is unblemished by success."[7]

Outside the industry context, the most significant concerns are at the level of national nonproliferation policy. The ban on reprocessing has been viewed for nearly three decades as an important symbol of U.S. commitment to the nuclear nonproliferation regime. During an early briefing of the program, Thomas Cochran, the Director of the Natural Resources Defense Council, voiced a wide-spread anxiety among the nonproliferation community when he said that use of reprocessing technology in any way will be a "recipe for proliferation problems."[8]

U.S. officials have tried to assuage these concerns by stressing that the process that the United States is proposing, Urex+, will not result in the separation of plutonium in the same way that the older process, Purex, does. Purex was in fact developed within the weapons program, to maximize the production of plutonium for nuclear explosives. The Department of Energy has sought to underline the difference by calling Urex+ a "recycling" process rather than reprocessing. Its goal is to produce materials that can be recycled into nuclear fuel production.

This worry about whether GNEP represents a retreat from former tough standards in U.S. nonproliferation policy is a significant one. It will only be assuaged if the U.S. government maintains a consistent emphasis on proliferation resistance in pursuing the technologies and processes that will be part of the initiative. At the moment, two of the four main goals of the program emphasize the importance of nonproliferation: the first addresses the reprocessing concern by calling for "recycling nuclear fuel using new proliferation-resistant technologies to recover more energy and reduce waste." The second calls for "utilizing the latest technologies to reduce the risk of nuclear proliferation world-wide."[9] If these policy goals are actually implemented, then GNEP could end up strengthening the nonproliferation regime, enabling it to prosper in an era of global expansion of nuclear power.

*Partnership Potential*

President Bush has not been alone in launching a new nuclear energy initiative since the start of 2006. President Vladimir Putin has proposed the establishment of an

[6] Horner, Hiruo, MacLachlan, *Nuclear Fuels*, February 13, 2006.
[7] Horner, Hiruo, MacLachlan, *Nuclear Fuels*, February 13, 2006.
[8] Elaine Hiruo, Daniel Horner, "DOE might need months to develop GNEP program plan, *Nuclear Fuels*, February 27, 2006.
[9] "Department of Energy Announces New Nuclear Initiative."

international center in Russia to provide other countries guaranteed access to nuclear fuel, including enrichment and fabrication services. Russia has also been at the forefront of planning for international services for the storage and disposition of spent fuel.

The United States and Russia have many interests in common in the two parallel initiatives. Russia is developing its international center in order to be at the forefront of countries offering guaranteed access to fuel services on a commercial basis. It has begun this effort by trying to negotiate such an arrangement with Iran. Although the effort has not been successful so far, it has been a means to continue the diplomatic track with Iran in very difficult circumstances. The United States has supported the effort, along with other members of the UN Security Council and the so-called "EU Troika" of France, Germany and the United Kingdom.

The United States, for its part, is interested in cooperating with Russia on GNEP, because Russian fast reactor and nuclear waste technologies and processes are among the most advanced in the world. Joint work with Russia could facilitate rapid progress in the initiative. Without them, the U.S. Department of Energy faces a serious problem. As mentioned above, the U.S. nuclear energy complex entered a deep hiatus after the Three-Mile Island accident, with the result being severe under-investment in new reactors and fuels as well as nuclear waste-handling. Russia, despite its serious economic crises of the past fifteen years, has managed to continue working on just these technologies.

Thus, from the outset the GNEP enthusiasts in the U.S. government have spoken about the necessity of cooperating with Russia to achieve the goals of the U.S. initiative. Russian experts, for their part, have noted the common ground between the U.S. and Russian proposals, and have talked about developing ways to bring them closer together.

This goal would be eminently achievable, except for one fact: the United States for over ten years has linked U.S. cooperation with Russia on nuclear power to Russia's continuing cooperation with Iran. This linkage has called for Russia to cease construction of the Bushehr nuclear power plant in Iran, as well as cease sales of high-technology defense equipment, such as air defense systems. Russia, thus far, has remained committed to its investments in Iran, unwilling to cut off these programs.

Overlaid on this long-standing irritant is the significant tension that has emerged in the U.S.-Russian relationship as Russia prepares to chair the G-8 summit in St. Petersburg in July 2006. Vice President Cheney unloaded on Russia in a speech in Vilnius in May 2006, accusing Russia with good reason of having fallen away from political and economic reforms. He was answered in short order by President Putin, who in his "State of the Nation" address also in May, criticized those countries who would throw their military or political weight around in the world. It was pretty clear that he was referring to the United States of America.

Moreover, the United States and Russia are not understanding each other on Iran. Washington sees a Russia "soft" on Iran, unwilling to take the tough steps necessary in the UN Security Council to stop Iran's rush to acquire nuclear weapons. To the

Americans, Russia looks to be pursuing its commercial interests in Iran and ignoring the threat that a nuclear-armed Iran would pose. Moscow, by contrast, sees a United States that is hell-bent on punishing Iran even as it has not thought through the implications of its moves. Russia seems particularly concerned that the U.S. will rush into military action without concern for the impact on regional stability.

*Is Cooperation Possible?*

Such mutual anger would not seem to bode well for any cooperation, much less joint projects focused on highly technical and sometimes sensitive areas requiring close working relationships. But here is the surprise: beginning with the aerospace and physics cooperation of the 1970s, it is just such projects that often lead the way in the relationship when the strategic outlook is not otherwise rosy. This goes not only for periods of tension but also of uncertainty, as when joint projects between the Russian and U.S. nuclear weapons labs opened the door to broader nonproliferation cooperation during the uncertain period of the 1990s.

A joint nuclear energy strategy could begin with three elements:

1. Bilateral agreements and national legislation to enable U.S.-Russian cooperation to move forward. An early goal should be to launch negotiation of an Agreement for Nuclear Cooperation (a "123 Agreement"[10]) by the time of the St. Petersburg summit.
2. Joint technology projects. Once the legal basis is in place, the United States and Russia should establish join projects on certain key nuclear energy technologies, beginning with fast burner reactors and recycling technologies and processes.
3. Pilot projects to develop key concepts and arrangements. An early pilot project should involve the United States in developing the concept of an international center for fuel services in Russia.

The most urgent near-term goal should be to launch negotiation of a 123 Agreement. This agreement will be required for GNEP technology cooperation to advance, and also to facilitate cooperation on international fuel service centers. Any storage of U.S.-origin spent fuel on Russian territory, which would be part of the services that such a center would provide, would require a 123 Agreement.

Launching negotiations on such an Agreement would thus be an important sign that Russia and the United States are ready to cooperate in a big way on nuclear power. Multiple problems will still need to be worked out—issues in the U.S.-Russian relationship, uncertainties about the staying power of the Global Nuclear Energy Partnership, and concerns about the proliferation impacts of a new emphasis on nuclear energy are all important examples. Having a 123 Agreement in hand or even under negotiation would not negate these problems, but it could serve as a foundation for progress toward resolving them.

[10] The 123 Agreement derives its name from Section 123 of the Atomic Energy Act of the United States.

The reason to pursue any cooperation at all is mutual interest, and this is particularly so during trying times. Assuming that Russia and the United States have a mutual interest in expanding nuclear power in a proliferation-resistant manner, cooperation that brings together the Global Nuclear Energy Partnership with Russia's international fuel center initiative could have a positive effect on the overall relationship.

Another more controversial reason is that such cooperation might serve as the basis for effectively engaging Iran on its nuclear program. Up to this point, Iran has insisted that pursuing nuclear enrichment is the only adequate way to express its right to peaceful nuclear energy. Because of the close link between enrichment and military nuclear programs, the international community has all but concluded that this insistence is cover for Iran's pursuit of nuclear weapons.

The effort undertaken by the European Union troika in May 2006 to develop a program of incentives is an attempt to smoke out Iranian intentions in this area once and for all.[11] Although this initiative is important, it would be made more effective if Russia and the United States would join forces to offer Iran the opportunity to participate in the development of new, proliferation-resistant nuclear technologies. Iranian reactions would be thrown into starker relief—assuming they refused the offer—and the United States and Russia would be pooling their resources rather than pulling in opposite directions in the diplomatic process.

In short, the reasons for the Russia and the United States to cooperate extend beyond their mutual interest in the expansion of nuclear power to a broader strategic goal: dissuading Iran from becoming a nuclear weapon state. Indeed, their interests are also engaged here, for if Iran continues to insist that the only way to express its right to peaceful nuclear energy is through an enrichment program, then it will be impossible to expand nuclear power in a proliferation-resistant manner. If other countries follow Iran's lead, then acquisition of nuclear power will be the direct doorway to nuclear weapons programs around the world. This, in turn, would spell the death of the Non-Proliferation Treaty and the nonproliferation regime that it underpins. Both the United States and Russia, despite their current differences, must be able to agree that this outcome would be a disaster for the international community.

[11] For more on the EU-3 efforts, see Daniel Bilefski, "EU plans 2nd package of incentives to Iran," *International Herald Tribune*, May 16, 2006, p. 4.