

Anne Lauvergeon

*The nuclear renaissance:  
an opportunity to enhance  
the culture of nonproliferation*

President Obama gave a remarkable speech in Prague on April 5, 2009, in which he called for deep reductions in nuclear arms in the immediate future and, eventually, a world without nuclear weapons. He also proposed strengthened measures to prevent the spread of nuclear weapons. His words recall those of the German philosopher Hegel: "Human beings make history, but they are not aware of which history they are making." We should join President Obama in becoming aware of the history we should all strive to make – one that lays the groundwork for a safer, more prosperous world in which the planet's resources are more equitably distributed and the environment is safer and cleaner.

The *we* which I use here refers, first and foremost, to states, which have the responsibility to ensure a peaceful and prosperous world. But nongovernmental actors, such as laboratories, universities, think tanks, and corporations, must each play its individual part in helping to build and sustain this world. And now that the growing enthusiasm for nuclear energy that has been expressed by governments, utilities, and electro-intensive

industries around the globe seems more than just a craze or a passing fashion, it is that much more necessary to involve all stakeholders.

Do we have to fear this nuclear renaissance? Several observers suggest that we do, arguing that the current nonproliferation system, the product of many decades of development, simply no longer works effectively or that it needs to be radically altered. I would suggest that, rather than fear a nuclear renaissance, we must seize it as a unique opportunity to enhance the culture of nonproliferation, in a way that involves all stakeholders in this renaissance.

Rational, well-grounded reasons underlie the nuclear renaissance. Governments and electricity utilities want to build new nuclear plants to address greenhouse gas emissions and to meet growing energy needs. Nuclear must do so while addressing three challenges that lie at the heart of any energy consideration: namely, sustainability, competitiveness, and security.

Few sources of energy can meet all three of these requirements. Fossil fuels, with their substantial greenhouse gas emissions, cannot meet the sustainability requirement. While we do need to develop renewable energy sources,

---

© 2009 by the American Academy of Arts & Sciences

Downloaded from <http://direct.mit.edu/daed/article-pdf/138/4/91/1831575/daed.2009.138.4.91.pdf> by guest on 18 May 2024

most renewables provide only intermittent supplies of energy and therefore cannot by themselves ensure full security of supply. Moreover, they do not meet the competitiveness requirement, since, like all sources of energy at an early stage of development, they will require heavy subsidies in the United States, as well as in Europe.

Nuclear energy meets all three requirements. Indeed, nuclear energy is:

- Carbon free and sustainable, because it emits the lowest amount of carbon per kilowatt hour among all sources of energy;
- Competitive, even without a carbon pricing system. That is why it is the choice of countries with highly regulated economic systems (for example, China and India); partially deregulated ones, such as the United States; or totally deregulated economies, like in the United Kingdom; and
- Secure, because uranium is widely available around the world. Current major mines are in politically stable countries, such as Canada and Australia, and conventional resources account for 200 times the annual demand. In addition, the global nuclear fuel market is functioning effectively, and consumer states are able to obtain satisfactory assurances of enriched uranium fuel through long-term contracts. For example, AREVA has signed a 60-year contract with one customer.

Nuclear power's ability to meet these requirements explains the growing global interest in nuclear energy. However, the prospects for expanding nuclear energy also come with concerns in some quarters that the spread of this technology could contribute to the proliferation of nuclear weapons, either in additional

states or among non-state actors, such as terrorist groups. As a result, some have advocated discouraging the development of nuclear power, particularly its spread to states that do not now have nuclear energy programs in operation. Over the last several years, some academic and media circles have taken a pessimistic view of the prospects of containing the spread of nuclear weapons. They have argued that the end of the Cold War has accelerated the risks of proliferation and that the current nonproliferation system, a decades-long development, is no longer effective and needs to be radically altered.

While a few countries have taken irresponsible actions in the nuclear field that threaten international and regional peace and security, the international nonproliferation system has, on the whole, been highly successful in limiting the spread of nuclear weapons. One hundred and eighty-seven states now adhere to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Only three states have elected not to join the NPT, and some states, such as South Africa or, more recently, Libya, have abandoned or dismantled their nuclear weapons programs altogether. The non-nuclear-weapons states that are party to the NPT have pledged to forgo the manufacture or acquisition of nuclear weapons and have agreed to accept International Atomic Energy Agency (IAEA) safeguards on all of their nuclear activities. Nearly all have faithfully abided by that commitment.

Nevertheless, during the past few years, new threats have emerged to challenge the global nonproliferation regime. Over a 20-year period, Iran has clandestinely acquired uranium enrichment capabilities in a manner that constitutes a violation of its obligations

under the IAEA safeguards agreement. In this action Iran has been supported by Pakistan, which itself has admitted that A.Q. Khan, the former head of the Khan Research Laboratory in Pakistan, transferred enrichment technology to North Korea, Iran, and Libya. The A.Q. Khan clandestine network also spread nuclear weapons technology to Iran and Libya. Thus far Iran has chosen to ignore several calls by the United Nations Security Council to suspend its enrichment activities. North Korea, which withdrew from the NPT and conducted nuclear tests, demonstrates another major challenge to the nonproliferation regime. While North Korea had begun dismantling its nuclear facilities, the 6-party talks with Pyongyang have stalled over disagreements about verification arrangements; as of this writing, North Korea had just expelled IAEA inspectors and announced its decision to restart its facilities.

Clearly the nonproliferation regime shows weaknesses and needs continuous strengthening. Responsible members of the international community must be ever vigilant, and must accelerate their efforts to strengthen international safeguards, nuclear export controls, physical protection, and other elements of the regime. The nonproliferation policy proposed by President Obama provides hope that the international community can take effective steps to close the loopholes in the nonproliferation regime.

However great the challenges we now face in preventing the spread of nuclear weapons, they do not cast doubt on the effectiveness of the nonproliferation system as a whole. Nor do they justify the conclusion that the growth of civil nuclear power programs means the spread of nuclear weapons. It is worth emphasizing that the few countries that have sought to acquire nuclear weapons in

recent years have done so for reasons of national security, national power, or prestige: in other words, their basic motivations have been political. The nuclear programs of these countries – North Korea, Iraq, and Iran – have never used nuclear power to produce a single kilowatt hour of electricity.

The responsibility for preventing the spread of nuclear weapons rests first and foremost with governments. As President Obama has said, “Rules must be binding. Violations must be punished.” States must ensure that countries comply with commitments they have made under the NPT, their IAEA safeguards agreements, and other elements of the regime. But we all share in the responsibility to prevent the proliferation of nuclear weapons. The nuclear industry, as well as the arms control and nonproliferation communities, must join governments in ensuring that the nuclear renaissance takes place under conditions that minimize the risk of proliferation.

The renewed interest in nuclear energy and the international growth of nuclear electricity generation do not equate – and should not be equated – with increasing proliferation risks. Indeed, the nuclear renaissance presents a unique opportunity to enhance the culture of nonproliferation. The nuclear industry must play a major role in strengthening this culture. AREVA’s “Value Charter” establishes nonproliferation at the top of its operating principles. Among other things:

- AREVA manages all of its nuclear facilities and nuclear materials in full accord with all international nonproliferation treaties, norms, and national regulations.
- AREVA does not, and will never, cooperate with any customer from a coun-

*An opportunity to enhance the culture of nonproliferation*

Downloaded from <http://direct.mit.edu/daed/article-pdf/138/4/91/1831575/daed.2009.138.4.91.pdf> by guest on 18 May 2024

try that does not adhere to international nonproliferation standards or is not compliant with its nonproliferation obligations.

- Even if a country satisfies the above criteria, AREVA reserves the right to assess the political stability and security situation of the country, and even the region, to consider possible risks associated with a given commercial transaction.
- AREVA strictly implements national and international rules and procedures governing export control for all end-user countries; it has also developed a special training and awareness program for all AREVA employees in charge of export control.
- AREVA is ready to supply countries with light water reactors, such as its EPR reactor, that by themselves do not present a proliferation risk, provided effective controls and conditions are accepted and implemented in these countries.
- AREVA is committed to exercising special care in considering the transfer of sensitive technologies, such as enrichment and reprocessing (or recycling) technologies, to other countries. We have transferred recycling technology to Japan, with the provision that Japan agree to refrain from retransferring the technology to any other country, and we have supported the implementation of IAEA safeguards in Japan. We are currently considering transferring recycling technology (without separation of pure plutonium) for peaceful purposes to China, and we are also prepared to transfer such technology to the United States, if the United States chooses to adopt recycling as part of its strategy to manage the back end of its fuel cycle. However, we have

no plans to transfer such sensitive nuclear technology to other countries.

It also bears mentioning that the vast majority of potential AREVA customers have no aspiration to acquire enrichment or recycling facilities. On the contrary, most are interested only in the generation of clean and affordable power. We no longer live in the era when countries sought to master all aspects of the nuclear fuel cycle for reasons of prestige or demonstrating their technological prowess. Rather, most countries recognize that we have entered an era of realism and efficiency in meeting energy needs. Countries have an equation to solve: how to generate X thousand megawatts of electricity beginning in 2020 or 2025 on a competitive, sustainable, and responsible basis. Nuclear electricity generation is one of the solutions; but most countries do not believe that the development of their own sensitive nuclear technologies, such as highly sophisticated uranium enrichment or used-fuel treatment capability, will provide them with a sensible, economic, or competitive approach to help solve this equation. None of AREVA's customers has expressed a real interest in acquiring sensitive nuclear technology. At any rate, AREVA would not provide such technologies to countries where it would make no economic sense, or where it would present a risk of political instability or a danger of proliferation.

Beyond the care that AREVA exercises in its nuclear export policies, AREVA also seeks to contribute to nonproliferation in several other ways. AREVA actively participates in numerous international initiatives, committees, and institutions that are working to strengthen the nonproliferation regime. Such participation gives AREVA the opportunity to share its

experience, to benefit from the expertise of others, and to improve its own export control practices, safeguards, and physical protection measures. For example, AREVA joined the IAEA's Committee 2020, established in 2008 by IAEA Director General Mohamed ElBaradei with the purpose of reflecting upon the nature and scope of the Agency's program up to 2020 and beyond and addressing the many challenges and opportunities the Agency will face in the coming years. That committee's report set out concrete recommendations, calling for a reinvigorated global nuclear order that reduces risks while allowing rapidly growing contributions from nuclear technologies to human well-being. AREVA is also working with the International Commission on Nuclear Nonproliferation and Disarmament, chaired by Garreth Evans and Yuriko Kawaguchi. The commission aims to revive the global debate on the need to prevent the further spread of nuclear weapons, as well as the need for nuclear disarmament; the commission also hopes to strengthen the NPT by seeking to shape a global consensus in the lead-up to the 2010 NPT Review Conference and beyond. A key issue that the commission will examine is how to ensure that expanded use of civil nuclear energy – most welcome in view of climate change and energy security concerns – does not result in an associated increase in proliferation risks.

AREVA does not participate in such endeavors to enhance its public image or to win a seal of good behavior for the nuclear industry. Rather, AREVA believes that being a responsible member of the international community means that the nuclear industry should partner with others, to learn from them and to share with them AREVA's considerable

experience in safeguards, physical protection, and other technical aspects of nonproliferation.

In considering the global nuclear renaissance, we need to pay special heed to the interests that developing countries have expressed in acquiring civil nuclear programs. Some observers have expressed concern that the expansion of civil nuclear power to such countries will only increase the risk of nuclear weapons proliferation. However, we should view these countries' interest in nuclear energy as good news, for at least three reasons.

First, we need to do everything we can to put an end to today's global energy imbalance. Two billion people currently live without access to electricity, and not having electricity shortens life expectancy to 35 or 40 years. We know that many countries without sufficient energy now will face serious power shortages in the future as their populations continue to grow. We should not – cannot – allow this situation to continue.

Second, the effects of climate change will not be limited to industrialized countries. Developing countries will be hit particularly hard by global warming. Many of them are now turning to nuclear power as a source of energy that is carbon free. Far from trying to dissuade this, we should applaud and support their efforts.

Third, objecting to nuclear energy in the developing world on nonproliferation grounds is politically, legally, and ethically unacceptable. Article IV of the NPT<sup>1</sup> is part of the basic bargain of the international nonproliferation regime. As President Obama stated in his speech in Prague:

The basic bargain is sound: Countries with nuclear weapons will move towards

*An opportunity to enhance the culture of nonproliferation*

disarmament, countries without nuclear weapons will not acquire them, and all countries can access peaceful nuclear energy. To strengthen the treaty, we should embrace several principles. We need more resources and authority to strengthen international inspections. We need real and immediate consequences for countries caught breaking the rules or trying to leave the treaty without cause.

And we should build a new framework for civil nuclear cooperation, including an international fuel bank, so that countries can access peaceful power without increasing the risks of proliferation. That must be the right of every nation that renounces nuclear weapons, especially developing countries embarking on peaceful programs. And no approach will succeed if it's based on the denial of rights to nations that play by the rules. We must harness the power of nuclear energy on behalf of our efforts to combat climate change, and to advance peace opportunity for all people.

Opposing the expansion of civil nuclear power to developing countries by claiming that it will lead to the spread of nuclear weapons is to deny these states' right to peaceful nuclear energy. Any effort to deny the benefits of civil nuclear power programs to developing countries risks overturning the fundamental balance of the NPT and jeopardizes the very foundation of the nonproliferation system. Nuclear energy is not just a privilege for rich countries.

This does not mean that it makes sense for all developing countries to choose the nuclear power option. Nuclear energy will not be appropriate for some countries in the world because they lack the required political stability and secure environment, the industrial infrastructure, and the human and financial resources to purchase, operate, and maintain nu-

clear power plants in the long run. However, for those countries for which nuclear power provides a sensible economic and technical means of meeting energy needs, AREVA believes that the rules for selling nuclear reactors and fuel should be fair, nondiscriminatory, and universal. Once a country commits to comply with international nonproliferation norms and obligations, we must apply the same rules, whether that country is America or Finland, China or South Africa. India has represented an important development in this respect. The reopening of nuclear trade relations with India over the last years has been based on the necessary peaceful-use guarantees and international inspections in the country.

The past several years have seen a number of proposals to minimize the risks associated with the spread of sensitive nuclear technologies. The Nuclear Suppliers Group is working to develop new criteria for the transfer of enrichment and reprocessing technology. France, Germany, The Netherlands, Russia, the United Kingdom, and the United States, at the June 2006 meeting of the IAEA Board of Governors, offered improved fuel assurances in order to discourage countries from developing enrichment and reprocessing facilities of their own. The proposal from that meeting, "Concept for a Multilateral Mechanism for Reliable Access to Nuclear Fuel," outlines a reliable supply mechanism, backed up by reserves of enriched uranium, that would support expansion of nuclear energy while at the same time obviating the need for investments in additional enrichment and reprocessing facilities.<sup>2</sup> The United States announced in September 2005 that it would commit 17.4 tons of highly enriched uranium to be blended

down to low enriched uranium “to support assurance of reliable fuel supplies for states that forgo enrichment and reprocessing.”<sup>3</sup>

In addition, the Nuclear Threat Initiative (NTI), an American nongovernmental organization, pledged \$50 million for the establishment of an international fuel bank under the auspices of the IAEA, provided that one or more member states contribute either an additional \$100 million in funding or an equivalent value of low enriched uranium to jump-start the reserve. The United States, the European Union, Norway, the United Arab Emirates, and Kuwait have pledged the necessary funds to establish this bank; the IAEA now needs to define the proper mechanism to implement such a bank.

In June 2007, Russia offered to set aside 120 tons of low enriched uranium, to be released upon request by the IAEA for use by member states of the Agency.<sup>4</sup> These initiatives show that the international community is prepared to take concrete and meaningful steps to provide nuclear fuel assurances to countries that suffer disruptions of supply unrelated to their fulfillment of nonproliferation obligations.

The nuclear industry itself can play an important role in making the acquisition of national enrichment and recycling facilities unnecessary and uneconomic. A well-functioning fuel cycle market, with suppliers like AREVA providing enrichment and used-fuel recycling services at competitive prices, makes it unnecessary for newcomers to nuclear energy to acquire sensitive nuclear technologies. It is worth pointing out that developed countries such as Belgium and Switzerland have enjoyed the benefits of nuclear energy for 40 years without perceiving any need to acquire sensitive capabilities, despite

their having the technical and financial means to do so. They have purchased nuclear fuel as part of long-term contracts with enrichment suppliers, covered by export licenses. To make sure its products and services remain reliable in the long term, the nuclear industry has already committed to major investments in new capacity.

However, we cannot restrict our attention to assurances of supply of nuclear fuel. We also have to decide how to manage the used nuclear fuel once it has been discharged from reactors. There has been a long-standing debate about the merits of recycling and the management of the back end of the fuel cycle. On one side of the debate is the once-through approach historically endorsed by the United States, which involves disposing of used nuclear fuel as a waste. On the other side is the recycling approach adopted by France, Japan, Belgium, Germany, the United Kingdom, The Netherlands, and under consideration by China and India; this approach entails recycling used fuel and recovering both plutonium and uranium to produce recycled fuel for peaceful use in nuclear reactors.

Concerns about the proliferation risks associated with recycling have been at the heart of U.S. policy, which was originally established on an interim basis by President Ford and was extended by President Carter. The Bush administration showed a new willingness to reconsider America’s once-through used-fuel management strategy and to examine the merits of developing advanced reprocessing and recycling technologies. We do not yet know what policy the Obama administration will adopt on recycling, but Secretary of Energy Steven Chu has expressed interest in continued research and development in the area of recycling technologies.

AREVA believes that the closed fuel cycle approach is an industrial solution available today, and that under the appropriate nonproliferation controls and conditions, it offers a sensible path in the future for some countries. In such cases, AREVA's experience shows that treatment and recycling can provide a very good fuel-cycle option at a competitive cost, and is an economically, environmentally, and socially responsible approach to the management of used nuclear fuel. AREVA has treated more than 20,000 tons of used nuclear fuel from seven countries on a commercial basis. AREVA takes the used fuel produced by our customers back to La Hague and treats it there to recycle 96 percent of its contents. The recycled materials are then manufactured into mixed-oxide fuel (MOX) in our MELOX facility. Waste from recycling (which is exempt from IAEA safeguards) is returned to the country that enjoyed the benefit of the energy delivered. Recycled uranium can be reenriched and sent back on the global market. Plutonium, the most sensitive material, shall be recycled in selected countries, dependent on technical, economic, security, and nonproliferation considerations and subject to international arrangements. With such a model, most countries could enjoy the full benefits of nuclear energy without having either to master or develop locally any sensitive technologies, significantly contributing to stabilizing the world's geopolitics.

AREVA believes that treating used nuclear fuel and fabricating MOX fuel for countries under effective international safeguards and physical protection measures do not present a proliferation risk and will not contribute to the weakening of the nonproliferation regime. On the contrary, AREVA is contributing both to reducing proliferation risks and to pro-

tecting the environment by removing used fuel, recycling reusable material, and reducing the volume and radiotoxicity of waste. In this respect, AREVA is prepared to consider treating used fuel from countries that would not necessarily be interested in or be in a technical or political position to recover the recycled fuels themselves. Some utilities that already recycle their own fuels, as well as utilities located in the G8 countries, for instance, could be encouraged to facilitate such operations.

In addition to its industrial reprocessing and recycling programs, AREVA is contributing to nuclear arms control and disarmament by helping to eliminate excess weapons-grade plutonium from the United States in connection with the U.S.-Russian Plutonium Management and Disposition Agreement of 2000. Securing and reducing global inventories of nuclear weapons and materials must be an integral part of any effort to prevent them from falling into the hands of terrorists. The United States and Russia have already declared a significant fraction of their plutonium as in excess of their defense needs. Much larger amounts could be removed as they reduce their arsenals to somewhere in the range of 1,700 to 2,200 operationally deployed strategic nuclear warheads by 2012, as agreed under the Strategic Offensive Reductions Treaty (SORT). And U.S. President Obama and Russian President Medvedev have agreed to pursue new and verifiable reductions in strategic offensive arsenals. Such reductions could result in additional quantities of excess plutonium from dismantled weapons.

AREVA is building a MOX fuel fabrication facility in Savannah River, South Carolina, based on its MELOX facility. This new U.S. facility will enable the

United States to convert 34 metric tons of surplus weapons-grade plutonium into MOX fuel and to produce electricity for peaceful use in nuclear plants. President Obama has urged the nuclear-weapons states to reduce their nuclear weapons arsenals. AREVA, already part of several U.S.-led initiatives aimed at reducing the risks of unused highly enriched uranium, is ready to deepen its partnership with the U.S. government to support this goal. It is important to stress that using MOX fuel for peaceful purposes in nuclear reactors is the only solution available in the short term to reduce the surplus of weapons-usable plutonium and civil plutonium.

**W**e have entered a world where the nuclear industry cannot be part of the problem; it must be an active part of the solution. It must help create a world

where countries must replace the alleged prestige and status of possessing nuclear weapons or sensitive nuclear technologies with new emphasis on the efficiency and pragmatism of producing electricity for peaceful purposes.

The ongoing nuclear renaissance presents a tremendous opportunity to meet the energy, economic, and environmental needs of both developed and developing countries for the lifetime of our children and beyond. However, governments, industry, and the nonproliferation community must cooperate closely to ensure that the growth of nuclear power does not increase the risk of nuclear weapons. We must make use of this nuclear renaissance as a unique opportunity to enhance the culture of nonproliferation among all stakeholders in the renaissance.

*An opportunity to enhance the culture of nonproliferation*

#### ENDNOTES

<sup>1</sup> Paragraph 1 of Article IV of the NPT provides that “Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.” Paragraph 2 of Article IV provides that “All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.”

<sup>2</sup> Cf. IAEA document GOV/INF/2006/10, June 2006.

<sup>3</sup> See IAEA document INFCIRC/659, September 2005.

<sup>4</sup> Cf. IAEA document INFCIRC/708, June 2007.