

# Atoms for Peace

## *A Vision for the Future*

by Mohamed ElBaradei

**“Atoms for Peace.”** These three words embody the vision that has driven the IAEA since its inception: that the power of the atom, newly tapped in the mid-20<sup>th</sup> century, held a vast potential—as a weapon of destruction on a scale previously unimaginable, or as a reservoir of energy that could be harnessed for a wealth of benefits to humankind. As with any advanced science, atomic energy posed a choice for the human race: would we use this tool for good or for ill?

With the horrific images of Hiroshima and Nagasaki still fresh in the mid-1950s, “Atoms for Peace” invoked the solemn commitment that nuclear science and technology would henceforth be used exclusively for peaceful purposes.

Fifty years later, the “Atoms for Peace” ideal remains appropriate and vital, the unifying principle behind the IAEA’s dual mission. We are committed to containing the spread of nuclear weapons, and we firmly support the elimination of the nuclear arsenals that exist. And we are equally committed to advancing the use of nuclear science and technology in peaceful pursuits: to enhance human health; to increase agricultural productivity; to improve the management of water resources; to generate electricity free of greenhouse gas emissions; and to strengthen many other aspects of social and economic development.

But with new times come new challenges. While “Atoms for Peace” continues to express the IAEA vision in the 21<sup>st</sup> century, it is worth considering how our approach has evolved, in response to these new challenges, as we seek to implement various aspects of this vision.

### **Nuclear Verification: the IAEA as “Watchdog”**

The most visible challenges in recent years have come in the area of safeguards. The Agency, in its role of verify-



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ing nuclear non-proliferation, has been much in the public view, often referred to as “the world’s nuclear watchdog.” Since the discovery of Iraq’s clandestine nuclear weapons programme in the early 1990s, the Agency has devoted extensive effort towards strengthening the nuclear safeguards regime—so as to provide credible assurance to the international community that nuclear material and facilities are being used exclusively for peaceful purposes.

Most recently, in Iraq and in the Islamic Republic of Iran—we have been able to demonstrate how effective Agency verification can be, even under difficult conditions, provided that we are granted the required authority and access to relevant information. Other factors—including new verification tools and approaches, such as satellite imagery and environmental sampling—have made the Agency better equipped than ever to carry out its “watchdog” role. However, no strengthened safeguards measures can be fully effective in providing “global” assurances as long as the regime itself is less than universally accepted.

Looking forward, it is clear that the international community must work harder to make the non-proliferation regime universal. But work is needed on many other fronts as well—to address new challenges and to find fresh ways of solving long-standing issues.

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Three key areas relate to the “big picture” of global security, which relates directly to nuclear arms control. First, the international community must be more assertive in resolving the *root causes* of global instability and insecurity—such as longstanding regional conflicts, poverty, and the suppression of human rights—which provide incentives for the proliferation of nuclear weapons and other weapons of mass destruction. Second, we must begin working together to develop and establish a system of collective security that does not depend on nuclear weapons. Concrete dialogue on this issue should begin immediately; because until such an alternative system is developed, we are less likely to move away from the doctrine of reliance of nuclear weapons for their deterrent effect. And third, even for those States that continue to rely on nuclear deterrence, concrete action should be taken to substantially reduce existing nuclear arsenals, which in total still hover around 30 000 nuclear warheads.

In addition, the Agency has recently begun to consider two proposals that reflect our understanding of how the current world situation differs from that of the late 1960s, when the NPT was being negotiated. A key difference is that, during the intervening decades, information and expertise on how to produce nuclear weapons has become far much more accessible. This places extra emphasis on the importance of controlling access to weapon-usable nuclear material.

Given the increasing threat of proliferation, both by States and by terrorists, one idea that may now be worth serious consideration is the advisability of limiting the *processing* of weapon-usable material (separated plutonium and high enriched uranium) in civilian nuclear programmes—as well as the *production* of new material through reprocessing and enrichment—by agreeing to restrict these operations exclusively to facilities under multinational control. These

limitations would naturally need to be accompanied by appropriate rules of assurance of supply for would-be users.

Equal consideration should be given to adopting multinational approaches to the management and disposal of spent fuel and radioactive waste. Over 50 countries currently have spent fuel stored in temporary locations, awaiting reprocessing or disposal. Not all countries have the appropriate geological conditions for such disposal—and, for many countries with small nuclear programmes, the financial and human resources required for the construction and operation of a geological disposal facility are daunting.

These proposals would enhance the assurance of the international community that sensitive portions of civilian nuclear fuel cycle programmes are not vulnerable to misuse. In addition, we should continue to promote technological innovation that would make future nuclear energy systems more proliferation-resistant.

Taken together, this array of non-proliferation and disarmament efforts will do much to advance the cause of “Atoms for Peace.”

## **Nuclear Technology: Meeting Human Needs**

The IAEA is less well known in the public view for its “humanitarian” pursuits—the transfer of peaceful nuclear technologies in applications that help to meet basic human needs—but this aspect of “Atoms for Peace” occupies an equally strong focus in our programme.

With an increased focus on understanding the needs and priorities of its Member States, the Agency in recent years has made significant contributions to progress on a number of sustainable development issues. In the area of human health, nuclear medicine and the use of radiation and radioisotopes have become ever more effective in diagnosing and curing cancer and other diseases; they are also being used to sterilize bone, skin and other tissues that are required in grafting tissue to heal serious injuries, and to identify drug resistant strains of malaria, tuberculosis, hepatitis and other diseases. Isotope hydrology has emerged as a key contributor to the effective management of groundwater and other water resources, and isotopic tracers are being used effectively to improve the management of geothermal fields used in power generation. Agricultural productivity has been enhanced by using nuclear techniques to track soil erosion and fertilizer uptake, to control and eradicate pests, and to develop new plant strains that have higher yields and are more adaptive to arid climates. We are working hard to raise the profile of these and other successful applications of nuclear technology—both with Member States and with potential partners and donors—to maximize the benefit of these Agency programmes.

In the area of nuclear power, the high expectations of fifty years ago have not been realized, and the overall trend in recent decades—particularly in Western countries—has been to move away from new nuclear power investment and construction. However, the increasing recent emphasis on preventing climate change, and the resultant need to minimize the impact of electricity generation, is leading an ever greater number of leaders to speak out in support of nuclear power as a source of large scale energy production that produces little or no greenhouse gases.

But the future of nuclear power is still far from clear. Asia and Eastern Europe remain the main regions of new construction—and while a number of other countries are taking incremental steps towards adding more nuclear power units, others are phasing out nuclear power based on concerns related to safety, security, waste disposal, economic competitiveness and public confidence. The extent of the future role of nuclear power will depend, in large measure, on the success of the nuclear community in developing innovative technology and new approaches that can address these concerns. The Agency is addressing this challenge through its International Project on Innovative Reactors and Fuel Cycles, or INPRO, to develop technology that is more inherently safe, proliferation resistant, and economically competitive—with additional focus on smaller reactors that will allow a more incremental investment and are better suited to the electricity grids of developing countries. Some progress is also being made on collaborative research for waste disposal and, in a number of countries, on decisions to construct geological repositories for high level waste.

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Looking forward, it is clear that the IAEA must work with the international nuclear community to provide Member States and the public at large with objective information about the range of nuclear technologies available—to achieve a more balanced view of the benefits of nuclear energy. We also should continue to use comparative assessments, where applicable, to enable Member States to make informed choices about how best to use these technologies to address development needs. Peaceful nuclear technologies, both power- and non-power-related, clearly hold great

potential for benefiting humankind, and they comprise a key element of the “Atoms for Peace” vision.

## **Nuclear Safety and Security: A Co-operative Effort**

The IAEA’s third area of activity seeks to ensure that, wherever countries choose to use peaceful nuclear technologies, they are used safely and securely. This is a co-operative role; nuclear safety and security are national responsibilities, and the IAEA promotes global co-operation to complement and facilitate Member State efforts in this regard. The 1986 accident at Chernobyl was, in this regard, a watershed event; it made painfully clear the urgent need for international co-operation on nuclear safety, and led to the establishment of a vital international safety regime. In my view, it is vital that we apply “the lesson of Chernobyl” in the security arena—namely, that we strengthen the international security regime without waiting for a watershed nuclear security event to provide the impetus for this expanded level of co-operation.

In their current form, these international regimes have three primary features: the promotion of international safety and security conventions; the establishment of international standards; and the provision of peer review services and other missions to assist Member States in implementing these standards and raising their safety and security performance.

Recent years have witnessed significant progress in these areas. It is gratifying to note that nuclear safety continues to improve at power plants worldwide, that more and more countries are raising their standards of performance in radiation protection, and that significant steps have been taken in the past two years to improve nuclear security. The *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* has entered into force and recently held its first review meeting to report on national programmes. The *Convention on Nuclear Safety*, which has been in place since 1996, is maturing into a useful instrument for improving international co-operation on and awareness of nuclear safety issues. A high percentage of the Agency’s safety standards have been updated in recent years, and Agency safety review services, which use these standards as a baseline, have been in heavy demand. Under a concerted, multi-year effort, using a “Model Project”, radiation safety practices have been significantly upgraded in a large number of countries.

In the past two years, there has been an enormous upsurge in activity to improve nuclear security, to ensure protection against nuclear and radiological terrorism. Multiple workshops and training sessions have been held, covering topics such as: illicit trafficking in nuclear and radiological materials; physical protection of nuclear materials and facili-



When it decided to stop and dismantle its nuclear weapons programme, South Africa asked the IAEA to verify it, and later presented the Agency with a symbol of its commitment to atoms for peace—a sculpture of a ploughshare.

ties; nuclear material accounting and control; assessment of threats; and nuclear forensics. A broad range of International Physical Protection Advisory Service (IPPAS) missions and other service missions have been conducted to help Member States analyse and upgrade their facility protection strategies. Numerous radiological source surveys and recovery missions have been launched to assist Member States in locating, identifying, and securing lost or “orphaned” radiological sources, and to strengthen State programmes for control of such sources.

One current challenge is to understand how safety and security aspects come together in the protection of vulnerabilities in nuclear installations—as well as in activities such as the transport of nuclear and other radioactive material. The IAEA has increasingly been asked to provide guidance on how to reconcile the need for transparency, in matters of nuclear and radiation safety, with the need for confidentiality, from a security perspective. Effective risk management in this area will involve striking a balance that protects the security of sensitive information while ensuring that safety concerns continue to be corrected in a transparent manner—and that lessons learned, related to both safety and security, are shared for the benefit of the entire nuclear community.

Another challenge relates to recurring events. The IAEA actively promotes the sharing of nuclear facility operating information. National regulatory bodies and the nuclear power industry also share operating experience, and both the IAEA and the World Association of Nuclear Operators communicate the lessons learned from international experience through their peer review programmes. But despite continued efforts by the entire nuclear community to share lessons learned from events that have occurred in nuclear facilities throughout the world, incidents with similar root causes continue to recur—often with safety culture implications. This has been seen in IAEA Member States with both robust and evolving regulatory infrastructures. A focused commitment is needed to ensure that lessons learned in one country are effectively and thoroughly communicated to all

countries, and that these lessons are incorporated into the operational and regulatory practices of all relevant nuclear facilities.

While much progress has been achieved in nuclear safety and security, improvements are still needed in areas of vulnerability. In addition to learning from recurring events, these needs include enhancing research reactor safety, strengthening transport safety, and tightening control of radioactive sources worldwide.

The strengthening of a global nuclear safety culture—characterized by broad adherence to existing safety conventions, the adoption of legally binding instruments for the remaining areas of nuclear activity, and increased collaboration with relevant international organizations—will do much to address these vulnerabilities. And we must sustain the current high volume and broad scope of activities relevant to protection against nuclear terrorism—particularly in combating illicit trafficking, protecting nuclear installations and material against sabotage, and responding to threats that could lead to radiological emergencies.

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### But the question remains: what legacy do we want to leave to our children?

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A challenge that relates to all three areas of IAEA activity—safety and security, technology, and verification—is the so-called “management of nuclear knowledge”. The international community faces the urgent need to develop a younger generation of scientists and engineers with the proper education and skills to replace the aging nuclear workforce—in short, to ensure “succession planning” for the nuclear industry. In this context, the IAEA is supporting the World Nuclear Association in its efforts to launch the World Nuclear University.

### Atoms for Peace: A Call for Leadership

Fifty years ago, the international community set about to move towards a world in which nuclear weapons would no longer be needed or pursued, and in which peaceful nuclear technologies would provide enduring benefits to all peoples and cultures. The 21<sup>st</sup> century has brought new and critical challenges to this mission. But the question remains: what legacy do we want to leave to our children?

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