

IAEA Vision & Reality

How far has the IAEA been able to realize the vision that inspired its creation in 1957?

by David Fischer

The IAEA's founders foresaw three principal functions for the new Agency:

- ① To promote the peaceful uses of nuclear energy throughout the world;
- ② To ensure, as far as it could, that any nuclear plant, activity, or information with which it was associated would be used only for peaceful purposes, and
- ③ To ensure the safe use of any such plant, activity or information.

In a speech to the UN General Assembly on 8 December 1953 President Eisenhower proposed the creation of an international atomic energy agency. The President's vision of the promise of atomic energy—and of the threat to humanity that atomic energy might present if nuclear arsenals were not strictly controlled—enthralled the normally sceptical audience of the General Assembly.

From Euphoria to Harder Times

The President's statement boosted the already widespread euphoria about the future role and contribution of nuclear energy and hence about the IAEA itself. In Geneva in 1955, this euphoria cast a warm glow over a mammoth UN conference on the peaceful uses of atomic energy. Two thousand scientists converged on the Swiss city in the largest meeting of its kind, and experts from nuclear-weapon States competed with each other in publishing information that had hitherto been shrouded in military secrecy. The Western manufacturers of nuclear plants hosted evening cruises on Lac Lemman, at which normally frugal scientists consumed more champagne and culinary delicacies than was their wont.

Participants from developing countries foresaw that nuclear energy would meet their national need for energy for the

indefinite future, producing electricity “too cheap to meter” as the American scientist Alvin Weinberg put it. Nuclear steamships would soon plough the oceans.¹ Nuclear reactors would supply steam heat for electric power, desalt the oceans and turn the deserts green. Developing countries saw in nuclear energy the means by which they could leapfrog the slow and painful path that industrial states had followed in order to accomplish the industrial revolution. Homi Bhabha, the Indian physicist, Nobel Prize Winner and president of the Conference, predicted that controlled nuclear fusion—promising limitless cheap electricity—would be mastered within twenty years. Other pundits foresaw nuclear motorcars and nuclear locomotives, and one bold expert even predicted nuclear aeroplanes.

This euphoria began to take concrete form in a spate of orders for nuclear power plants. In the late 1950s and 1960s the aggregate orders for nuclear plants overtook the total of those for all others put together—coal, oil, gas and renewables such as wind and water.

But nuclear ascendancy was relatively short lived, at least in the USA and Western Europe, with the notable exception of France. Within 25 years, the optimism of the 1950s and 1960s was rapidly fading.

There were several reasons for this. In 1979, the severe nuclear accident in the American nuclear power plant at Three Mile Island (TMI) put an abrupt end to the flow of orders for new nuclear power plants in the United States. TMI cost no human lives, but the two billion dollar plant was damaged beyond repair, and confidence in the safety and competitiveness of nuclear power in the USA suffered a severe blow.

Within a few years the civilian nuclear industry in Western Europe was facing a similar fate. Only in France did a robust nuclear programme, which was providing about 70% of the country's electricity, continue to prosper. But even here

the programme for the industrial use of the breeder reactor which most countries, but especially France, regarded as the nuclear power plant of the future, came to a halt. Orders for new nuclear plants for the saturated national grid tapered off but the country became the major exporter of electricity that it is today.

In 1986 the Chernobyl disaster seemed at first to sound the death knell for the civilian nuclear industry (the military, responsive to other incentives, seemed little affected). In Western Europe and North America, most nuclear programmes not already frozen were soon brought to a standstill. In Italy, the construction of three nearly completed nuclear power plants came to a halt and all other nuclear plants were eventually dismantled, making Italy the only leading industrial country completely devoid of nuclear power.²

Paradoxically, this slowdown has been least drastic in the Soviet Union and the newly independent States even though these countries sustained the most damage by Chernobyl. Yet in contrast to earlier expectations, the total number of developing countries operating nuclear power plants has hovered at low levels for the past thirty years.

There are some exceptions to this generally bleak picture. Several countries in the Far East and South Asia are continuing to look to nuclear energy as a leading future source of electricity. Recent failures of other energy sources in the US, Italy, the UK and some other Western countries, and the resulting black-outs and “brown-outs,” have reminded governments of the vulnerability of energy supplies based on renewable sources, on marginal reserves and on fuel imports from politically unstable countries. Concern about climate change that may be brought about by burning fossil fuel is having some effect on energy policies and calls for greater use of nuclear energy. However, any substantial renewal of interest in nuclear will require industry to continue to avoid serious accidents (as it has done since 1986) to increase public confidence and reduce the cost of nuclear electricity.

Evolving Key IAEA Roles

At first the architects of the new Agency, i.e. the drafters of the IAEA's Statute, were tempted to merge two of its main functions—namely those of ensuring that nuclear hardware under IAEA safeguards was not used for any military purpose and that of ensuring the safe use and maintenance of that hardware. It seemed logical to use the same corps of inspectors for verifying the accomplishment of both purposes and this approach is reflected in some of the guidelines that the IAEA Board approved in the early days. However, safeguards serve a political purpose and States chose IAEA safeguards to achieve that purpose. On the other hand, safety of national nuclear programmes is a technical problem and must ultimately be the responsibility of the government concerned and not an international

Secretariat, which is unlikely to have the resources, or the authority, needed for the task.

It soon became obvious that a merger of safety and safeguards would not work. However, an efficient international Secretariat is well placed to verify and certify that the national safety authority is carrying out its task effectively and can draw attention to deficiencies that may arise in the operation of the national nuclear safety programme.

With the passage of time, this differentiation of roles has become less clear-cut. TMI sapped popular confidence in national safety authorities and led to demands for sharper and more proactive international oversight. Meanwhile, the failure of the IAEA in the 1970s and 1980s to detect the massive Iraqi nuclear weapon programme encouraged some governments to take direct action to eliminate any such programme. At the same time, during the last three decades, international regulations applying to virtually every aspect of nuclear safety and radiation safety have paid off in many ways. Internationally agreed, regularly re-examined and revised standards, recommendations, and guidelines now cover virtually every type of nuclear operation from the mining and preparation of nuclear fuel to the disposal of nuclear waste. In time, the fundamental safety elements are enshrined in internationally ratified and binding conventions or treaties and are made available for the international community. Much, however, remains to be done to promote uniform safety practices in the form of nuclear safety services, safety and design reviews, international design and peer reviews and follow-up missions.

One of the most striking changes over the last five decades has been the change in attitude of IAEA's Member States towards its safety activities. Until the 1980s, leading nuclear powers tended to take a rather condescending view of the Agency's work in this area. The work was supported insofar as it encouraged developing countries to pay attention to nuclear safety and helped ensure that nuclear plant and material imported from industrialized countries would be safely operated and maintained. But, in their view, the advanced countries themselves were quite capable of meeting their own resources without the need for IAEA services.

TMI and Chernobyl showed that nuclear safety is indivisible. Today, the job of assuring such safety is a vast international cooperative effort. It draws heavily on the support of bodies such as WANO (the World Association of Nuclear Operators), the Nuclear Energy Agency of the OECD (Organization for Economic Co-operation and Development), WHO (World Health Organization), other UN agencies and the European Union.

Controlling the Military Atom

In the IAEA context, safeguards initially meant both the promotion of nuclear safety and the proscription of any



The Grand Hotel on Vienna's Ringstrasse served as IAEA's temporary headquarters from 1957-1979.

military use. But soon the latter was seen as a separate function. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which came into force in 1970, introduced a further refinement—NPT safeguards would not exclude every military use but only the development of nuclear explosives. An NPT non-weapon State would, in principle, be free to carry out any non-explosive use of nuclear technology. For instance, it would be free to acquire nuclear submarines, although so far none has done so.

The aim of safeguards has undergone even more radical change since 1946. In the immediate post-war years, two leading Americans put forward a detailed plan for the total elimination of nuclear weapons. They were US Assistant Secretary of State, Dean Acheson, and the progenitor of the Tennessee Valley Authority, David Lilienthal. The plan was presented to the UN—and fatally amended by the American Statesman, Bernhard Baruch.

Unfortunately, Baruch had introduced a provision into the Acheson/Lilienthal Report that was certain to make the revised plan unacceptable to the Soviet Union—under Baruch the actions undertaken to implement the plan were

not to be subject to the vetoes of the five permanent members of the Security Council. For Stalin and his colleagues, the right of veto was an indispensable protection against the West's built-in majority in all UN councils. In any case, what Stalin wanted was the bomb and not a lawyer's paper plan. So the West would have to persuade the Soviet Union that it was in its own enlightened self-interest to contribute nuclear material to the new organization, i.e. to the IAEA.

Eisenhower's proposals were an attempt to get around problems inherent in the Acheson/Lilienthal Report and the Baruch Plan. Eisenhower proposed that instead of an all embracing authority controlling every aspect of atomic energy, the three nuclear-weapon States of the time—the Soviet Union, the US and the UK—would draw down their stocks of nuclear weapon material below the level at which any of the three could inflict a fatal blow on the industrial base of the others. The siphoned-off material would be transferred to the IAEA, which would distribute it to help meet mankind's needs for energy and nuclear research.

Since the IAEA would handle growing stocks of nuclear material, provision would have to be made for their storage, protection, distribution, purchase and sale.

Several provisions of the IAEA's Statute reflect these expectations, in particular Articles IX, X, XI, XIII, XIV. Most of these Articles have remained dead letters into which the fire of life has never or only feebly penetrated.

In view of the Agency's sensitive functions and the expectation that it would become a major repository and transit point for nuclear material, it seemed desirable to house it in a neutral capital. Geneva, Copenhagen and Rio were mentioned but with the help of an energetic Austrian government, and of a supportive Washington and Moscow, Vienna took the prize.

International Safeguards: A Slow Start

Despite their potential political importance and consistent and generous US backing, IAEA safeguards ran into strong opposition and got off to a very slow start. It cannot be denied that the proposition that foreign technicians should be given access to the technically most advanced and potentially sensitive branches of the national industry (which was how many perceived nuclear operations in the

final decades of the 20th century) was bound to arouse suspicion and opposition.

In the case of States not having nuclear weapons—industrialized or developing—the sense of discrimination was compounded by the fact that the nuclear-weapon States would be exempt from inspection. Initially this was because they would not need the nuclear assistance that triggered inspection and later because of the exemption granted by the NPT. As Homi Bhabha put it, nuclear energy will be the key to our future and we are not prepared to see that key in the hands of 23 gentlemen (the members of the IAEA Board of Governors, which today number 35 and include ladies, as well as gentlemen) sitting in Vienna. The Indian position found wide support amongst the developing avant-garde countries. The USSR, heavily engaged in the Cold War with the West and unhappy about increasing Western closeness with an industrially resurgent West Germany, tended for several years to echo the Indian position. The Western Europeans, striving to strengthen the bonds designed to unite them, set up their own nuclear and safeguards authority by the EURATOM (Rome) Treaty. The USSR regarded Western inspectors as Western spies posing as UN officials. Apart from the US and the UK, which offered a couple of nuclear plants on which inspectors could be trained, the only countries in which IAEA safeguards could operate were Japan and a handful of developing countries interested in obtaining nuclear equipment for which IAEA safeguards were a condition of supply.

In the early 1960s, the position began to change. On the proposal of Japan, discussions began on substituting IAEA safeguards for those of the US and Canada on the nuclear plants that the two countries were supplying to Japan and that would constitute most of the Japanese nuclear park. The existing safeguards of the IAEA covered only small reactors. Some plants being offered were large power reactors and the safeguards would obviously have to be revised. The US offered some of its own plants as training facilities.

The safeguards revision covered all sizes and almost all types of nuclear plants. Reflecting a remarkable change in the position of the USSR and a softening of India's approach, the revised documents were approved unanimously. The IAEA was approaching the stage when it could accept responsibility for applying the safeguards prescribed in the NPT. In 1970, the NPT came into force.

In 1971, the IAEA approved a standard agreement for applying safeguards to the entire fuel cycle of an NPT non-weapon State. After lengthy negotiations, the standard agreement was accepted in 1975 with some modifications by the non-

weapon States of the Common Market and by Japan in 1976. The long-term duration of the NPT was to be decided in 1995 by a conference of the parties. By that date, and after many changes of course, most of the remaining non-weapon States had acceded to the NPT or to comparable regional treaties. Thus, all of Latin America, Australasia, and Africa, had renounced or were in the process of renouncing nuclear weapons. The exceptions were the five “official” weapon States—China, France, Russia, UK, and USA³—and three non-weapon States in the Middle East and South Asia: Israel, India, Pakistan—all in regions of high political tension. A few States that had renounced nuclear weapons by joining the NPT were suspected of working secretly to make nuclear warheads; foremost among them was Iraq. The US and Israel also suspected Iran.

The 1995 NPT Review and Extension conference decided to extend the Treaty indefinitely, thus incidentally extending indefinitely the duration of the safeguards agreements concluded under the Treaty. The conference also reaffirmed the commitment of the parties to eliminate all nuclear weapons. But it must be said that today we seem no nearer the fulfilment of that commitment than we were on the several previous occasions when it was affirmed or reaffirmed.

21st Century Uncertainties

As we progress further into the 21st century, another uncertainty has begun to confront the non-proliferation regime.



The first session of IAEA's General Conference was held in 1957 at the Konzerthaus, one of Vienna's famous concert halls.

In the 1940s and 1950s responsibility for avoiding the further spread of nuclear weapons lay almost entirely with a small handful of States that already possessed such weapons or would soon be able to acquire them. It cannot be

said that they were unduly successful in discharging this responsibility—assuming that they genuinely wished to constrain proliferation, which was not always the case.⁴

By 1970 seven States (including Israel and South Africa), already had nuclear warheads or were in reach of them. The arsenals of the five official nuclear-weapon States—in particular the Soviet Union and the United States—had reached staggering numbers, tens of thousands of nuclear warheads and missiles.

With the entry into force of the NPT, in 1970, multilateral diplomacy began to play a central role. And with the end of the Cold War, negotiations and verification could be much less formal and painstaking. The nuclear arsenals of the five shrank dramatically.

As noted earlier, when nuclear commerce began safeguards were usually negotiated bilaterally between supplier and importer States rather than the result of accepting an internationally standardized set of rules. In fact, until the 20th century, verification of most treaties was a bilateral matter between victorious and defeated states. With the conclusion, chiefly since 1945, of several verification treaties, responsibility for verifying has become increasingly multilateral, usually by a body set up by a group of States specifically in order to verify compliance with the parent treaty. However, the potential weakness of multilateral verification has been illustrated in the course of recent conflicts, for instance, in Iraq's ability to pursue for many years a very large undetected programme for the manufacture of nuclear warheads and North Korea's ability to defy the verifying and enforcing organizations—the IAEA and the UN Security Council.

In Iraq's case, compliance with the requirements of non-proliferation and verification is being sought by military force, but whether this compliance will prove enduring remains to be seen. It is also possible that the results sought in the Iraqi case—location and elimination of whatever weapons of mass destruction Iraq may still possess—could have been achieved without resort to war.

In the wake of the 9/11 terrorist attacks, there has been strong pressure on governments to take visible and incisive action against governments and organizations loosely qualified as terrorists; the climate was not favourable for careful and judicious reactions, particularly in dealing with chronic crises in the Middle East. But so far, at least, the use of force has proved no more effective than multilateral diplomacy in finding solutions or in recovering missing ordinance.

To sum up, in this century the task of the international community, and especially its leading members, may consist less of improving the efficacy, technology and methodology of verification and more in directing resources—including force—against those who are suspected of planning to use

force. But how will the majority of nations react to this? Will they deplore gunship diplomacy especially if they are the targets of the guns?

The answer to the question of how far the IAEA has realized the early visions is, of course, mixed. The peaceful uses of nuclear energy have not fulfilled their early promise except in their secondary applications as tracers and as sources of beneficent radiation. To the extent that its resources permit, the IAEA is fulfilling its promise to make the use of nuclear energy as safe as possible. But much still has to be done in translating safety principles and rules into practical and uniform applications. As for ensuring the purely peaceful use of nuclear energy, as long as nuclear weapons exist and are deployed for hostile use, the threat of devastating misuse will be with us. The threat, however, is considerably less so than during the years of the Cold War or in the 1960s when runaway nuclear proliferation seemed inevitable.

On hearing about Hiroshima the English writer H.G. Wells is said to have commented, "...at last the idiot child has got hold of the box of matches." So far we have kept the lid down and the IAEA has been one of the main means of doing so.

David Fischer took part in the negotiations on the IAEA Statute in the mid-1950s and served on the Preparatory Commission for the Agency. From 1957 to 1980 he was IAEA Director and subsequently Assistant Director General for External Affairs. He is the author of several books on nuclear safeguards and non-proliferation issues, including the authoritative history of the IAEA's first 40 years. The book is available on the Agency's web site at www.iaea.org.

End Notes

- 1) Germany, the US and Japan each built and subsequently scrapped a commercial nuclear liner. Russia built a number of nuclear icebreakers and is today the only country still operating non-military nuclear ships.
- 2) In Austria, host to the IAEA, a referendum decided by a hair thin majority not to bring into operation a nuclear power plant it had just completed and made it illegal to produce electricity by the use of nuclear energy.
- 3) The States under the NPT designated as weapon-States are those that demonstrated nuclear explosives before 1 January 1967. They happen to be the five permanent members of the Security Council.
- 4) It seems that France played a crucial role in the nuclear arming of Israel; Canada, the US and UK in the nuclear arming of India; Germany in the nuclear arming of South Africa; the USSR in the nuclear arming of China and possibly China in the nuclear arming of Pakistan.