As delivered

International Co-operation and the Future of Nuclear Power

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It is a pleasure for me to take part in this joint Opening Session of ENC and RECOD. I note with a good deal of satisfaction the participation of the ENS Young Generation Network and its planned workshop on public perception and communication. It is clear that one of the key challenges for all those involved in the nuclear industry is to engage more widely with civil society and to foster a culture of communication and transparency. Public understanding is key to public acceptance. And public acceptance is key for nuclear science and technology to be able to contribute their full share to addressing the many serious challenges facing our common future.

The Role of the International Atomic Energy Agency (IAEA)

The panel of distinguished speakers has articulated very clearly the major current issues of nuclear power generation. One common theme emerges from all presentations: the importance of strengthened international co-operation in all areas relevant to the safe and peaceful use of nuclear energy. As the only intergovernmental global organization dedicated to nuclear science and technology, the role of the Agency is to serve as the international focal point for standard setting, independent analysis, technology transfer and oversight and verification. The value and credibility of the Agency depends on its scientific and technical competence and its objectivity. It is from this vantage point that I make my remarks today.

Nuclear Power

The facts of nuclear power generation may be stated simply. At the beginning of this year, 437 nuclear reactors operating in 31 countries provided about 17 per cent of global electricity and accounted for the avoidance of about eight per cent of global carbon emissions. Accumulated operating experience reached approximately 8,500 reactor years. Several existing reactors are now approaching the end of their design life. Decisions must be made to extend their time in service, to replace them with new plants or to find other options.

Global energy demand is growing. It is projected to increase two to three fold for developing countries in the next thirty years, depending on the economic growth scenario. Concern about possible global climate change is also growing. At the Kyoto Conference, industrialized countries agreed to lower their greenhouse gas (GHG) emissions. Energy produced from fossil fuels accounts for about half of man-made GHG emissions. Except for nuclear or hydro power (which has limited growth potential), there are not yet any other economically viable, minimal-GHG-emission options for base load power generation. The extensive use of renewable resources for this purpose does not appear to be close at hand. And for many countries, security of energy supply remains a high national priority.

With varying degrees of urgency, both developed and developing countries are thus faced with major energy choices. However, new nuclear power projects are at a standstill in Western Europe and North America. The impact of the current financial crisis on planned expansion in parts of Asia and Eastern Europe is not yet clear. In many countries, public concern over nuclear safety, particularly waste management and transport, is a critical inhibiting factor on decisions to construct new plants and on the continued operation of perfectly safe and efficient plants. And in countries which are deregulating their energy markets, the high initial capital costs of new plants and concerns about competitiveness have tended to focus new investment elsewhere, including on combined cycle gas power plants.

The most recent OECD International Energy Agency projections show the nuclear power share of global electricity supply falling to twelve per cent in 2010 and eight per cent in 2020. Yet there are compelling reasons why nuclear power, together with improved energy

efficiency and greater use of renewable energy sources, should continue to be a major component of many national energy strategies.

The challenge is to ensure that the nuclear power option is given a full and fair hearing. This requires action on three fronts: the restoration of public confidence in the safe and exclusively peaceful use of nuclear energy; the demonstration of economic competitiveness with special attention to nuclear power plant life management; and further technological development.

Public Trust

Public trust is inseparable from nuclear safety. And nuclear safety cannot be proclaimed - it must be demonstrated throughout the entire nuclear fuel cycle, most urgently with respect to the management of radioactive waste and spent fuel. A demonstrated global safety culture, together with timely and transparent public information, is an essential building block for public confidence. The contribution of the IAEA is through the development of a comprehensive nuclear safety regime that consists of three elements: international binding agreements; detailed safety standards; and measures to provide for the application of those agreements and standards.

Over recent years the global safety record for nuclear power plants has shown continued improvement. However, the Agency's Nuclear Safety Review for 1997 identified events concerning management practices in power plants which provide a warning that even well developed nuclear power programmes can experience a gradual deterioration in safety performance unless there are continuous efforts to maintain and improve nuclear safety.

Moreover, the impact of market deregulation will also require continued vigilance by national regulatory authorities. This is to ensure that there is no sacrifice of safety for the sake of profitability; that plant operators continue to devote the necessary resources to staffing, training, maintenance; and that there is full adherence to operating procedures.

In recent years, several important international conventions, negotiated under the IAEA's auspices, have helped to fill gaps in the international nuclear safety regime. But we need to

remain watchful of other areas in which the international community as a whole would benefit from binding norms. The Agency's Safety Standards Series represents international consensus on safety requirements and their implementation. In the present biennium we have undertaken the preparation or revision of the entire corpus of safety standards - a total of some seventy documents - to ensure that they are comprehensive, scientifically accurate and current.

The provision of safety assistance services is key to achieving a global best practice in the application of safety standards. They are the best practical way for safety culture to penetrate borders.

Decisions on the management of spent fuel and the final disposal of radioactive waste can be delayed but cannot be avoided. The quantities involved are growing. Existing and planned storage capacity will keep ahead of accumulated inventories, but there is concern that in some countries the resources will not be available to construct planned facilities. This is an area for urgent national attention and co-operation on an international or regional basis, as appropriate.

Through the assessment of different technologies and the dissemination of information, the Agency is supporting Member States in properly addressing low and intermediate level waste management issues. With respect to high level radioactive wastes, experts agree that technical solutions exist for its safe and permanent disposal. But these solutions have not been demonstrated. One of the comparative advantages of nuclear power is the small volume of wastes generated. However, for reasons of public concern, this will not be perceived as an advantage until available technical solutions for safe and permanent disposal of wastes are demonstrated. The need for Member States to develop disposal plans and construct facilities has thus become one of the most urgent priorities.

The Competitiveness of Nuclear Power

The structure of the global electricity sector is changing. Several States are deregulating and privatizing their energy supply markets. Power plant operators are searching for greater efficiency from existing plants and greater economy to reduce costs. National regulatory

authorities are considering applications for plant life extension. Governments are considering how to factor national GHG emissions commitments into deregulated domestic markets.

While the performance of nuclear power plants over the world has been steadily improving over the past years (average annual availability grew from 70 percent in 1989 to 78 percent in 1996), the increasingly competitive environment has significant implications for plant operations. These include the need for efficient use of all resources, including personnel; more effective management of plant activities, such as outages and maintenance; greater use of analytical tools to balance costs and benefits; and sharing of resources, facilities and services at a national, regional and international level.

The Agency assists the Member States in all these areas through collection and dissemination of the latest technological improvements and accepted good practices. Two areas are of immediate importance: managing nuclear plant life extension and ensuring that environmental externalities are factored into comparative assessments of energy options.

Information and exchange of experience is key to the evaluation of the current condition and future degradation trends of the component system and structure of nuclear power plants. It requires systematic collection, processing and management of a large amount of data on ageing and degradation processes. In 1994, the IAEA commenced development of an International Database on Nuclear Power Plant Life Management. This is a multi-module database which covers Reactor Pressure Vessel Materials, pipe components, Steam Generators and Concrete Containment.

The choice of nuclear power and of a particular energy mix are national decisions. To make those decisions wisely, with due consideration of all relevant factors, national authorities and energy investors need to have available the tools for objective comparative assessment between nuclear and other energy systems. Since 1992, in close co-operation with eight other international organizations, the Agency has developed the tools and methodologies for the comparative assessment of different energy chains and conversion technology options through the 'DECADES' project (Databases and Methodologies for Comparative Assessment of Different Energy Sources for Electricity Generation). The comparisons include energy

demand and supply options, economic analysis, the health and environmental impacts, the risks of energy systems, and sustainable energy development. The DECADES methodological framework is being used by some 35 Member States to conduct their own independent energy option analyses.

The Agency is also contributing to the International Panel on Climate Change (IPCC) Third Assessment Report and is working together with UNDP, the UN Department of Economic and Social Affairs and the World Energy Council to conduct a world energy assessment for the UN Commission on Sustainable Development which, at its Ninth Session in 2001, will address energy issues for the first time.

Technology Development

As this Congress will undoubtedly show, the full potential of nuclear science and technology has not yet been reached. There is much exciting ongoing research and development. At the IAEA's General Conference last month, Member States supported strengthening of the Agency's activities relating to nuclear desalination and small and medium reactor development. This programme includes assisting developing countries in planning and implementing demonstration programmes. I was also pleased that the US Secretary for Energy announced during the General Conference the continuation of US participation in the International Thermonuclear Experimental Reactor project for controlled thermonuclear fusion.

But these are only some of the many areas of prospective developments. The challenges to the future of nuclear energy require a constant search for improvement in every component of the nuclear fuel cycle. Some of the objectives to reach include proliferation resistant fuel cycles to give the highest assurance of no diversion of nuclear material; new reactor designs with higher efficiency, lower cost and improved safety; lower output reactors for use where large reactors are not attractive and new techniques for on-site and surface storage and for underground disposal of nuclear waste.

Before I leave this area of science and technology, I would draw attention to the necessity to transfer the know-how in the nuclear technology sector, even for States moving away today from the nuclear power option. A new generation of scientists, engineers and technicians will have to be trained and a robust R&D Programme will have to be maintained to manage existing nuclear facilities over the long term, and to keep open for the future the nuclear power option. The continuity of knowledge is also important for the continued use of nuclear technology in such sectors as industry, health and in other areas of scientific research, and in order to maintain national capabilities to respond appropriately to any radiation emergency. Human resources are pivotal to our future.

Non-Proliferation

I would conclude with some comments on the prospects for nuclear arms control and reduction. An effective verification system is indispensable to the peaceful utilization of nuclear energy. The IAEA new strengthened safeguards system has given it the legal authority to implement a more effective system designed to detect possible non-peaceful activities at an early stage. Good progress is being made in the conclusion of the required Protocols - we expect global adherence by the year 2000. Our objective is to achieve optimum effectiveness and efficiency by meshing fully the traditional nuclear material accountancy system with the strengthened measures. These include utilization of advanced technology such as environmental sampling and remote monitoring.

In the wake of the nuclear weapons tests conducted in May, widespread concern has re-emerged at the possible erosion of the basic norm of the non-proliferation regime, namely that, pending nuclear disarmament, world security is better served with fewer rather than more nuclear weapons and nuclear weapon States. The tests underscored the need to focus on the driving forces behind the acquisition of nuclear weapons and to accelerate the process of nuclear disarmament through freezing the production of fissile materials for weapons purposes and the gradual reduction of stockpiles of such materials. I am pleased that some progress is taking place.

In August the Conference on Disarmament agreed to commence negotiation of a treaty prohibiting the production of fissile material for nuclear explosive devices. Separately, progress was made last month in ongoing discussions between Russia, the US and the IAEA to develop the modalities for placing under IAEA verification some of their existing stockpiles of fissile material considered excess to their military sectors. But agreement has not yet been reached on the modes of financing.

Conclusion

Nuclear science and technology has always been accompanied by a mixture of hope and apprehension. In these times of change and uncertainty, we are on notice from a sceptical public opinion. But the world would not be well served if an important energy choice were foreclosed unnecessarily. When we speak of the hopes and the apprehensions concerning the use of nuclear technology, it is incumbent on all of us to co-operate to maximize the hope and eliminate the sources of apprehension. This is a task worthy of our continued endeavour.