IAEA TECHNOLOGY TRANSFER FACTS & TRENDS

PILLARS FOR DEVELOPMENT

BY PAULO M. C. BARRETTO AND ALEXANDER ROGOV

As the new century opens, the transfer of technology for peaceful nuclear development stands strengthened in important ways. Working through the IAEA, developing and industrialized countries moved together over the past decade to improve the effectiveness and efficiency of the Agency's Technical Cooperation Programme, which serves the interests of 130 Member States at various stages of nuclear development.

These steps came at a challenging time. Over the past decade, political and economic developments had major influences on the Agency's work, requiring strategic and programmatic adjustments. A new strategy for technical cooperation has been put into place, and new approaches are being implemented to target the priority needs of Member States and to form partnerships for development with other organizations and groups. *(See article, page 2.)*

Overall, trends show that the use of nuclear technologies in developing countries is growing, as local infrastructures improve and technology transfer increases. At the same time, financial resources remain limited. Over the past five years, for example, resources for IAEA technology transfer activities, which had increased in past decades, have levelled off. *(See box, page 9.)* During this period, the IAEA's membership has increased from 122 States in 1995 to 130 in 1999. In practical terms, this growth signifies a reduction in the Agency's capacity to respond to the developmental needs and expectations of all its members.

While much has been accomplished, it is clear that much more remains to be done in extending the benefits of nuclear energy for sustainable development. Importantly, opportunities exist and projects responding to the priority needs of Member States have been identified; the main constraint has been the level of resources at hand.

This article highlights major trends over the past five years characterizing the IAEA's technology transfer activities. It also briefly looks at prospects over the near term, in the context of strategic goals set in the IAEA's *Medium Term Strategy* for the period 2001-05. The strategy integrates major activities under three substantive pillars of work -- technology transfer, safety, and safeguards. The strategy calls for the Agency to enhance its role as the principal international vehicle for multilateral cooperation in the peaceful uses of atomic energy.

The Technical Cooperation Programme is the Agency's main, though not the only, channel for technology transfer. Many ways and means are used to this end, including scientific and technical meetings and publications, research contracts and programmes, numerous textual and statistical databases, and a wide range of expert services by advisory teams and research laboratories. *(See box, page 12.)*

The Technical Cooperation Programme includes national, regional, and interregional projects in various fields. Since the early 1990s when they were introduced, a growing number of Model Projects that must meet strict criteria have been implemented. All technical cooperation projects can include expert services, provision of equipment and services, fellowship training, scientific visits, and training courses.

In 1999, a total of 868 technical cooperation projects were operational in 95 Member States. Under these projects, over 3300 experts including lecturers from all over the world conducted visits to recipient Member States. Significantly, 55% of these visits were carried out by experts from developing countries, which is an indicator

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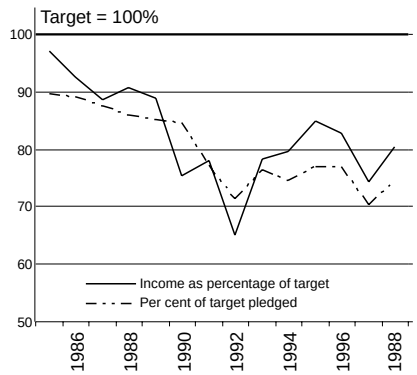
RESOURCES FOR THE IAEA TECHNICAL COOPERATION PROGRAMME, 1985-98

Trends in resources for the IAEA's Technical Cooperation Programme reflect a mixed picture over the past ten years. The major source of support are voluntary contributions made to the Technical Cooperation Fund (TCF), for which a target amount is set each year by the IAEA General Conference.

In 1998, a record number of 73 countries, 13 more than in 1997, made pledges to the TCF target amount of US $71.5 million. Most of the newly pledging countries were among developing Member States, including least developed countries. The 20 largest contributors (15 developed and five developing Member States) represent 95% of the TCF payments for 1998. At the same time, 55 Member States neither pledged nor paid contributions to the TC, and some major donors paid only a fraction (20% to 80%) of their respective targets for 1999. This led to a significant shortfall to the target.

Over the past decade, trends show a continuous gap between the approved TCF target and the actual record of payments to the fund. The unpredictability of resources makes it difficult to plan and implement activities effectively.

Pledges & Payments to IAEA Technical Cooperation Fund, 1985-98



of the advancement achieved by many developing Member States.

A total of 1222 persons received training as fellows or visiting scientists. Fourteen interregional and 184 regional training courses were held in 65 countries; 82% of these courses were hosted by developing countries. A total of 2422 persons were trained at the courses. Various items of equipment and instruments totalling US $30 million were delivered. *(See graphs, page 10.)*

Regarding Model Projects, they may be national, regional or interregional. They are tailored to respond to a high priority national need; demonstrate the major role of nuclear technology; achieve significant and measurable end-user/end-beneficiary impact; receive much greater government commitment; and remain sustainable beyond the life-cycle of the project itself. The strategy calls for Model Project standards to be extended to the entire Technical Cooperation Programme. By 1999, a total of 122 Model Projects were operational in 59 Member States.

Interesting to note is that the total number of operational technical cooperation projects has been significantly reduced from nearly 1200 in 1995 to slightly over 900 in 1998. This year, about 700 projects are operational.

Another interesting aspect is the growing trend towards "regionalization" of the programme. This points out the implementation of projects through institutions within a region, using existing regional capacity and expertise whenever possible, thus promoting technical cooperation between developing countries.

In Africa, for example, while the budget for national technical cooperation projects has changed little in the past five years, allocations for regional projects have increased considerably, from about one quarter of the total programme budget in 1993 to over half in 1999-2000.

The range of activities related to the transfer of technology and expertise directly address two of the Agency's three strategic pillars of work -- namely, technology and safety. Major activities are highlighted in the following sections.

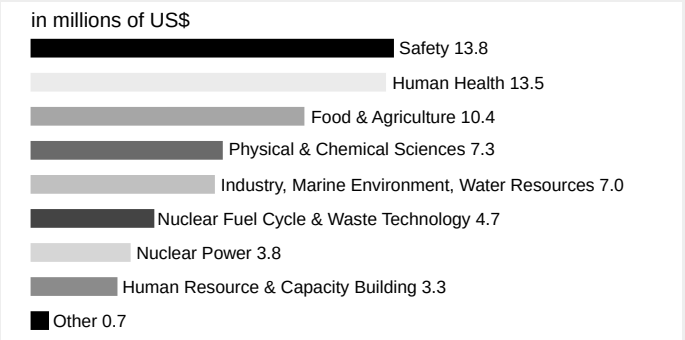
PILLARS OF DEVELOPMENT: TECHNOLOGY

The technology pillar encompasses activities related to the production of electricity from nuclear power and to nuclear applications in other fields.

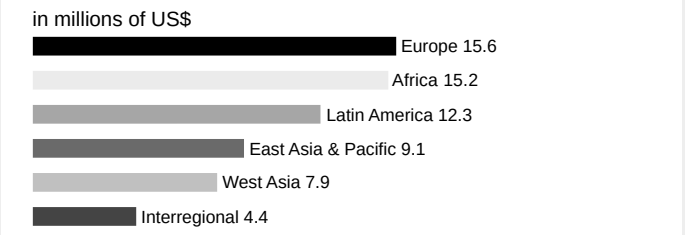
Technology Transfer. As for the direct transfer of

TECHNICAL COOPERATION DISBURSEMENTS, 1998

Disbursements by Field of Activity
(Total: US $64.5 million)



Disbursements by Region
(Total: US $64.5 million)



technology under the 1998 Technical Cooperation Programme, a total of 110 projects related to nuclear power and the fuel cycle were operational, including regional and interregional activities. The disbursements for these projects amounted to nearly US $8.5 million or 13% of total expenditures.

The majority of these projects dealt with radioactive waste management and disposal (35%) followed by projects in nuclear power implementation and performance (33%) and raw materials for reactor fuels (15%).

■ Nuclear Power & the Fuel Cycle, including Radioactive Waste Management. Global energy demand is growing as a result of economic development and increases in world population; for developing countries the demand is projected to increase two to three-fold in the next thirty years. Nuclear power is one of the few readily available options that can help countries meet large-scale electricity demand without releasing common environmental pollutants and greenhouse gases.

Comparative Energy Studies. The choice of a particular energy mix is a national decision that can be made only in the light of national conditions and priorities. However, States considering the different energy options should be able to make that decision on the basis of up-to-date and complete information and with the benefit of technical expertise.

In this context and in co-operation with eight other international organizations, the IAEA has continued its activities to assist Member States in developing their capacity for decision making in the energy sector.

To that end, the IAEA's nuclear power programme has established country and technology databases, developed analytical computer tools, and provided training and support to developing countries in conducting comparative assessment studies. Such studies make it possible to evaluate the perpetual trade-offs between technical, economic, and environmental features of different electricity generation technologies, chains and systems at the national, regional and interregional levels. More than 90 countries are using these tools, and more than 25 of them have developed their own country databases containing information about more than 2500 technologies.

Under the programme, during the period 1995-99 several international and regional conferences and seminars were organized and a number of technical documents dealing with nuclear power planning and implementation were prepared by the IAEA.

Reactor Operations & Performance. The IAEA continually provides Member States with information on the operation of nuclear power plants around the world. In 1996, the Power Reactor Information System (PRIS) database was made available on the Internet, providing easier access to this information resource for statistical analysis. The number of PRIS users in

54 Member States and eight international organizations has increased to 280, representing a growth of 25% over the previous year.

Additionally, technical documents regularly report on various aspects of nuclear power plant performance. They cover, in particular, organization and staffing for improved performance, advanced methodologies used for training and qualification of personnel, technical support for nuclear power operation, and good practices of some of the world's most productive plants.

Advanced Nuclear Plants. Considerable efforts are being made worldwide to develop advanced nuclear power plants. Expenditures for development of new designs, technology improvements, and the related research for the major reactor types combined are estimated to exceed US $1.5 billion per year. Within the framework of its nuclear power programme, the IAEA has continued to serve as an international clearinghouse for objective reference information on different concepts being developed and project status, as well as on typical development trends throughout the world.

Small- and medium-size reactors, which are of particular interest for such applications as the desalination of sea water and district heating, have continued to receive the IAEA's close attention. They may also be a suitable option for electricity generation in countries with small electricity grid capacities or in remotely located areas.

Nuclear Fuel Cycle. Concerning the nuclear fuel cycle, the IAEA's programme covers several key areas: uranium supply and demand, reactor fuel technology and performance, spent fuel management, and nuclear fuel cycle issues. These issues include the safe handling and storage of plutonium and comparative assessment of the different options for the back end of the fuel cycle.

Some major assessments and their implications have emerged from this programme. The supply of uranium for nuclear power reactors will be sufficient to satisfy world needs up to the year 2050. Since delays are expected in the availability of high-level waste and spent fuel repositories, prolonged storage of spent fuel and conditioned high-level waste is anticipated. However, technologies are available for safe storage and disposal of spent reactor fuel or radioactive waste. Also, a significant quantity of separated civil plutonium, which can be used for fueling power reactors, has been accumulated in the nuclear fuel cycle industry.

Radioactive Waste Management. The IAEA's waste management activities also deal with operational waste from nuclear power and its fuel cycle, and with radioactive waste from many other different sources. The majority of the IAEA's Member States do not have nuclear power programmes and use radionuclides principally for research, and for medical, industrial, and agricultural applications.

Over the past decades, the technologies to effectively manage small amounts of radioactive wastes generated from non-power applications have been developed and implemented. Still, there are Member States where the available infrastructure is either inadequate or missing. In view of this, at present almost half of the IAEA's ongoing waste technology tasks are oriented to wastes generated outside the nuclear fuel cycle. The main objective is to identify the best ways and means to transfer demonstrated technologies and associated experience to all countries, especially to developing IAEA Member States.

■ Non-Power Applications of Nuclear Energy. IAEA support for the use of radioisotopes and ionizing radiation for research, agricultural, medical, industrial and other non-power applications is extensive.

Food & Agriculture. In the area of food and agriculture, emphasis is placed on facilitating the development and adoption by Member States of nuclear and biotechnologies which enhance the ability at national and international levels to identify and alleviate constraints to sustainable food security. This activity is conducted jointly with the Food and Agricultural Organization (FAO). *(See article, page 23.)*

During 1998, nearly 180 projects in food and agriculture were operational under the Technical Cooperation Programme, including one interregional and 15 regional projects. The disbursements for these projects accounted for 16% of total expenditures.

Human Health. In human health, IAEA activities are focused on nuclear medicine, clinical radiation therapy, dosimetry and medical physics,

IAEA LABORATORIES FOR TECHNOLOGY TRANSFER

The IAEA operates its own research and service laboratories, which contribute significantly to the transfer of nuclear technologies.

■ The IAEA's Seibersdorf Laboratories, near Vienna, carry out research and provide a diverse range of technical services in applied physics, chemistry, hydrology, agriculture, and nuclear instrumentation.

■ The International Centre for Theoretical Physics in Trieste, Italy, brings together hundreds of scientists from developing and industrialized countries every year. The Centre is financed jointly by the Italian Government, United Nations Educational, Scientific and Cultural Organization (UNESCO) and the IAEA, with additional funds from other sponsors. It serves both as a research facility and a scientific training centre. The IAEA's main objective in ICTP's activities is to foster the growth of advanced studies and research in physical and mathematical sciences and their interface with technology, especially in developing countries.

■ The IAEA's Marine Environment Laboratory in Monaco carries out research and training in marine science, particularly in environmental monitoring and in the study of radioactive and non-radioactive pollutants in oceans and seas. The laboratory frequently collaborates with oceanographic institutes worldwide and undertakes projects in cooperation with other international environmental programmes and institutions.

and on nutritional and health-related environmental studies. *(See article, page 33.)*

In nuclear medicine, emphasis is placed on the introduction of cost effective applications of many diagnostic nuclear medicine procedures in routine medical practice in a large number of developing countries. More than 400 radioimmunoassay laboratories have received IAEA support.

Additionally, molecular biology methods have been introduced in a number of centres. About 70 gamma cameras have been provided to 56 Member States and 150 existing analogue gamma cameras upgraded to digital ones. More than 700 nuclear medicine professionals have been trained. Over 200 national, regional and interregional training courses, workshops and seminars were organized during the past five years.

In clinical radiation therapy, the IAEA has been involved predominantly in selecting equipment, establishing training for all echelons of staff and identifying experts to start the first radiation oncology departments in four Member States. In dosimetry and medical radiation physics, major achievements have been the expansion of support to the IAEA/World Health Organization (WHO) network of secondary standard dosimetry laboratories. Another major activity is quality audit of radiotherapy centres, involving promotion of national networks; there has been a substantial increase in the number of beams checked owing to the automation of thermoluminescent dosimetry procedures.

In the environmental area, air pollution -- a serious problem in many parts of the world and particularly in developing countries -- has been extensively tackled. It has been demonstrated that nuclear analytical techniques are highly appropriate for determining the elemental composition of airborne particulate matter collected on filters and appropriately selected biomonitors, and that chemometric evaluation of the multi-element data sets produced by these techniques enables identification of pollutant sources and their apportionment.

The 1998 Technical Cooperation Programme included 175 projects related to human health, of which one was interregional and 25 were regional. Disbursements for these projects amounted to US $13.5 million or 21% of total expenditures. More than two-thirds of these projects dealt with nuclear medicine, and applied radiation biology and radiotherapy.

Scientific & Industrial Applications. A traditional and important area of activity has been the use of isotope and radiation techniques for various industrial applications. These include, in particular, non-destructive testing, radiation processing of industrial and medical products, treatment of wastewater and flue gases, and application of tracer techniques for assessing, developing, and managing water resources.

Assistance has also been rendered in utilization of research reactors and particle accelerators for research and production of radioisotopes for industrial, medical and other applications; monitoring and study of the marine environment; nuclear instrumentation; and radiochemical applications.

Another important activity has been the application of isotopes in hydrology which has significantly improved groundwater resource management and pollution prevention in many countries. Dam sustainability has also been improved by isotope techniques in several countries, bringing large economic benefits in the past five years.

In 1998, assistance to developing Member States in these areas was provided under 236 projects running to US $14 million. This represents 22% of the total disbursements under the technical cooperation programme.

PILLARS OF DEVELOPMENT: SAFETY

Over the past five years, the IAEA has continued its activities to strengthen the global framework for nuclear, radiation, waste, and transport safety. The framework comprises three main components: legally binding agreements between States, internationally recognized safety standards, and measures to assist States in the implementation of these conventions and standards.

In addition, technological solutions for improving safety are being promoted. In 1999, the IAEA also focused on assisting Member States to manage the Year 2000 (Y2K) computer problem.

International Conventions. The IAEA is supporting efforts to implement major international conventions related to safety. These include Conventions negotiated and adopted under its auspices in the late 1980s that relate to the notification and assistance in case of nuclear accidents, physical protection, and civil liability for nuclear damage.

In addition, the IAEA facilitated the conclusion in 1994 of the Convention on Nuclear Safety, which entered into force in 1996, and the adoption in 1997 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, which is yet to enter into force.

Safety Standards. By its Statute, the IAEA is authorized to establish safety standards and provide for their application. Over the years, the IAEA, in co-operation with its Member States, has developed and issued more than 200 standards which represent international consensus on safety standards and requirements and provide essential guidance for national authorities. They cover all areas where nuclear energy and radiation are used, including nuclear power and its fuel cycle, and various applications in research, medicine, industry, agriculture and other non-power sectors. Since 1996, a programme of work has been under way to revise and update some 70 safety standards.

In 1996, revised versions of two safety standards of fundamental importance were issued. One is the latest edition of the *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (BSS), and the other is the latest edition of the *Regulations for the Safe Transport of Radioactive Material*. Both documents are the basis for national regulations in a large number of countries and the latter is also reflected in the regulatory documents of the major international bodies concerned.

Safety Services. The key to an effective safety regime is the full application of conventions and standards at the workplace. Responsibility for the implementation of the conventions and the application of safety standards rests primarily with Member States.

The IAEA, however, undertakes many activities to assist countries in this endeavour. Throughout the past five years, the IAEA expanded the range of services it can offer in this area and is in the process of upgrading its services to include various types of safety review missions, training, the fostering of scientific research, technical co-operation, legislative assistance, and information exchange.

In the past years, the number of Member States using the different safety services of the IAEA has grown considerably. Services cover such areas as operational and engineering safety of power and research reactors or the review of regulatory approaches in nuclear, radiation and waste safety.

In recent years, a substantial number of safety related technical cooperation activities have been implemented under a Model Project on upgrading radiation and waste safety infrastructure, which is based on achieving the standards required by the BSS. The project is designed to establish and strengthen the national safety infrastructure of States using radiation sources and radioactive materials for medical, industrial and research purposes. Particular emphasis has been placed on the basic infrastructure elements, such as establishing legal frameworks for safety, creating and strengthening national regulatory bodies, providing initial education and training for safety professionals, and setting up national systems for the notification and control of radiation sources.

It is expected that by the end of 2000, most of the 52 States participating in the Model Project will have approved or moved to approve legislation, rules for the regulatory authority, and a system of notification, authorization and control of radiation sources.

Under this Model Project, a variety of expert missions were undertaken according to action plans agreed on with the participating countries. Between 1995-99, the IAEA conducted 302 expert missions and held 37 workshops and seminars covering most of the project activities.

In addition, the IAEA has continued its educational and training activities under the Technical Cooperation Programme as an efficient mechanism for strengthening nuclear and radiation safety. Under the overall safety programme, about 170 national, regional and interregional training events were conducted between 1995-99.

Technology Transfer. The safety-related activities under the Technical Cooperation Programme between 1995-99 involved approximately US $72 million. This amount represents about 25% of total disbursements in that period, and covers more than 400 national, regional and interregional projects.

Extrabudgetary Safety Programme. In recent years, an extrabudgetary project has been conducted under the regular programme on the main safety issues related to the design and operation of early generation nuclear power plants in Eastern and Central Europe and the Newly Independent States (NIS). Its findings and recommendations have been used as technical bases for safety upgrading work at the plants in question, for review by national regulatory authorities and for the establishment of safety priorities in national, bilateral and other international programmes.

As a result, considerable progress in nuclear safety has been achieved in the operation of WWER and RBMK reactors in Central and Eastern Europe, in strengthening the independence and technical competence of the nuclear regulatory authorities, and in establishing a legislative and regulatory framework for national nuclear regulation.

Notwithstanding the results accomplished, more remains to be done. For instance, further efforts are required to maintain and enhance an effective safety culture and to improve design safety through specific safety analysis reports.

A regional extrabudgetary activity on the safety of nuclear installations in countries of South East Asia, the Pacific and the Far East started in early 1998. The objective is to strengthen nuclear safety in participating countries and, in particular, to enhance the capabilities of regulatory authorities and technical support organizations.

Information Exchange. Significant inputs for the further development and promotion of nuclear and radiation safety are made through a wide spectrum of meetings. They range from international conferences and symposia attended by hundreds of participants to technical meetings of several experts or consultants.

In the past five years, an area of continued concern in the debate over the use of nuclear technologies has been the safety of spent fuel and radioactive waste management. The concerns are associated with the wastes generated by nuclear power plants and the wastes from nuclear applications in medicine, agriculture and industry, but also with the considerable

potential increase in the volume of the wastes from the envisaged decommissioning of a number of nuclear power and research reactors. Hence, there is an urgent need to develop and implement disposal plans. The IAEA has assisted Member States in this area, particularly through the development of consensus on safety standards. In some areas, such as the near surface disposal of low level waste, this consensus exists, but in others - for example, geological disposal of high level waste - it has been more elusive.

Radiation Sources. Over the past few years, a particularly urgent concern has been the threat to public health arising from "orphan" radioactive sources. The IAEA has provided assistance to check the radiological impacts of these sources that are not under the control of national authorities and helped the national authorities to take the necessary protective measures, including emergency humanitarian assistance. The IAEA is now engaged in the implementation of an Action Plan on the safety of radiation sources and the security of radioactive material, including the development of a possible best code of conduct for use by national authorities in this area.

Safety of Research Reactors. Another area of concern has been the safety of research reactors. Of the more than 600 research reactors which have been built, 344 have been shut down but only 106 have been decommissioned. Many States operating research reactors still have inadequate regulatory infrastructures, and there are also other serious issues such as old and obsolete equipment, lack of spare parts, and budgetary constraints.

The IAEA's activities in this area have focused on upgrading the regulatory structure and on safety review services. More needs to be done. In the future, the Agency plans to support additional efforts to enhance operational safety. These efforts include the completion of a safety requirements document for research reactors; the increased use of advisory missions; the development of guidelines for peer reviews and self assessments; and the provision of assistance in enhancing the safety of ageing research reactors and associated spent fuel stores.

More assistance also is planned to assist countries in which research reactors have been shutdown and are being decommissioned.

Radiological Safety Assessments. In recent years, a new direction has emerged for the Agency's safety services -- the organization of radiological assessments of areas with radioactive residues from accidents and from past practices such as nuclear weapon testing and radioactive waste disposal. Such areas include some parts of the Kara and Barents Seas, the former nuclear test site near the city of Semipalatinsk in Kazakhstan, Bikini Atoll in the Marshall Islands, and the Mururoa and Fangataufa Atolls in the South Pacific. Reports on these assessments have been published by the IAEA.

Transport Safety. An additional area of concern over the past five years has been the safety of transport of radioactive materials. In an effort to assist its Member States to apply the IAEA's *Regulations for the Safe Transport of Radioactive Material* more effectively and universally, the IAEA established a Transport Safety Appraisal Service and provided training on the safe transport of radioactive materials. The IAEA also invited partner organizations -- namely, the World Health Organization, the European Commission, the Nuclear Energy Agency of the Organization for Economic Cooperation and Development, the International Air Transport Organization, and the International Federation of Airline Pilots Associations -- to work closely with it on matters relating to the safe transport of radioactive materials.

Safety Research. The IAEA continues to encourage research and development by supporting research contracts and agreements on a wide range of safety related subjects. At the beginning of 1998, almost 300 such contracts and agreements were active on particular aspects of nuclear, radiation and radioactive waste safety.

CHALLENGES FOR TECHNOLOGY TRANSFER

In the past decade, political, economic, and technological developments have been major influences on the IAEA's work. They have presented new challenges and opportunities, requiring that the IAEA's plans and priorities be adjusted to changing realities.

The IAEA's *Medium Term Strategy* foresees a number of developments likely to influence the IAEA's technology transfer activities in the near future.

They include:

■ *Technology Trends.* The use of nuclear applications in developing countries is growing, as local infrastructures improve and technology transfer increases.

■ *Energy Demand.* As the demand for electricity continues to increase and the drive for sustainable development gains momentum, the need to exploit energy sources with limited environmental impacts (in particular to meet commitments made in connection with the Kyoto Protocol) could revitalize the nuclear power option.

■ *Safety.* In the context of global economic liberalization, leading to utility privatization, deregulation and diminishing State support for the nuclear power industry, there is a need to ensure that nuclear safety will not be compromised.

■ *Nuclear Fuel Cycle Issues.* As nuclear power plants age and spent fuel and waste accumulate, more must be done to implement existing technical solutions for the management of spent fuel, for the disposal of radioactive waste and, where appropriate, for plant decommissioning and life optimization.

■ *Outreach Efforts.* Civil society is acquiring an increasing role in shaping national and international policy, with the attendant need for enhanced and more open communication between the IAEA and the general public.

■ *Information Technology.* Rapid and extensive advances in information technology will offer exceptional opportunities for new ways of working. In addition, new information technology will make better communication and outreach possible.

Strategic Goals & Objectives. The *Medium Term Strategy* establishes goals and specific objectives for the five year period from 2001-05 and specifies the means proposed to meet these objectives.

The Agency's 130 Member States have different interests in, needs for and attitudes towards the use of nuclear technologies, which themselves change over time. In addition, developments in other technical fields have had an impact -- both positive and negative -- on the comparative advantages of nuclear technologies. The threefold challenge for the IAEA in the medium term is:

■ to understand how the needs and interests of Member States are changing so as to be able to respond by focusing on the appropriate nuclear technologies;

■ to contribute to the objective assessment of the use of nuclear technologies and to assist Member States in the safe application of those technologies that continue to have a comparative advantage;

■ to play a catalytic role in the international effort to maintain and increase knowledge, understanding and expertise in the nuclear field, particularly through the collection and dissemination of scientific information and the transfer of technology.

In summary, the IAEA's activities related to technology transfer are many, diverse in scope and focused on priority needs of its Member States. These activities continue to enjoy interest and support from both donors and recipient countries. However, due to its voluntary nature, the level of funding for these activities continues to be unpredictable.

Over the past five years, the IAEA has continued its efforts aimed at strengthening promotion of the peaceful application of nuclear energy in Member States. A new technical cooperation strategy has been adopted and is now actively used in programming and implementation. Technical departments have intensified activities in priority areas related to the transfer of nuclear technology to developing countries, especially in areas such as water resource management, environmental monitoring, radiation safety, and radioactive waste management.

Further improvement of the efficiency and effectiveness of the technology transfer activities is foreseen as a priority goal under the IAEA *Medium Term Strategy* covering the first five years of the 21st century. This will enhance the contribution of nuclear technologies towards meeting the needs and interests of a growing number of Member States.

As elements of the strategy are more solidly put into place, the IAEA is expected to fortify its role as the principal vehicle of worldwide multilateral cooperation in the peaceful use of nuclear energy. ❑