

Programme D. NUCLEAR SCIENCE

Rationale: The multifaceted aspects of atomic energy, in nuclear power production and applications of radioisotopes and ionizing radiation in every sphere of science and technology, are contributing significantly towards sustainable development and improving the quality of life. Many Member States have a significant nuclear power programme. There is also a continuous growth in the non-power applications of nuclear sciences.

Research reactors are essential engines of progress in these areas and are crucial for any country embarking on a nuclear energy programme. They provide the main source of radioisotopes and are extensively used for material development and characterization.

The last decade has seen a rapid growth in accelerator science and technology, including the production of reliable accelerators for protons, heavy ions and electrons, and for routine applications in industry, research and medicine. High energy proton accelerators are used as sources of spallation neutrons for beam research and transmutation.

An important factor in the progress of nuclear science has been the development of nuclear instrumentation for reactor control and for all kinds of radiation measurements. Continuous refinement of instruments has facilitated progress in many areas, and properly functioning instrumentation is vital for all applications.

Nuclear fusion promises to become an abundant, environmentally clean source of energy. About 50 Member States (including 30 developing countries) have programmes in plasma physics and fusion research. Since the research facilities are expensive, international co-operation facilitated by the Agency is important to these countries.

The entire spectrum of nuclear sciences and applications is deeply rooted in nuclear and atomic physics data. Owing to a co-operative effort, nuclear data generation, evaluation and dissemination have become integrated worldwide. The Agency is the main source of up-to-date information in this area for many Member States.

The Agency has a responsibility to promote research, development and practical applications of atomic energy for peaceful purposes. The growth of nuclear science and its applications is sustained by continuous R&D input from research institutes within the Member States, particularly the nuclear research centres. Continuous involvement of the Agency in co-ordination of this worldwide effort was recommended in a meeting on 'Nuclear Research Centres in the 21st Century'. Furthermore, the developing Member

States seek technical assistance from the Agency for enhancing their nuclear science based programmes. The continued involvement of the Agency is required not only for fostering new developments, but also for maintenance of the valuable knowledge in nuclear science, which could be lost as a result of the current reduction of activities in some areas. The Nuclear Science Programme is formulated taking into account the comments of Member States and of advisory groups such as PPAS committees, the Standing Advisory Group on Nuclear Applications (SAGNA), the International Nuclear Data Committee (INDC) and the International Fusion Research Council (IFRC).

Objective: To increase Member State capabilities in the development and application of nuclear science as a tool for their economic development.

| Outcomes |
|--|
| <ul style="list-style-type: none"> — Increased international co-operation in nuclear sciences. — Preservation and increase of knowledge in nuclear sciences. — Increased competence of national institutions, including better use of resources, facilities, nuclear data and Agency databases. |
| Performance Indicators |
| <ul style="list-style-type: none"> — Number of requests for the Agency's products/documents for their nuclear science activities. — Number of nuclear science facilities participating in/benefiting from the Agency's programme. |

Subprogramme D.1. Nuclear and Atomic Data

Problems and issues to be addressed by the Agency: The development and maintenance of nuclear technology rely on numerical nuclear and atomic data to provide an accurate description of the underlying physical processes. The necessary data include reaction cross-sections for many combinations of target and projectile, energy and angular distributions of reaction products, properties of nuclear and atomic energy levels, and radioactive decay data. The data are reasonably complete for some purposes, but substantial work remains to be done in support of emerging technologies such as those relating to nuclear medicine, environmental measurements, advanced nuclear fuel cycles, nuclear safeguards and nuclear waste transmutation. Through the co-ordination of international networks, supplemented where needed by specific in-house activities, the

Agency contributes significantly to the development and maintenance of very extensive, internationally available databases of experimental and evaluated nuclear, atomic and molecular data. In addition, rapid developments in the field of information technology are being exploited to improve the means of user access to this resource. As noted by the 1999 PPAS review, scientific services such as these are best provided by the Agency, because of the inherent trans-national character of science and scientific data and the Agency's global scope for accessing and disseminating information. Specific activities in this programme have been formulated on the basis of needs identified by the INDC and the Atomic and Molecular Data Subcommittee of the IFRC.

Objective: To contribute to the safe and economic application of nuclear technologies in Member States by ensuring convenient access to accurate and reliable nuclear and atomic data for energy and non-energy applications.

| Outcomes |
|--|
| <ul style="list-style-type: none"> — Introduction of newly acquired numerical nuclear, atomic and molecular data into the shared international database and improvement of user services through network co-ordination. — Improved databases of evaluated data and their uncertainties, available to users in Member States. — Increased capability of users in Member States in the retrieval and application of nuclear data. |
| Performance Indicators |
| <ul style="list-style-type: none"> — Growth in the size of the shared international nuclear and atomic database. — Increased demand for Agency data and other services. — Number of new data products and scientific publications. |

Programme changes and trends: The delivery of nuclear and atomic data services via the Internet and CD-ROM has been well received by users and is continually evolving to take advantage of advances in information technology. Data development work emphasizes new initiatives supported by standing advisory committees and other expert groups. Such initiatives include a shift to an in-depth validation of the Reference Input Parameter Library (RIPL) in the framework of modern nuclear model codes and the development of processed data with wide applicability, in particular data for Monte Carlo neutron transport calculations. Also, more emphasis will be placed on the use of formal quality assurance procedures in the Agency's data centre and data development activities.

Resource changes and trends: The regular budget for 2002 represents a decrease of \$26 000, or 1.2% compared to the 2001 budget. Highly specialized data needs, for example nuclear data for ion beam

analysis, will be met through Agency co-ordination of activities financed primarily by the participating institutions.

Financial resources

| | 2001 | 2002 | 2003 |
|------------|-----------|-----------|-----------|
| Reg. budg. | 2 210 000 | 2 184 000 | 2 187 000 |

Recurrent Project D.1.01: Data services, data networks and user support

Main outputs: Member States will be provided with unrestricted, cost-free access to quality assured databases of measured and evaluated nuclear and atomic data, which are basic input to many branches of nuclear technology. The Agency's web based online data services will offer convenient, interactive retrievals controlled directly by the user. These services will be supplemented where necessary by the distribution of CD-ROM versions of databases and by postal transmission of the results of custom retrievals by data centre staff. The NDS Newsletter will be published semi-annually in order to inform users of additions to the available data. Software and manuals for the management of this shared resource will be regularly updated and distributed. Handbooks containing bibliographic references to measurements and calculations of nuclear data (CINDA) and atomic and molecular data (CIAMDA) will be published regularly. Training of data users will be provided at nuclear data workshops regularly held in Vienna and at ICTP, Trieste, to ensure effective retrieval of the information and to facilitate proper use of the data in energy and non-energy applications.

Ranking: 1 ex æquo

Project D.1.02: Nuclear data standards and evaluation methods

Main outputs: This project will lead to an improved database of evaluated cross-sections and their uncertainties for nuclear reactions used as evaluation standards, as well as an improved reference database of X- and gamma-ray energies and intensities for gamma ray detector calibration. The Reference Input Parameter Library (RIPL) will be implemented in state-of-the-art nuclear reaction model codes by developing standardized library access software to be distributed along with the library. This new interface will permit a more detailed validation of the RIPL library in the intended application environment.

Duration: 2002–2008

Ranking: 3

Project D.1.03: Nuclear data for radiotherapy using radioisotopes or external radiation sources

Main outputs: An improved database of evaluated cross-sections for the production of therapeutic isotopes will be developed. Improved data will also

be provided for the production of neutrons through photonuclear reactions in the construction materials of radiotherapy facilities. A web page dedicated to nuclear data resources available for medical applications will be created.

Duration: 2002–2007

Ranking: 4

Project D.1.04: Atomic and molecular data for fusion experiments

Main outputs: This project will promote research to develop the atomic and molecular data needed to accurately model the behaviour of fusion plasmas and fusion experiments. A database for molecular processes in plasma-edge regions will be developed and assessed for inclusion into the Agency's atomic and molecular databases. In addition, data for plasma diagnostics relevant to fusion experiments will be incorporated into the databases. The current status of cross-sections for electron impact processes on heavy elements such as argon will be assessed. Improved values will be incorporated into the databases. Finally, further assessment of the process of tritium retention in the walls of fusion machines will take place. All results from this project will be accessible through the web based data services. In addition, most results will appear in volumes of the Agency publication "Atomic and Plasma-Material Interaction Data for Fusion".

Duration: 2002–2007

Ranking: 5

Project D.1.05: Data for the Th–U fuel cycle

Main outputs: Data files containing evaluated nuclear data for the key isotopes of the proliferation resistant Th–U fuel cycle will be reviewed, updated and supplemented with explicit cross-section uncertainty information. This will enable feasibility studies of thorium fuelled systems to be carried out with increased confidence. A web page dedicated to nuclear data resources available for nuclear safeguards applications will also be created.

Duration: 2002–2008

Ranking: 1 ex æquo

Project D.1.06: Nuclear data for reactor dosimetry

Main outputs: A library containing processed neutron transport data in continuous energy Monte Carlo (ACE) format will be developed for the validation of general purpose nuclear data libraries and for performing three-dimensional neutron transport calculations. To facilitate the interpretation of reactor dosimetry (neutron energy spectrum unfolding) measurements in nuclear reactor components, the International Reactor Dosimetry File will be updated

(IRDF-2002) and distributed. Also, a data library that will permit more accurate material analyses using prompt gamma ray neutron activation analysis will be produced. The FENDL-2 library will be updated. Also, a working group on nuclear data for ion beam analysis will be formed.

Duration: 2002–2007

Ranking: 6

Subprogramme D.2. Research Reactors

Problems and issues to be addressed by the Agency:

For over fifty years research reactors have been a cornerstone of nuclear science and technology. Their contributions to the development of nuclear power, basic science, materials development, radioisotope production for medicine and industry, and education and training of scientists and engineers are well documented. Research reactor issues are of great interest and importance to 58 countries that have one or more research reactors, 40 of which are developing countries. For scientific research and technology development to continue to prosper, research reactors must be safely and reliably operated, adequately utilized, refurbished when necessary, provided with adequate non-proliferating fuel cycle services, and safely decommissioned at the end of life. Moreover, since about 60% of the operating research reactors in the world are over 30 years old, ageing core materials and the technology for ageing management are priority issues in the majority of Member States with research reactors. The subprogramme is formulated to cover this broad range of issues and to promote the continued development of scientific research and technological development. Member States look towards the Agency for co-ordination of the worldwide effort in this area and for help in solving specific problems.

Objectives: To increase the capabilities of interested Member States to safely and reliably continue and improve scientific research and technology development at research reactors, to promote non-proliferation considerations, and when the need arises, to plan new facilities.

| Outcomes |
|--|
| — Improved capability of Member States to address issues in research reactor utilization and related fuel cycle. |
| — Improved capability to manage ageing research reactor facilities and to plan and implement decommissioning. |

| Performance Indicators |
|---|
| — Number of facilities adopting optimum utilization strategies and spent fuel storage conditions. |
| — Number of reactors converting from HEU to LEU. |
| — Number of facilities carrying out ageing management programmes or formulating and implementing decommissioning plans. |

Programme changes and trends: Compared to previous cycles where activities on research reactors were fragmented in different areas of the programme, this new subprogramme represents the first holistic approach to the important issues associated with research reactors. At the same time it introduces a project which tracks research reactor technology and is aimed at improving the capabilities of Member States planning new and innovative research reactors. Following the recommendations of the PPAS on research reactors and low energy accelerators, one project focuses specifically on the qualification of new, high density, low-enriched uranium (LEU) fuels and the back-end of the fuel cycle, while another focuses on the technological and engineering aspects of ageing management and decommissioning. In all of the projects, engineering and technological development for safety is included.

Resource changes and trends: The 2002 and 2003 budget reflects an increase over the 2001 amount, mainly because of the introduction of a new project which tracks research reactor technologies for the purpose of improving the capabilities of Member States planning new research reactors.

Financial resources

| | 2001 | 2002 | 2003 |
|------------|---------|---------|---------|
| Reg. budg. | 699 000 | 758 000 | 759 000 |

Project D.2.01: Effective utilization of research reactors

Main outputs: This project will provide an updated research reactor database, accessible via the Internet, giving the status of research reactors worldwide. The annual publication "Research Reactors of the World (RDS-3)" will provide a compact summary of that information. The research reactor list server and calendar will keep researchers informed of recent activities and coming events. A research reactor strategic planning guide will be produced to help reactor managers develop meaningful plans for their facilities. Training will be provided for strategic planning and marketing of research reactor services. Technology transfer packages for specific reactor applications, such as neutron radiography, will help reactor staff assimilate new technology. A TECDOC will be produced from a CRP on small angle neutron scattering to help developing Member States make use of this technique for materials characterization. Another TECDOC from a CRP on reactor modifications for medical irradiation will help reactor

managers decide whether to embark upon such an upgrade. Another TECDOC will be published on new applications of prompt neutron activation analysis in research, industry and environment which will enhance the utilization of this nuclear analytical modality. A TECDOC will be issued on the results of a CRP on research reactor core conversion to uranium-molybdenum fuel in order to help reactor managers decide whether to convert their fuel, and plan for conversion. The proceedings of the symposium on research reactor utilization, safety and management will be issued. A TECDOC on research reactor applications, such as neutron radiography, will be produced to help reactor staff develop new applications.

Duration: 2002–2005

Ranking: 1 ex æquo

Project D.2.02: Supporting research reactor modernization and promoting information exchange on innovative technology development

Main outputs: Technical information will be published on new reactor designs, refurbishment and modernization of old reactors, and the installation of new systems such as cold sources at research reactors around the world. This information will be valuable to other reactors planning similar projects.

Duration: 2002–2006

Ranking: 4

Project D.2.03: Providing assistance on research reactor fuel cycle

Main outputs: Technical guidance will be published on the fabrication of fresh fuel, the qualification of new low enriched fuel, the optimum conditions for the interim storage of spent fuel, and technical and administrative preparations required for the shipment of fuel to its country of origin. By co-operation with the international Reduced Enrichment for Research and Test Reactors (RERTR) programme and the United States acceptance programme for foreign research reactor fuel of United States origin, the project will also promote non-proliferation through reduced commerce in highly enriched uranium for research reactors.

Duration: 2002–2006

Ranking: 1 ex æquo

Project D.2.04: Facilitating transfer of know-how on decommissioning of research reactors and irradiated core materials

Main outputs: Technical information will be published on the decommissioning of research reactors. In the framework of a CRP, samples of irradiated core materials from research reactors under refurbishment or decommissioning will be collected

and tested in order to evaluate, interpret and publish data on ageing phenomena in reactor core materials. This information will help the designers of new reactors to choose improved materials and operators to make improved cases for life extensions of existing facilities, and will provide information for recycling materials produced during decommissioning or storing them as waste.

Duration: 2002–2006

Ranking: 1 ex aequo

Subprogramme D.3. Nuclear Research Facilities and Instrumentation

Problems and issues to be addressed by the Agency:

Many Member States have acquired accelerators and nuclear instrumentation to meet their developmental needs and to build infrastructure for sustainable exploitation of nuclear energy. For a variety of reasons, including the complexity of these facilities, some developing Member States are not able to exploit the full potential of their facilities, or to make innovations for expanded applications. Therefore, they seek Agency assistance. Member States need Agency help to achieve safe, reliable operation, to develop new applications, and to implement quality assurance, so there are many requests for technical co-operation in this area. The accelerator utilization programme strategy has been aligned with the relevant PPAS reviews.

Programmes to harness the potential of nuclear fusion for power production are being pursued in many countries. The progress so far has clearly established the feasibility, but there are many scientific and technology issues that still need to be addressed. The Agency plays a catalytic role in this area by promoting information exchange and research co-ordination. Member State interest is reflected by participation in Agency sponsored meetings using national resources. The Agency is advised by the International Fusion Research Council (IFRC), which represents Member States having strong fusion research activities, and is in-line with the relevant PPAS reviews.

Objective: To improve the use of accelerators and nuclear instrumentation for nuclear science research, development and education, and to facilitate the development of fusion energy.

| Outcomes |
|---|
| — Increased capability of Member States to utilize existing facilities and instrumentation. |
| — Progress in plasma physics and fusion research and development. |

| Performance Indicators |
|---|
| — Number of Member States making full use of their accelerators as indicated in the accelerator database. |
| — Number of cost-free participants at Agency sponsored meetings on fusion. |

Programme changes and trends: The accelerator project will promote emerging applications such as heavy ion beam applications for materials development. Information exchange will be facilitated through the development of the low energy accelerator database on the Internet. New accelerator technologies will be evaluated for potential use in Member States. The nuclear instrumentation maintenance project will incorporate new training modules using information and communication technology. The nuclear instrument applications project will promote the development of new detectors, nuclear electronics and software for expanded applications.

The fusion project strategy is aligned with the Long Term Guidance Report of the IFRC to emphasize technical meetings and conferences, public information and research co-operation between large and small laboratories. Many of the project activities will be continuations of the series of Technical Committee meetings on topics of special interest, as recommended by the IFRC. In response to expressions of interest from scientists in many Member States, new CRPs are being started on dense magnetized plasmas and on elements of power plant design for inertial fusion energy. The Agency activities are co-ordinated with those of the International Energy Agency of the OECD, and jointly sponsored activities are being initiated.

Resource changes and trends: Decreases are foreseen both for 2002 and 2003 compared with 2001, reflecting a readjustment of resources.

Financial resources

| | 2001 | 2002 | 2003 |
|------------|-----------|-----------|-----------|
| Reg. budg. | 2 819 000 | 2 681 000 | 2 681 000 |

Project D.3.01: Effective utilization of accelerators

Main outputs: A TECDOC will be published from a CRP on the use of ion beam techniques for analysis of light elements. The aim is to help scientists implement depth profiling for detailed analysis of materials in order to develop better thin film coatings. A database on low energy accelerators will be made accessible via the Internet. An Advisory Group report will be issued to help managers of low energy accelerator laboratories improve their facility operations and marketing of their services. Advisory Group reports will be issued on accelerator mass spectrometry (to help laboratories incorporate recent developments into their research), and on in-situ applications of accelerators (to facilitate expanded

use of portable accelerators for applications such as environmental monitoring and explosives detection). Training will be provided in accelerator utilization and in synchrotron radiation applications.

Duration: 2002–2005

Ranking: 5

Project D.3.02: Nuclear instrumentation maintenance

Main outputs: Under this project, which provides exclusive support to the technical co-operation programme, a CRP will develop new tools and modules for information and communication technology based learning tools, such as CD-ROM disks, to reduce the required duration of classroom training for nuclear instrument maintenance. A consultant report will describe implementation of quality assurance procedures in instrument maintenance programmes. A new training facility will be established for training in printed circuit board repair. Training will also be provided in nuclear instrumentation design, selection, use, troubleshooting and repair. Spare parts will be provided to developing Member States to facilitate rapid, low cost repair of valuable instruments. Some regional training centres will be established to provide low cost training on specific topics.

Duration: 2002–2005 (the need for continuation will be reviewed in 2005)

Ranking: 1 ex æquo

Project D.3.03: Improvements in nuclear instrument applications

Main outputs: Training will be provided in the use of advanced nuclear analytical techniques, such as accelerator mass spectrometry and synchrotron based X ray fluorescence (XRF). A TECDOC will be issued from the CRP on alpha particle spectrometry to help scientists implement this technique for environmental monitoring and other applications. A TECDOC comparing gamma ray analysis programs will be issued to assist laboratories to choose the most appropriate software for low level radiation measurements, such as for environmental monitoring. A TECDOC will be produced on in-situ applications of XRF techniques (to help scientists implement this technique for studies of archaeology, art and other applications). A worldwide database on the capabilities of many XRF laboratories will be established. A report of a worldwide proficiency test will be issued for XRF laboratories. An XRF list server and newsletter will be produced to facilitate communications among XRF researchers around the world. An Advisory Group report will be published on the monitoring of atmospheric aerosols, which are of importance for analysis of global climate change. An Advisory Group report will also be produced on

modern computer controlled data logging systems that are needed for many nuclear science applications. Kits will be provided by the Agency Laboratories to facilitate environmental monitoring in remote locations using solar energy.

Duration: 2002–2005

Ranking: 1 ex æquo

Project D.3.04: Plasma physics and fusion research

Main outputs: A TECDOC on compact toroid configurations will explain the strengths and weaknesses of spherical tokamaks, spheromaks and field reversed configurations, and will identify areas of future research. A report will be issued on inertial fusion reactor components, describing the state of the art of targets, drivers, target injection systems and chambers, with the major topic of the associated CRP being on the interfaces between these four elements. A report of a CRP on dense magnetized plasmas will help scientists find practical applications for small, high density plasma devices, such as for X ray and neutron sources. The proceedings of the 19th IAEA Fusion Energy Conference will be published on CD-ROM. A TECDOC on research using small fusion devices will describe progress in developing countries. A TECDOC will be issued on the steady state operation of magnetic fusion devices, discussing the problems of long pulse operation, such as plasma-wall interactions and current drive. The proceedings of a technical meeting on H-mode physics/transport barriers will be published in a technical journal. A report on control, data acquisition and remote participation, which will assist the incorporation of modern data acquisition and control techniques in fusion research laboratories, will be issued. A report on inertial fusion will provide an up-to-date summary of a specific topic, such as prevention of target surface instabilities, while the report of a technical meeting on plasma theory will describe recent advances in a focused area to be recommended by the IFRC. The proceedings of the 2nd electron cyclotron resonance heating technical meeting will be published. A report on transport modelling in magnetic confinement fusion devices will compare theoretical models, computer simulations and experimental data about the rate of heat loss from fusion plasmas in various configurations. A report will be issued on spherical tori to compare data from the spherical tokamak experiments in the UK, USA, the Russian Federation, Brazil and Japan, so that the prospects for fusion power using such devices can be assessed.

Duration: 2002–2007

Ranking: 1 ex æquo

Project D.3.05: International Thermonuclear Experimental Reactor (ITER)

Main outputs: The Agency will publish monthly ITER Newsletters. The ITER Council proceedings will be published. About two ITER technical documents will be published each year, dealing with topics such as design improvements, site specific issues and research plans. The Agency may also facilitate the signing of new ITER agreements, upon request. The Agency will provide its facilities for one or two meetings of the ITER Technical Advisory Committee and Management Advisory Committee.

Duration: 2002–2003

Ranking: 4

Subprogramme D.4. Maintenance of Knowledge in Nuclear Science and Technology

Problems and issues to be addressed by the Agency:

Recently, a number of Member States have expressed their concern about the ageing of the human workforce in the nuclear sector and the sharp decline in the number of new entrants to training in nuclear science and engineering. The continuity of technical skills and the maintenance of standards in the peaceful utilization of nuclear energy depend on the availability of knowledge and expertise and the quality of the workforce. Different actions can be initiated to overcome these problems: launching knowledge management programmes, aimed at the preservation of nuclear know-how; increasing the efficiency of research and development programmes at universities, institutes for technical education, research establishments and industry, with special focus on the younger generation; establishing close co-operation between nuclear utilities, research centres and universities in carrying out R&D projects, training and the exchange of personnel; supporting relevant educational activities and making use of information communication technology.

The demand for expertise and qualified personnel in the nuclear field will continue, whatever strategy each country adopts for the use of nuclear power or other nuclear technologies. The Agency has for many years been promoting nuclear science and technology and facilitating the transfer of know-how between developing and developed countries. It is best positioned to facilitate scientific research and development through international co-operation, and more efficient use of resources for knowledge maintenance, training and education.

Objective: To enhance the capacity of Member States to maintain accumulated knowledge and expertise in nuclear science and technology and sustain competence in the nuclear field.

| Outcomes |
|---|
| <ul style="list-style-type: none"> — Member States taking action to maintain knowledge in the nuclear field. — Increase in the number of scientists and engineers being trained in the nuclear field. |
| Performance Indicator |
| <ul style="list-style-type: none"> — Number of Member States participating in and supporting the Agency's activities to maintain knowledge. |

Programme changes and trends: The subprogramme as proposed will be implemented for the first time. It is expected to strengthen and integrate important Agency activities, such as the meetings on Nuclear Research Centres and the Industry Forum. It will also introduce an analytical component on studies relating to nuclear science and technology. A more comprehensive programme of co-operation in research and training in the field of nuclear science and related fields will be implemented with the Abdus Salam International Centre of Theoretical Physics (ICTP) in Trieste.

Resource changes and trends: The proposed resources for this new subprogramme amount to \$2 147 000. This comprises the Agency's contribution to the International Centre for Theoretical Physics in Trieste (\$1 983 000) and funds for activities related to the maintenance of knowledge.

Financial resources

| | 2001 | 2002 | 2003 |
|------------|-----------|-----------|-----------|
| Reg. budg. | 1 983 000 | 2 147 000 | 2 147 000 |

Project D.4.01: Assessing policy and requirements for nuclear science research and development and education

Main outputs: A report will be produced containing the analysis of status and trends in nuclear science research and development as well as innovative developments in nuclear technology. The report will be used as input to the regular Nuclear Technology Review document to be presented to the Board and to the General Conference. Two separate reports on the meeting on Nuclear Research Centres and the Industry Forum will be issued. In addition, an analysis will be carried out and a report prepared on co-ordinated research activities in the field of nuclear science and technology.

Duration: 2002–2003

Ranking: 2

Project D.4.02: Facilitating education, training and research in nuclear science and related fields

Main outputs: The project will lead to better co-ordinated and more efficient and closer collaboration between the Agency and ICTP in the education and training of young scientists in different areas of nuclear science and related fields. Workshops on nuclear data and reactor physics calculations and NPP simulation will be organized. Scientists at ICTP will also be conducting research and publish technical documents on topics of relevance to the Agency's programme on the analysis of sustainable energy development, models for isotope hydrology studies, the dispersion of radionuclides in the environment and seismic risk for nuclear power plants. The project will also produce a feasibility study for an Agency sponsored international school in nuclear science and technology, including the development of guidance and curricula for important disciplines in nuclear science and technology. The project will promote the next Young Generation Forum in the Republic of Korea as well as training for young scientists in Italy.

Duration: 2002–2003

Ranking: 1

Project D.4.03: Maintaining knowledge in specific areas of nuclear science and technology

Main outputs: The project will focus mainly on maintenance of knowledge on fast reactors (reactor physics, fuel and cladding materials and operating and decommissioning experience). It will produce review reports and identify critical areas of reactor technology which may currently be receiving less attention. Review reports and databases will be prepared on irradiated nuclear graphite properties, and the thermophysical properties of materials for light and heavy water reactors. The INIS database as well as other databases will be analysed and a report produced on important areas for knowledge maintenance, particularly in regard to operational and decommissioning experience.

Duration: 2002–2005

Ranking: 3