

Programme C. CAPACITY BUILDING AND NUCLEAR KNOWLEDGE MAINTENANCE FOR SUSTAINABLE ENERGY DEVELOPMENT

Rationale: All plausible long term energy scenarios project significant growth of global energy, especially if the Millennium Declaration on poverty eradication and the Plan of Implementation agreed at the World Summit on Sustainable Development (WSSD) are to be met. Projected growth is the fastest in developing countries. These Member States need to develop or enhance the indigenous capacity for energy system planning consistent with their national sustainable development objectives. Upon request, the Agency should be ready to assist Member States in this regard. It is the sole UN agency responsible for, and capable of, building capacity in overall energy system planning, including nuclear power, and for managing nuclear knowledge and nuclear information collection and dissemination.

The Agency as the UN nuclear expert should help assure a level playing field for nuclear power in UN negotiations about sustainable energy development and climate change. Agency effectiveness requires a visible expertise in global analyses of nuclear energy's role in the context of global energy system evolution.

The nuclear option should remain open for all Member States that wish to use it. Retaining the nuclear option necessitates the preservation and maintenance of the accumulated knowledge in nuclear science and nuclear industry. A number of Member States have expressed their concerns about the ageing of the human workforce in the nuclear sector and the sharp decline in the number of new entrants to education and training in nuclear science and engineering. Clearly, the demand for expertise and qualified personnel in the nuclear field will continue for many decades, irrespective of national strategies towards the future use of nuclear power or nuclear applications.

The likely concentration of nuclear expansion in developing countries emphasizes the need for nuclear capacity building in these countries, especially those contemplating the introduction of nuclear power over the next few decades. In addition to comprehensive energy system planning, including all energy demand and supply options, capacity building in the nuclear context embraces all activities required to support informed decision making on all issues surrounding the full life cycle of nuclear power and covers aspects ranging from national energy demand and supply planning to technology, fuel cycles, waste management, safety and non-proliferation. All these aspects have one fundamental commonality, i.e. nuclear knowledge and information transfer.

For 2004–2005, Programme C will give greater emphasis to economic analyses given the increasing importance of energy affordability in developing countries, of economic development considerations

in sustainable development policies, of liberalized energy markets, and of financial viability as the make-or-break issue for specific nuclear and non-nuclear energy projects. Nuclear knowledge management and information transfer (and the necessary preceding steps of knowledge and information creation, enhancement, maintenance and preservation) as well as on-line access to all information resources collected and managed by the International Nuclear Information System (INIS) and integrated with the Agency Library's information resources will be core activities of the programme cycle.

Objective: To enhance the capacity of Member States to perform their own analyses regarding electricity and energy system development, energy investment planning and energy–environment policy formulation and to sustain and effectively manage nuclear knowledge and expertise; to maintain and enhance the information and knowledge resources on the peaceful uses of nuclear energy serving the needs of Member States and the IAEA; to keep the nuclear option open for Member States who wish to retain it.

Outcomes
<ul style="list-style-type: none"> — Member States, particularly developing countries and countries with economies in transition, increasingly underpin their energy policies and investment decisions with analyses based on Agency methodological tools, and take steps to sustain the expertise and knowledge necessary to keep the nuclear option open. — Member States and international organizations regard the Agency as an objective, wide-ranging and accessible source of information on nuclear energy and comprehensive energy system analysis (including all demand and supply options) and sustainable development.
Performance Indicators
<ul style="list-style-type: none"> — Number of Member States using the Agency's assessments and analysis tools related to energy system and investment planning as well as energy–environment policy formulation. — Number of co-operative ventures, presentations and other interactions of the Agency with other international organizations. — Member States' satisfaction with the availability and quality of information services required in their national nuclear programmes.

Specific criteria for prioritization:

- Capacity building in the area of energy — environment planning.
- Information, analysis and engagement in the debate to keep the nuclear option open.
- Enhancement of the nuclear information systems for capacity building and knowledge preservation.

Subprogramme C.1: Energy Modelling, Databanks and Capacity Building

Rationale: In the context of elaborating medium to long term energy strategies in support of overall sustainable development of a country or region, comprehensive analysis of energy systems is necessary, including analysis of the possible impacts of energy system developments on the social and economic progress of society. All this requires sound and reliable data and information, appropriate analytical methodologies/tools and a clear description of system boundaries and its interactions with other systems. The Agency is the sole UN agency building capacity in overall energy system planning. Many Member States, particularly the developing countries and countries with economies in transition, lack local expertise and experience in these areas and seek the Agency's support to help build these capabilities. Accordingly, Subprogramme C.1 is designed to provide the necessary data, up-to-date information and suitable analytical tools, as well as to build local capabilities in Member States for undertaking comprehensive energy studies for elaborating their sustainable energy strategies and making sound policy decisions.

Objective: To enable Member States to carry out their own electricity and energy system analyses, energy investment planning and energy-environment policy formulation.

Outcome
— Increased ability of Member States, particularly developing countries and the countries with economies in transition, to independently conduct, through the use of Agency databases and analytical tools, their own studies for comprehensive analysis of energy issues and systematic planning of energy and electricity development consistent with their national goals for sustainable development.
Performance Indicators
— Number of Member States and international organizations using Agency databases and analytical tools (models) for country studies.
— Number of experts trained in the use of Agency tools.

Programme changes and trends: In view of the high importance assigned by the international community to sustainable development and the commitment of all countries to Agenda 21, the activities within this subprogramme will give more emphasis to capacity building in the field of planning for sustainable energy development. The Agency databanks and analytical tools will be further improved to incorporate sustainable development aspects of energy system development, for example energy disparities, affordability, efficiency, environmental protection and financial viability.

Resource changes and trends: The proposed resources for the Subprogramme C.1 amount to \$1 370 000 in 2004, reflecting a decrease in the budget of \$92 000, or 6.3% compared to 2003. The decrease results mainly from a streamlining of the Agency's model portfolio and hence reduced maintenance requirements.

Financial resources (2003 prices)

C.1.	2003	2004	2005
Reg. budg.	1 462 000	1 370 000	1 380 000

Recurrent Project C.1.01: Energy, electricity and nuclear power economics: databanks on status and trends

Main outputs: The following databanks and information will be available: updated databanks containing information on energy and electricity supply and demand patterns; data on technical, economic (including externalities), environmental and human health parameters of various energy technologies, specifically nuclear power, covering full energy chains; time series data on Indicators for Sustainable Energy Development (ISED); annually updated information on status and trends of energy and electricity supply and demand patterns, availability of energy resources, technology developments and economics; latest information for the Nuclear Technology Review, including data for updating internal and external web sites; and the annual Agency publication Reference Data Series 1 (RDS-1) on "Energy, Electricity and Nuclear Power Estimates for the Period up to 2030".

Ranking: 6 (priority 2)

Recurrent Project C.1.02: Models for analysis and capacity building for sustainable energy development

Main outputs: Enhanced analytical tools (models) for elaborating sustainable energy strategies, applicable in widely diverse country situations will be provided to the Member States. Trained experts in Member States for the use of Agency tools and for training other professionals in their countries will be available, while national studies will provide necessary information to the decision makers.

Ranking: 1 ex-aequo (priority 1)

Subprogramme C.2: Energy Economics Environment (3E) Analysis

Rationale: The practical emphasis within the sustainable development debate is shifting from a more exclusive focus on environmentalism to a broader recognition of the need to assure socio-economic development. Rapid technology change and a greater emphasis on competitive economics influence the constantly shifting balance among

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social, economic and environmental priorities — the three pillars of sustainable development. These in turn govern energy technology and regulatory choices being made by Member States as they structure their own sustainable energy development strategies. To provide a perspective on energy system issues in different countries, and to shed light on the possible reconciliation of sometimes conflicting sustainable development objectives, there is a need for over-arching analysis of the contribution nuclear energy can make to sustainable development in increasingly competitive, cost conscious and environmentally demanding markets. Recent General Conference resolutions have called for more active Agency involvement in the debate on nuclear power and its contributions to sustainable energy development. This subprogramme specifically includes a project designed to permit a broad range of Agency involvement in Agenda 21 sustainable development issues. Moreover, the UN General Assembly in 2002 endorsed the exploration of new and innovative nuclear technologies to benefit future generations. Subprogramme C.2 includes activities that will assist Member States that may choose to respond to this endorsement.

Objective: To enhance the consideration of nuclear power as compatible with competitive energy markets and with sustainable development objectives based on systematic and objective analysis.

Outcomes
<ul style="list-style-type: none"> — Increased consideration of nuclear technologies, where appropriate, in Member States' sustainable development strategies. — Enhanced reputation of the Agency among Member States and other international organizations as a competent partner in addressing sustainable energy development issues and as an objective and up-to-date source of information on nuclear energy in the context of evolving energy systems. — Increased incorporation of 3E analysis in in-house and Member State analyses.
Performance Indicators
<ul style="list-style-type: none"> — Number of Member States using Agency assistance for addressing energy and sustainable development related topics. — Number of Agency presentations at international organizations and other forums and participation in joint projects in areas related to Agenda 21 and to 3E analysis in response to requests.

Programme changes and trends: Economic performance is increasingly seen as the make-or-break factor for the deployment of nuclear power. This demands a shift in this subprogramme's focus towards a higher concentration on the overall economics of nuclear power within an energy system context. Project C.2.01 is, therefore, now named "Economic analysis for sustainable energy system development". Economic analysis under this subprogramme will expand to include the relative economic performance of evolving energy systems, and of all energy technologies including non-electric

energy services such as chemical fuel production, process and district heat generation and desalination (integrated multi-fuel and multi-purpose plants), with particular focus on external costs.

The activities in this subprogramme will continue to be oriented towards response to requests from Member States and from the international community. The exact nature and timing of solicited contributions, therefore, remain unknown and unknowable factors (e.g. contributions to the Inter-Agency Task Force on Energy or to assessment reports of the Intergovernmental Panel on Climate Change (IPCC)). Moreover, as Agency developed analyses and models become ever more widely appreciated, there is a continuing increase in the number of requests for Agency assistance to Member States, for input and participation in national and international activities in these focus areas. Because of the uncertain nature of future requests for contributions, the Agency needs to continue developing its anticipatory approach with regard to possible new developments. In order to allow for the necessary flexibility, Subprogramme C.2 once again incorporates several new activities (e.g. studies on the sustainability of specific energy systems including cost internalization, topical reports on 3E assessments of different energy supply options, on aspects of Agenda 21 implementation, and on climate change negotiations) aimed at enhancing the capability of the Agency to respond in a co-ordinated and harmonized manner to challenges ahead.

Resource changes and trends: The proposed resources for the Subprogramme C.2 amount to \$1 348 000 in 2004, reflecting an increase in the budget of \$92 000, or 7.3%, over 2003. In 2005 there is a decrease of \$33 000, or 2.4% compared to 2004. The increase is due to more efforts being dedicated to the identification of sustainable energy development trajectories in Member States.

Financial resources (2003 prices)

C.2.	2003	2004	2005
Reg. budg.	1 256 000	1 348 000	1 315 000

Project C.2.01: Economic analysis

Main outputs: Outputs of this project will include: comprehensive background and topical analyses (in the form of reports and case studies) on the economic, environmental and energy market factors relating to the potential role of nuclear and other energy supply options in sustainable energy strategies and in protecting the global environment; assessments and comparisons of economic and environmental aspects of nuclear power and non-nuclear alternatives (the exact focus of the analysis to be defined by requests from Member States); contributions to the deliberations of other international organizations; and teaching and background material for workshops and training courses for Member States on economic and environmental issues affecting nuclear power and sustainable energy development, and on the

contribution of the nuclear option for meeting energy and sustainable development objectives, and economic analyses in support of other Agency programmes.

Duration: 2004–2008

Ranking: 6 ex-aequo (priority 2)

Recurrent Project C.2.02: Sustainable energy development

Main outputs: Technical and substantive reports will be provided to Agenda 21, UNCSD, UNDESA, IPCC, UNFCCC, inter-agency task forces and other international activities related to sustainable development, environmental quality and climate change. Reports assessing the sustainability of nuclear power over the medium term, and demonstrating the use of economic analysis and the application of the Agency's Indicators for Sustainable Development as key tools for assessing sustainable development over time will be made available.

Ranking: 1 ex-aequo (priority 1)

Subprogramme C.3: Nuclear Knowledge Management

Rationale: The ageing of the nuclear workforce and the decreasing number of young entrants in many Member States as well as the scarce resources for nuclear research and development are creating a concern about the availability of nuclear expertise and skills necessary to keep the nuclear option open in the future. The preservation of nuclear knowledge thus becomes critical for ensuring sustainability and encouraging innovation, in guaranteeing safety and security, and in assuring that the benefits of nuclear energy — related to human health, food and agriculture, water management, energy supply, and other applications — remain available for future generations. A General Conference resolution requests the Agency to initiate activities in the field of knowledge management. A meeting of senior officials on managing nuclear knowledge endorsed Agency involvement with the recommendation to embrace both knowledge preservation and enhancement. The meeting's recommendations provide the backbone of the project and activities of this subprogramme. While all technical programmes address — through a variety of projects — preservation and promotion of knowledge and maintenance of competence in nuclear science and technology, the subprogramme on Nuclear Knowledge Management serves as a focal point for these cross-cutting activities. In 2004–2005 the focus will be on the development of a comprehensive medium term strategy for promoting education, training and research embracing all areas of interest to the Agency and its Member States.

Objective: To increase awareness and understanding in Member States of the need for sustaining knowledge and expertise in nuclear science and technology and to effectively serve the knowledge management needs of Member States.

Outcome
— Member States increasingly recognize the need for sustaining nuclear knowledge and expertise and take necessary steps to address the relevant issues.
Performance Indicator
— Number of Member States participating in and/or supporting knowledge management activities.

Programme changes and trends: Knowledge management related to nuclear science and nuclear technology, including training in preserving, archiving and retrieving vast amounts of scientific and technical data and documentation, has long been an integral part of the Agency's activities, although these were not always highlighted as part of an overall "knowledge management" agenda. It is now recognized that a more focused and consolidated approach to knowledge management is required.

By the end of the biennium a comprehensive Agency-wide strategy in nuclear knowledge management needs to be developed which will also serve as input to the Agency's next Medium Term Strategy. Within the available resources, Subprogramme C.3 will continue to serve as a focal point for the Agency's knowledge management efforts, with each of the major programmes placing greater importance on the education, training and qualification of the next nuclear generation. Otherwise nuclear science and technology is not sustainable. The target is the creation of an effective Agency Nuclear Information Resource System based on INIS and the Agency Library. This service would build on the Agency's existing databases of nuclear, scientific and technological documents, while networking with other systems, libraries and electronic information centres to provide an enhanced nuclear knowledge base.

Resource changes and trends: Activities on nuclear knowledge management were introduced in the 2002–2003 Programme (in subprogramme D.4) with minimal resources. In the 2004–2005 programme, the subprogramme is an integral part of Programme C, which reflects knowledge management's essential importance to Capacity Building for Sustainable Energy Development. Funding has been strengthened and the subprogramme shows an increase of \$120 000, or 9.3%, in 2004 compared with 2003 to reflect the high priority given to this subprogramme by all Member States as outlined in the General Conference resolution GC(46)/12/B. In 2005 there will be a slight decrease of \$15 000.

Financial resources (2003 prices)

C.3.	2003	2004	2005
Reg. budg.	1 287 000	1 407 000	1 392 000

Project C.3.01: Developing policy and guidance for nuclear knowledge management

Main outputs: A strategy for increasing the awareness of the young generation on the opportunities and benefits offered by nuclear science and technology will be developed. Guidance documents for assisting policy makers in Member States in addressing the issues of nuclear knowledge management, including discontinuity in nuclear education and training will also be developed. A Conference on “Nuclear Information and Nuclear Knowledge Management” will be organized in 2004.

Unfunded activities/means of implementation: Additional staffing resources required to develop a vision, policy and strategy for nuclear knowledge management.

Duration: 2004–2005

Ranking: 1 ex-aequo (priority 1)

Project C.3.02: Facilitating sustainable education and training in nuclear science and related fields

Main outputs: Roadmap for establishment of an educational network involving Member States will be initiated and developed. Meetings with Member States will be conducted and a platform for networking will be elaborated. Content (curricula) for educational programmes in the basic disciplines of nuclear science and technology will be developed or adopted.

Unfunded activities/means of implementation: Additional staffing resources required to set up networks of collaboration among nuclear science and technology related institutions.

Duration: 2004–2005

Ranking: 6 ex-aequo (priority 2)

Project C.3.03: Maintenance and preservation of knowledge in specific areas of nuclear science and technology

Main outputs: The main outputs include: reports identifying critical areas in reactor technology that currently are not mainstream subjects for knowledge preservation (e.g. reactor physics, fuel and cladding materials or operating and decommissioning experience); substantially improved electronic repositories of fast reactor technology data, documents and records; a CRP on knowledge preservation technologies leading to archiving of information.

Duration: 2004–2005

Ranking: 6 ex-aequo (priority 2)

Subprogramme C.4: International Nuclear Information System (INIS)

Rationale: For more than 40 years, there has been a strong interest within Member States in maintaining continuity of knowledge and expertise in the peaceful use of nuclear energy, particularly through the collection and dissemination of scientific and technical information and through technology transfer. In response to this interest, the IAEA has developed a variety of nuclear information resources, including bibliographical, technical and numerical databases, each serving a specific purpose and distinguished by contents or programme implementation.

The International Nuclear Information System (INIS), operated since 1969 by the Agency on behalf of its Members, includes the INIS Bibliographic Database and the INIS full text non-conventional literature (NCL) collection. It is by far the largest Agency information resource in nuclear science and technology.

Today it is recognised that the political and technological environments that led to the creation of INIS have fundamentally changed: the focus for nuclear science and technology has shifted from basic research to technology development and applications, leading to a change in the INIS customer base; furthermore, the emergence of the Internet has created a range of users’ needs and expectations that did not earlier exist.

Consequently, INIS has to adjust to these changes by implementing a more active programme that focuses on improving efficiency, improving access to its resources and developing partnerships.

Objective: To maintain and enhance the information resources on the peaceful use of nuclear energy serving the needs of Member States and the IAEA.

Outcome
<ul style="list-style-type: none"> — Member States regard INIS as the foremost nuclear information resource for quality information on the peaceful uses of nuclear science and technology. — Scientific and technical information in support of peaceful applications of nuclear sciences and technology is preserved and available cost-effectively to all INIS Members. — Increased usage of INIS products and services.
Performance Indicator
<ul style="list-style-type: none"> — Comprehensiveness and timeliness of coverage of the published literature. — Level of access and utilization of INIS products and services.

Programme changes and trends: INIS will be simplified and made more flexible, to facilitate streamlined information acquisition without compromising quality. The resulting savings will be used for expanding the Nuclear Knowledge Maintenance and Preservation activities under Subprogramme C.3. The System's further development will be aligned with the Agency's information management framework; while supporting key activities of interest to INIS Members.

The construction of the bibliographic database and the enhancement of the collection of non-conventional literature will remain key elements in the 2004/5 programme. Products will be enhanced to fully support direct on-line access to all information collected by INIS. INIS will direct more efforts to harvest and disseminate Internet-based resources and establish new strategic partnerships with publishers and sister organisations, in order to ensure access to information and documents of interest to INIS Members that are not currently available through the System.

INIS will increase its outreach activities in order to enhance knowledge of INIS within the Agency and in Member states. It will maintain its Technical Co-operation activities in order to assist in information capacity building in INIS Members States.

The INIS Secretariat will develop metrics to evaluate internal and external capacities to benchmark and learn from other international agencies dealing with information dissemination. Quantifiable indicators will be developed to determine how efficiently objectives are being met.

Resource changes and trends: Resources for 2004 remain unchanged when compared to the adjusted budget of 2003. There will be an increase of \$88 000 for 2005 for a consultative meeting of the INIS liaison officers.

Financial resources (2003 prices)

C.4.	2003	2004	2005
Reg. budg.	3 196 000	3 196 000	3 284 000

Recurrent Project C.4.01: INIS products and quality assurance

Main outputs: The INIS Atomindex will be produced. The INIS Bibliographic Database on CD-ROM and the Internet and the, INIS NCL full text collection will be updated and further enhanced. INIS Internet products, the Thesaurus and other technical/reference manuals will be maintained.

Ranking: 1 ex-aequo (priority 1)

Recurrent Project C.4.02: INIS services, partnerships and outreach

Main outputs: The distribution of the INIS Atomindex and INIS database within the existing licensing arrangements will be maintained and

further enhanced. Co-operation with other programmes will take place in order to assist them in their use of the INIS Distance Learning Programme and to fulfill their information needs. Advice will be provided to National INIS Centers in developing more proactive activities and promotional materials, especially to reach more young nuclear professionals in universities and research institutes.

Ranking: 12 (priority 3)

Recurrent Project C.4.03: INIS development and innovation

Main outputs: A new INIS/ETDE Exchange Format will be available. Better on-line and off-line capture, improved retrieval and access thanks to the development of new navigation interfaces and search mechanisms and use of multilingual tools will improve Internet access to information. A scalable distributed architecture to support collaboration, authentication and encryption, access control and user personalization will be implemented. All INIS systems will be internationalized by adopting Unicode, enhancing support for scientific notation and implementing multilingual dictionaries online. An auto notification mechanism will be implemented. Two CRPs for computer assisted indexing and multilingual and multi-script OCR technologies will be organized.

Ranking: 1 ex-aequo (priority 1)

Recurrent Project C.4.04: INIS training and capacity building

Main outputs: The following measures will be provided: training, end-user training, INIS Training Seminar at the INIS Secretariat and fellowships. Capacity building in Member States will be supported through the implementation of four national or regional technical co-operation funded projects (two per year). Guidance on nuclear information manipulation, storage and preservation will be developed and provided.

Ranking: 6 ex aequo (priority 2)

Project C.4.05: INIS policy and planning

Main outputs: The biennial Consultative Meeting of the INIS Liaison Officers will be conducted in 2005 and the report, decisions and recommendations will be made available. The Joint INIS/ETDE Technical Committee meetings will be conducted in 2004 and 2005 and a technical report, decisions and recommendations, as well as standards and guidelines to be used in the operation of INIS will be produced. A meeting of the Advisory Committee for INIS will be held in 2004 in order to determine the role of INIS in knowledge preservation.

Duration: 2004–2005

Ranking: 6 ex aequo (priority 2)