

Strengthening Nuclear Power Infrastructure Development in Member States 2012-2014 Budget Request

Background

This proposal is focused on strengthening the ability of Member States, especially Governments, to undertake the careful planning and preparation required to develop a sustainable infrastructure for nuclear power. The infrastructure requires high-level Government involvement, technical knowledge and capabilities, and good coordination among several national institutions. This proposal contains support for strengthening the Milestones approach, review missions, and events to promote information-sharing, transparency, and coordination of international assistance. It is focused on cross-cutting and over-arching infrastructure issues and filling the gaps that exist in the Agency's ability to support these needs. Other proposals are more specifically focused on support to future owner-operators, regulatory bodies and specific technical issues.

This infrastructure covers a wide range of interrelated issues and involves coordination of many national institutions. The NE Series Guide NG-G-3.1 "Milestones in the Development of a National Nuclear Power Programme" provides an integrated approach and framework which focuses on cross-cutting aspects of the infrastructure needed to support nuclear power. This approach is widely recognized and followed by IAEA Member States. Self-evaluation and Integrated Nuclear Infrastructure Reviews are an important feature of this approach. Continuing to strengthen the application of the Milestones approach, related guidance materials and databases, and review services such as INIR missions will ensure that Governments launching nuclear programmes receive international expert advice regarding key cross-cutting issues.

Countries launching nuclear power today are facing different challenges than those who developed programmes in the 1970s and 80s. Opportunities for sharing lessons learned among themselves and with countries that have experience operating nuclear power is an essential element of the development process. It also contributes to developing a culture of transparency and openness around the use of nuclear power as expected by the international community. Networks, workshops and international conferences are mechanisms for sharing lessons learned.

Nuclear power development is an issue that transcends national boundaries. In addition to IAEA assistance, bilateral and other multilateral assistance is being provided to countries launching nuclear programmes. Facilitating coordination of these efforts can improve effectiveness and identify synergies to the benefit of countries launching nuclear programmes.

Objectives

The objectives of this project are to:

- Strengthen the Milestones approach, review services and related databases
- Ensure comprehensiveness of cross-cutting guidance and fill gaps in the Agency's guidance and related materials in the infrastructure issues
- Encourage sharing of lessons learned and transparency through workshops, conferences and other events
- Facilitate "soft coordination"
- Ensure effective use of resources

Outcomes

- Increased awareness of the integrated and comprehensive nature of nuclear infrastructure development.
- Better informed decision making and planning by governments and other stakeholders for new nuclear power programmes through sharing experience and lessons learned, INIR programme would be conducted effectively and with adequate follow-up.
- Complete and comprehensive IAEA guidance documents that support infrastructure development. Continuous improvement of IAEA guidance by gathering and distributing up to date international experience and views on infrastructure development.
- Improved transparency and awareness of a culture of openness around nuclear power development.

Description of Activities

1. Updating and developing Agency guidance documents in topical areas of nuclear infrastructure development.
2. Strengthening the INIR mission programme and other services
3. Organizing workshops, conferences and other events to promote information sharing on nuclear power development.
4. The coordination of infrastructure assistance between member states through networks, soft coordination, and information tools.

To achieve these objectives, the US funding under the Peaceful Uses Initiative would be used for the following activities:

1. Guidance documents and Nuclear Energy Series reports are a means of gathering and distributing international experience and views on infrastructure development. Funding will enable the updating the Milestones and Evaluation Methodology (NG-T-3.2) as well as further development of Agency documentation to cover the 19 infrastructure issues identified in NG-G-3.1. Topical areas that are high priorities for 2012-14 include: nuclear security requirements for newcomers, environmental issues including environmental impact assessments and monitoring, as well as developing a library of case studies from current experience on various topics. These documents will be developed in cooperation with other Departments and offices. The funding will support a cost free expert (2012-2013), consultants and temporary secretarial support necessary for preparation and planning activities; the consultancy meetings and the technical meetings. **Funds Requested: \$480 000**
2. Strengthen INIR programme including supporting the conducting of missions, gathering feedback for continuous improvement, action plan development to address deficiencies, and follow-up activities. Funds requested will support training materials, expert development, database management and consultancies. **Funds Requested \$200 000.**
3. Sharing lessons learned and experience on topical issues of infrastructure development for nuclear power. Funding would support participation by international experts and by representatives from developing countries in the IAEA's series of annual workshops on topical nuclear infrastructure issues, including a large workshop on financing nuclear power programmes in 2012 and

organizing the International Ministerial Conference on Nuclear Power in the 21st Century in 2013. This conference will result in better international understanding of the status and prospects for nuclear power use globally. **Funds Requested: \$200 000**

4. Supporting the coordination of infrastructure assistance through soft coordination, and improving tools for information exchange will be accomplished by: 1) The IAEA will facilitate soft coordination through national, regional, and interregional events to increase effectiveness of efforts and avoid their duplication. 2) New or improved tools to handle an increased need for information to allow access by member states to timely and accurate information. The IAEA Infrastructure website will be improved to include effective web-enabled and interactive services and databases. Funds in this activity will also support a cost free expert (2012-2014) for continued development and maintenance of a network to be developed with funds received from the US PUI in 2010. **Funds Requested: 200 000**

Main Participants

The main participants will be the Integrated Nuclear Infrastructure Group (INIG), other divisions within the Department of Nuclear Energy, other Divisions and offices such as Nuclear Safety, Office of Legal Affairs, member states that are actively building their nuclear power infrastructures (especially those in Phase II), countries providing bilateral and multilateral support in the area of infrastructure development, external consultants and experts required for technical areas, and regional and international organizations that are involved in nuclear energy.

Schedule of Project

This project will continue from 2012-2014

Budget (USD)

Budget (\$USD)

	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
-- US CFEs	0	330 000	330 000	150 000
- other	650 000	650 000	800 000	450 000
<i>Subtotal (per year)</i>	<i>650 000</i>	<i>980 000</i>	<i>1 130 000</i>	<i>700 000</i>
<i>PSC</i>	<i>48 925</i>	<i>73 764</i>	<i>85 054</i>	<i>52 688</i>
<i>Total</i>	<i>698 925</i>	<i>1 053 764</i>	<i>1 215 04</i>	<i>752 688</i>

Grand Total: \$3 720 431

Member State assistance from Site Survey to Site Evaluation

Objective

Assistance to Member States under this program will be provided in two distinct areas. First, assist in all phases of the process to establish a site/s for nuclear power plant construction. The assistance will be provided on a one to one basis in implementing the guidance of the IAEA safety standards in the siting process. Second, after the siting is complete further assistance will be providing to the requesting Member States in establishing the design basis with respect to the external hazards. The funding will provide the IAEA with the capability to provide sequential and on time assistance to Member States actively engaged in pursuing a nuclear power program. The Member States in addition, will benefit from a level of international peer review of their implementation of the IAEA safety standards in the siting process and site specific external hazard assessment. This effort has taken an increased significance since the events in Fukushima.

Outcomes of the project

Each of the target countries will benefit from having an established site or sites with associated design basis parameters identified for the construction of a nuclear power plant. The Members States can then choose from the different options available to them for the construction and operation of a nuclear power plant that meets the design basis for the site. The time frame of the program funding aligns with the time needed for for a Member State actively engaged in pursuing a nuclear power program to accomplish the above objective.

Description

1. Site selection and site assessment for nuclear power plants is one of the fundamental steps in the infrastructure development of a member state pursuing the development of nuclear power. As a part of this program the Members States can solicit assistance at any stage of the siting process. Solicitation at the site survey process assures the MS of IAEA review:
 - a. of the terms of reference for a consultant to perform this activity.
 - b. of the execution of process and
 - c. a review of the consultant's report on site survey.
2. Solicitation at the site selection process assures the MS of IAEA review:
 - a. of selecting the proper criteria for exclusion criteria
 - b. of selecting the appropriate discretionary criteria
 - c. of the ranking process
3. Solicitation after the the site selection process assures the MS of IAEA review:
 - a. of the terms of reference for the site evaluation program
 - b. of the adequacy of the site evaluation
 - c. of the establishment of the site specific hazard assessment
 - d. of the draft Safety Evaluation Report

The selection of the site implementing the above sequence of activities will provide a level of defence in depth that complement the safety measures designed into the nuclear power plant systems. Direct interaction with Member States will enhance their capability to make safety based decisions in the future activities of the nuclear power program.

This targeted funding will enable IAEA to provide to those Member States actively engaged in pursuing a nuclear power program, as demonstrated by a systematic and successful implementation of the individual steps of the siting process, in establishing a site/s for the construction of a nuclear power plant. At the completion of this entire series of activities the Member States will have a site/s suitable for nuclear power plant construction along with the associated regulatory process to support such a selection.

Main Participants

The International Seismic Safety Centre with the role of providing global support for siting and external hazard assessment and those Member States actively engaged in pursuing a nuclear power program such as Vietnam, Bangladesh, Thailand, Malaysia, Indonesia, Jordan, Egypt, UAE, South Africa.

Schedule

Anticipated start in June 2011 and will continue to Dec 2014.

Budget

	2011	2012	2013	2014
<i>[Office]</i>	50 000	50 000	30 000	30 000
<i>--consultant</i>	100 000	100 000	100 000	50 000
<i>--travel</i>	40 000	50 000	70 000	70 000
<i>--other</i>	60 000	50 000	50 000	50 000
Subtotal (per year)	250 000	250 000	250 000	200 000
<i>PSC</i>	18 817	18 817	18 817	15 054
Total	268 817	268 817	268 817	215 054

Grand Total: \$1 021 506

TC footnote a

--travel

--procurement

--consultant

--other

Regulatory Cooperation Forum

Objective

To assist in the development of effectively independent and robust nuclear safety regulatory bodies of RCF Member States embarking on nuclear power.

To achieve and sustain a high level of nuclear safety, based on self-assessment by a Member State of its regulatory body's needs, as identified from the IAEA Safety Standards and guidance.

To optimize the coordination and collaboration among RCF members to meet these needs.

Outcomes of the project

Coordinated regulatory support provided by Member States with advanced nuclear power programmes to those Member States committed to developing of a nuclear power programme for the first time.

Development of effectively independent and robust regulatory bodies of nuclear power taking advantage of experienced regulators of nuclear power.

Description

Problem Statement and Proposed Solution

Problem - Regulatory bodies in countries starting nuclear power programmes need to develop the processes and capabilities to keep pace with the nuclear power project development. They will need to be prepared with the regulatory approach and licensing process when the invitation for bids is issued. Having access to practical experience of regulators in advanced nuclear power countries can facilitate their development. Recognizing this need, many advanced regulators are offering assistance programmes.

Proposed Solution - Member State regulatory bodies at the 2009 Conference on "Effective Nuclear Regulatory Systems" in Cape Town, South Africa agreed to establish a Forum to provide effective coordination and collaboration among requesting Member States (Recipients) and those asked to provide regulatory support (Providers). In June 2010, the Regulatory Cooperation Forum (RCF) was established. The forum was established to better coordinate regulatory support that was previously done in an ad-hoc manner through bi-lateral arrangements. The IAEA, as Secretariat, will facilitate and promote coordination and collaboration of these Member State driven activities.

The RCF is open to all Member States. Currently, there is a Core Group of 15 members that serve as the RCF steering committee. The Core Group has approved a Terms of Reference and a Programme Plan. It is expected that certain RCF members will need EBP funding for travel, lodging and per diem expenses as the RCF develops.

Expected results

It is expected that the RCF will facilitate bilateral regulatory support provided by Member States with advanced nuclear power programmes to those developing of a nuclear power programme for the first time as identified by their progress in the safety issues identified by the IAEA milestones approach. Targeted RCF recipient members are those who are readying themselves for the bidding of the first nuclear plant. This facilitation will reduce unnecessary support overlap and improve the ability of the recipient Member States to effectively "absorb" the support received. In addition, the RCF will more effectively channel the needed support from the most appropriate provider Member State dependent upon the recipient needs.

Expenditures

IAEA staff to facilitate and promote the RCF. This staff would include one full time P-5 and one part time G staff for administrative support.

Transportation, lodging and per diem costs for recipient Members States and for certain provider Member States to attend regular RCF meetings and expenses for traveling to receive RCF assistance.

Specific future costs

It is anticipated that there will be three RCF meetings per year. Transportation, lodging and per diem expenses will be needed for recipient members to attend these meetings. Assuming \$5K per person per meeting with an assumed number of 7 recipients, the total for these meetings would be \$105K per year.

In addition, transportation costs would be needed for recipient members who will need to travel to receive support from provider members. It is anticipated that at any given time there will be 3 recipient members receiving support with than estimated 3 support related trips needed per year. At \$5K per trip, the annual estimated costs would be \$45K.

The IAEA, serving as secretariat, will require one full time P-5 staff member and one G-staff at 0.33 FTE. Assuming a salary for a P-5 at \$115K and salary for a mid-range G-staff at \$51K at 0.33 = 17K.

Projected total yearly expenditures = \$282K.

Main ParticipantsRCF Core Group and other RCF members

RCF Providers: Canada, China, France, Finland, Germany, Japan, Iran, Pakistan, Russian Federation, South Korea, UK, and U.S.

RCF Recipients: Chile, Egypt, Jordan, Poland, South Africa, UAE, and Vietnam

IAEA participants

In the Department of Nuclear Safety - one full time P5 and one part time G staff.

Schedule

The project began in June 2010 and numerous activities occurred for the remainder of the year, primarily including support for Jordan. The funding support is requested to start as early as possible. The budget of this proposal is based on the assumption that the support will start in July 2011.

For future years, it is estimated 3 new countries will be supported each year with each country's support lasting between 2-3 years.

By 2014, it is therefore estimated that 9 countries will have been supported by the RCF which is dependent upon how many countries are ready and willing for RCF support.

Budget

<i>NS</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
<i>Staff time</i>	66 000	132 000	132 000	132 000
<i>Travel</i>	75 000	150 000	150 000	150 000
Subtotal (per year)	141 000	282 000	282 000	282 000
PSC	10 613	21 226	21 226	21 226
Total	151 613	303 226	303 226	303 226

Grand Total: \$1 061 291.

Support to countries embarking upon nuclear energy in establishing radioactive waste and spent nuclear fuel infrastructure

1. Project objective

To assure that countries developing nuclear power are capable of planning and establishing in a timely manner adequate formal and technical infrastructure for radioactive waste and spent fuel management that will allow them to initiate bids for their first nuclear power plants.

2. Project background and rationale

Countries embarking on nuclear power face the need to develop or at least significantly upgrade their systems for radioactive waste management. Most have generated small amounts of institutional waste and disused sealed sources from medical, research or industrial applications but have not been pressed to create a complex organisational system. They may have facilities to condition and store such waste, but no disposal capability. Similarly, they may have no or limited financing systems for managing radioactive waste, much less the ability to address long term liabilities associated with nuclear power plant (NPP) waste management. Regulatory activities may have focused on radioprotection issues, and the legislative system may be insufficiently developed to address waste management technologies and facilities associated with NPP programmes.

The IAEA has recognized these problems and developed documents with advice on principal infrastructural matters and technical solutions. Their purpose is to create awareness of the scope of the problem, formulate safety principles, and introduce technical solutions and requirements for an adequate management environment¹.

To support the building of efficient radioactive waste management systems in newcomer countries the IAEA will focus in this project on support for formulating national policies on radioactive waste and spent fuel management and thus help build the formal infrastructure by helping countries to allocate responsibilities, develop the necessary legislative environment and relevant regulatory capacities, and identify adequate funding mechanisms. The Agency will promote the creation of a technical infrastructure by assisting with the development of spent fuel and radioactive waste strategies, by building human capacities to implement these strategies and to run waste/spent fuel management programmes, by advising on the selection of relevant technologies and available equipment, and by creating sound quality management systems. This assistance is intended to be provided, in coordination with national and regional technical cooperation projects, to about 10-15 Member States that are taking steps to introduce nuclear power.

3. Planned activities and project steps

The project will therefore include:

- 4.1 An assessment of the national radioactive waste management systems in interested newcomer countries, estimation of anticipated waste/spent fuel inventories and the outlining of necessary steps toward developing and/or upgrading the national infrastructures.

¹ For example, *Policies and strategies for radioactive waste management* (NW-G-1.1); *Legal and governmental infrastructure for nuclear, radiation and radioactive waste and transport safety* (GS-R-1); *Cost considerations and financing mechanisms for the disposal of low and intermediate level waste* (TECDOC 1552); and *The management system for facilities and activities* (GS-R-3).

4.2 Support to national governments in formulating and implementing national policies for radioactive waste/spent fuel management, in particular: allocating responsibilities, designing relevant funding mechanisms, creating adequate legislative environments and regulatory systems, selecting waste export/import principles, and introducing medium and long term plans for national policy implementation.

4.3 In accordance with national policies, advice to facility operators on suitable radioactive waste management strategies and planning for their implementation through the selection of technologies and facilities relevant to generated waste streams (including also from sources other than power plants).

4.4 In accordance with national policies, advice to facility operators on suitable long term spent fuel management strategies and planning for their implementation through the selection of relevant technologies and facilities.

4.5 Training aimed at the development of proper managerial proficiency for running a sound waste and spent fuel management system.

5. Financing Plan

Description	Estimated Cost in Euro	US\$ ROE: 0.778	PSC	Total US\$
Assistance in reviewing existing waste management infrastructures and outlining the process for their adequate upgrade (end 2013)	100 000	128 602	9 002	137 605
Support for formulating national waste/spent fuel management policies (end 2014)	140 000	180 043	12 603	192 647
Advice on outlining plans for policy implementation (end 2014)	100 000	128 602	9 002	137 605
Promotion of sound quality management systems (middle of 2015)	80 000	102 882	7 202	110 084
Assistance in formulating efficient strategies for managing radioactive waste (end 2015)	100 000	128 602	9 002	137 605
Assistance in formulating efficient strategies for long term management of spent fuel (end 2015)				
Support for the development of long term, medium term and implementation plans for creating technical infrastructure for waste/spent fuel management (end of 2016)	120 000	154 323	10 803	165 126
Total	€640 000	\$823 056	\$57 614	\$880 670

Grand Total: \$880 670

6 Expected outcomes

It is anticipated that each newcomer country involved in the project and planning to initiate a bid for an NPP will be able to:

- Establish its formal radioactive waste management infrastructure (spent nuclear fuel / radioactive waste management (SNF/RWM) responsibilities, financing arrangements, and legislative environment),
- Develop plans for creating technical infrastructure (proposed SNF/RWM facilities and timing for their implementation),
- Build a quality management system for radioactive waste and spent fuel management.

IAEA OFFICE OF LEGAL AFFAIRS

- PUI PROJECT PROPOSAL -

Project Title	Assisting Newcomer States in the establishment of adequate and comprehensive national legislation implementing relevant international instruments on the safe and peaceful uses of nuclear energy
Lead Office	Office of Legal Affairs Contact: Mr. Wolfram Tonhauser, Head, Nuclear and Treaty Law Section <w.tonhauser@iaea.org >
Beneficiaries	Selected Member States planning to introduce nuclear power generation for the first time (hereinafter “ Newcomer States ”).
Objective	To support Newcomer States in the establishment of adequate and comprehensive national legislation implementing relevant international instruments on the safe and peaceful uses of nuclear energy.
Starting Date	[...]
Duration	[...] months
Budget Estimate	US\$ 3,125.00 million (see Part E below on the allocation of funds over a four year period)

A. PROJECT SUMMARY**B. BACKGROUND AND JUSTIFICATION**

The decision to embark on a nuclear power programme should be based on a firm commitment to establish a sustainable national legal infrastructure, taking into account relevant IAEA standards, guidance and international legal instruments.

There continues to be an increasing demand by Newcomer States for assistance to be provided by the IAEA Office of Legal Affairs to support them in establishing such infrastructures. The provision of assistance by the Office in this regard continues to be an essential component of the IAEA's contribution to the safe, secure and peaceful use of nuclear energy.

The Proposed Activities identified below complement and support current and foreseen activities implemented under the IAEA's Legislative Assistance Programme.¹ Funds provided under this proposed PUI Project would supplement current funding of that Programme.

¹ This Programme currently includes three regional projects for Africa, Asia and Latin America under the TC Programme, as well as a forthcoming TC project for Europe.

C. PROPOSED ACTIVITIES

1. COMPETENCE AWARENESS MISSIONS

Objectives: To encourage, inform and raise the awareness of national policy-makers about the importance of adhering to relevant international legal instruments, as well as the measures needed to be taken in order to effectively implement these instruments.

Beneficiaries: To include national policy-makers, such as from the Ministry of Foreign Affairs and national nuclear regulatory body(ies), as well as Parliamentary and other officials etc.

Implementation: 3-5 high-level missions per-year to Newcomer States composed of senior legal, policy and technical experts.

2. BILATERAL LEGISLATIVE ASSISTANCE

Objectives: To support Newcomer States in drafting the required national nuclear legislation which should cover in a comprehensive manner, all aspects of nuclear law, in particular, nuclear safety, security, safeguards and liability for nuclear damage.

Beneficiaries: To include legislative drafters and policy-makers.

Implementation: Provision of assistance by senior legal experts to 6-8 Member States per-year, including, missions to Newcomer States, national seminars (workshops) and/or bilateral meetings held at IAEA Headquarters.

3. DEVELOPMENT OF ONLINE (E-LEARNING) TRAINING PLATFORM

Development of an e-learning platform specifically targeted at Newcomer States and essentially covering the subject matters of the Handbook on Nuclear Law Volumes I, II & III.

4. DEVELOPMENT OF TRAINING AND REFERENCE MATERIALS

Includes the development and publication of Volume III of the IAEA Handbook on Nuclear Law. An important aspect of Volume III will be the consideration of how legal measures in a State beyond those specifically addressing nuclear regulation should be approached to enable nuclear energy projects to move forward in the most efficient and timely manner, once a national decision to do so has been adopted.

D. EXPECTED ACCOMPLISHMENTS AND INDICATORS OF ACHIEVEMENT

	EXPECTED ACCOMPLISHMENTS	INDICATORS OF ACHIEVEMENT
1. COMPETENCE AWARENESS MISSIONS	Successful Missions to Newcomer States	<ul style="list-style-type: none"> • Effective buy-in by national policy-makers and development of future corresponding policy at the national level • Subsequent adherence to the relevant international legal instruments • Request for further legislative assistance
2. BILATERAL LEGISLATIVE ASSISTANCE	Successful bilateral meetings with Newcomer States	<ul style="list-style-type: none"> • Effective buy-in by national legislative drafters and policy-makers • Request for further legislative assistance • Subsequent adoption of national nuclear legislation
3. DEVELOPMENT OF ONLINE (E-LEARNING) TRAINING PLATFORM	Establishment of a functioning platform with relevant materials	<ul style="list-style-type: none"> • Broad registration and access of the platform by relevant beneficiaries in Newcomer States
4. DEVELOPMENT OF TRAINING AND REFERENCE MATERIALS	Includes, the publication of Volume III of the Handbook on Nuclear Law	<ul style="list-style-type: none"> • Broad uptake of the materials by relevant beneficiaries in Newcomer States

E. TOTAL ESTIMATED BUDGET AND ALLOCATION OF FUNDS OVER 4 YEAR PERIOD

	2011	2012	2013	2014	TOTAL (US\$)
1. COMPETENCE AWARENESS MISSIONS	80 000	80 000	80 000	80 000	320 000
2. BILATERAL LEGISLATIVE ASSISTANCE	560 000	560 000	560 000	560 000	2 240 000
3. DEVELOPMENT OF ONLINE (E-LEARNING) TRAINING PLATFORM	265 000 ²	-----	-----	-----	265 000
4. DEVELOPMENT OF TRAINING AND REFERENCE MATERIALS	300 000 ³	-----	-----	-----	300 000
Subtotal (per year)	1 205 000	640 000	640 000	640 000	3 125 000⁴
PSC	90 699	48 172	48 172	48 172	235 216
Total	1 295 699	688 172	688 172	688 172	3 360 216

Grand Total: \$3 360 216

² Comprises the following three components: (i) Consultant component: one 2 day meeting for 10 participants (US\$ 50.000); (ii) Drafting exercise component: 3 months (US\$ 65.000); and (iii) IT component (US\$ 150.000).

³ Comprises the following three components: (i) Consultant component: one 2 day meeting for 10 participants (US\$ 50.000); (ii) Drafting exercise: 6 months (US\$ 130.000); and (iii) Printing and translation component (US\$ 120.000).

⁴ Includes, associated costs such as staffing costs needed for the implementation of the Proposed Implementation Activities. As required, including, appointment of a Project Manager and Support Staff and associated activities for the redesign of the IAEA's Legislative Assistance Programme.

Development of Infrastructure for Emergency Preparedness and Response in Member States Starting with a Nuclear Power Programme – Part I (Phase 2)

Objective

Overall objective: to assist Member States embarking on a nuclear power programme to develop the appropriate infrastructure for emergency preparedness and response, including relevant capabilities and arrangements.

Objective in Phase 2 (Part I): (1) to finalize and publish the document with the working title: Emergency Preparedness Considerations for Member States Embarking on a Nuclear Power Programme and based on the document to prepare standard training material, (2) to develop and conduct workshops that will raise awareness among key players and stakeholders at national level of appropriate emergency preparedness and response infrastructure that needs to be in place prior to the commissioning process as a base for strategic planning, and (3) to review the existing national emergency preparedness and response infrastructure identifying in an objective and unbiased manner gaps and areas where improvements are required (initial EPREV missions).

Outcomes of the project

Overall outcome: Member States will have established adequate emergency preparedness and response capabilities and arrangements, including facility, local and national emergency plans, establishment/testing of operational reporting and notification procedures and training and exercising of all members of emergency response organisations.

Outcome of Part I (Phase 2): (1) the document Emergency Preparedness Considerations for Member States Embarking on a Nuclear Power Programme will be published and standard training material will be ready for use, (2) key players and stakeholders in the country will be aware of needed EPR infrastructure as a first step in a strategic planning of building EPR infrastructure, and (3) recommendations to appropriate governmental authorities will be made regarding strategic infrastructure planning, as well as possible gaps and needed improvements will be pointed out.

Description

Overall description

Infrastructure for efficient preparedness for and response to nuclear emergencies is one of the important prerequisites for successful implementation of a national nuclear power programme, so its establishment should be considered from the very beginning of the programme development.

Recently many countries have declared to the IAEA that they are considering developing the use of nuclear power. Hence, extensive efforts are required in order to assist them to develop the appropriate infrastructure for emergency preparedness and response.

The proposed project will cover assistance in establishing emergency preparedness and response capabilities and arrangements, including development of facility, local and national emergency plans, establishment/testing of operational reporting and notification procedures and training and exercising of all members of emergency response organisations.

The implementation of the project will ensure that the Member States embarking on a nuclear power programme will develop the infrastructure for emergency preparedness and response, including relevant capabilities and arrangements, consistent with the IAEA safety standards in this area.

Description for Part I (Phase 2)

Part I (Phase 2) consists of sensitising the national key players in requirements for emergency preparedness and response and preparing them for early strategic planning of EPR capabilities.

Main Participants

Agency: Incident and Emergency Centre; Responsible Officer: Elena Buglova

MS: 10 to 12 countries starting with nuclear power programme

Schedule

Start: September 2011

End: December 2014

Budget

The budget needed for the implementation of Part I (Phase 2) consists of the following:

Activity	Costs [US\$]	Subtotal [US\$]	PSC [US\$]	Total [US\$]
Finalize and publish document	70 000	70 000	5 269	75 269
Develop standardized training material	30 000	30 000	2 258	32 258
Develop awareness workshop	30 000	30 000	2 258	32 258
Conduct awareness workshops	25 000 x 6	150 000	11 290	161 290
Initial EPREV	20 000 x 3	60 000	4 516	64 516
Accidentals	10 000	10 000	753	10 753
Total		350 000	26 344	376 344

It is envisaged that up to 6 countries will receive this support which makes total **350K US\$** for the Part I (Phase 2) of the project. The following breakdown approximately reflects envisaged expenses in this phase.

	2011	2012	2013	2014	Total
	[K US\$]				
<i>consultant</i>	70 000	110 000	20 000	20 000	220 000
<i>travel</i>	10 000	30 000	30 000	30 000	100 000
<i>other</i>	5 000	10 000	10 000	5 000	30 000
Subtotal (per year)	85 000	150 000	60 000	55 000	350 000
PSC	6 398	11 290	4 516	4 149	26 344
Total	91 398	161 290	64 516	59 140	376 344

Grand Total: \$376 344.

Human Resources (HR) Development for new-entrant Member States (MS)

Objective

The project objective is to enable MS to develop the Human Resources they need to be a 'knowledgeable customer' to implement a nuclear power programme by:

1. Developing 'working level' guidance for MS for the staffing of the various organisations, but with the main focus on Operating organisations, consistent with the IAEA NE Series Guide "Managing Human Resources in the field of Nuclear Energy, NG-G-2.1, and NE Series Report "Workforce Planning for new nuclear power programmes", NG-T-3.10.
2. Providing the Workforce Modelling Tool (originally created by Los Alamos Nuclear Laboratories [LANL]), to MS to assist them in effective Workforce Planning.
3. In MS, developing new/validating existing University programmes at BS/MS/PhD level in Nuclear Engineering/Nuclear Technology, using the experience of MS with mature nuclear power programmes promoting, where practicable, University partnerships between donor and recipient states.
4. Creating a model 'virtual' regional training centre (RTC) to support the training of Technician level staff for nuclear power programmes, capable of being replicated in other Regions.
5. Providing appropriate Fellowships, either through the existing IAEA-TC mechanism or directly, to enable MS staff to gain 'hands on' experience of the activities associated with implementing a nuclear power programme.

Outcomes of the project

For each MS participating in the Project:

- They should be able to produce detailed, achievable workforce plans for implementing a nuclear power programme
- They should have a thorough understanding of their national workforce requirements, including the impact on those requirements of any changes in programme strategy
- They should have a framework in place for delivering a competent workforce able to support the initial implementation of a nuclear power programme, including technical school and graduate level education and training programmes of an internationally acceptable standard
- They should have a core team of personnel, spread across the various organisations, who have some practical hands-on experience of various aspects of implementing/managing a nuclear power programme

Description

1. The development, using an external Consultant and input from other external experts, of an NE Series report on forming and staffing the organisations needed to implement a first NPP, identifying the functional responsibilities to be addressed, detailing the various organisational structure options which may be adopted and the key factors influencing the size and shape of the organisation and estimating the resources needed according to the options selected. The main focus of the document will be the operating organisation, where the resource needs are greatest.

Estimate: 1 x Consultant and 3 CS meetings (~ \$\$50K + \$90K)

TOTAL: \$140K

2. The LANL Workforce Modelling tool to be further developed with a 'User friendly' interface and training provided for its use, to enable MS to directly use the model:
 - As a training tool, to help them develop their understanding of the main inputs to the workforce planning process, and the impacts on the workforce of decisions taken regarding these inputs
 - As a workforce modelling tool to enable them to first estimate, and subsequently refine, their national workforce requirements to implement a nuclear power programme

A Consultants' meeting to be held to define requirements of needed further development of model and LANL to carry out model development and provide initial training course and technical support for MS representatives.

Estimate: Initial Consultants meeting \$50K. LANL costs (model development, training materials + 1 year tech. support – estimate \$250-350K) Initial training Course \$60K

3. Develop/review/enhance the curricula for nuclear energy related Graduate programmes in MS and identify any needed facilities (note that laboratories, equipment, etc. – are outside the scope of the proposal). This will be achieved bringing together expertise from experienced MS and newcomer MS, initially on a regional basis to review programmes collectively and identify good practices/sharing opportunities, then individual review with MS (4 proposed initially) and external experts, and finally regional meeting to agree on-going responsibilities and close-out.

*Estimate: Initial/final meetings 2 x \$30K, individual MS meetings (\$20K x 4) \$80K
TOTAL: \$140K + cost of providing identified needed additional material*

4. The concept is for a *virtual* Regional Training Centre, initially for the training of technician staff, but with applicability for Graduate level development. The project would be to develop/adapt a remote learning platform, populated initially with existing/new learning material provided/developed by donor states to enable students to remotely undertake learning/activities related to nuclear power specifics. The objective ultimately is to enable MS, on a Regional basis to maintain and further develop the platform to suit their needs. This element would require an Initial Consultant's meeting, preferably in a MS with suitable facilities in this field, to develop a 'User specification.' Additionally, 'start-up' hardware may have to be provided to participating MSs, as well as the provision/translation of training material as identified within the User Specification. In addition, initial 'technical programme support' would be required from donor countries, as well as 'Train the Trainer' packages to support each MS/Region in developing/enhancing its national personnel to support learning on such a platform.

Estimate: Initial CS meeting \$60K, Hardware/Software \$50K per MS, Training/Support \$100K - \$200K per MS(4?) per year(propose 3 years). TOTAL: Year 1-\$660K, Year 2-\$400K-\$800K, Year 3-\$400K-\$800K

5. It is proposed to provide increased fellowships, preferably through the existing TC process, to 'established' MS (objectives based, each focusing on different areas/topics), in order to create a 'core team' in each newcomer MS (10-20 per MS, initially 4 MS?) with some actual experience in the activities associated with implementing a nuclear power programme including: construction project management, training systems, commissioning, operations (inc. maintenance & outages) and regulatory oversight. This core team would be made up of people already fully trained in nuclear fundamentals, perhaps with existing fossil-plant experience, who would become a key resource in Phase 2, able to provide some training/ technical input to the various involved organisations and ultimately assume roles in the relevant organisations. It is assumed that experienced MS would accept these personnel on only administrative costs, so main costs are related to travel and subsistence for the 'trainees'.

Estimate: (based on a 3-month fellowship) \$15K per student = \$\$150K-\$300K per MS

Plus the equivalent of 1 Consultant to manage overall project of HR Roadmap from Autumn 2011 through to mid-2013.

Main Participants

It is expected that this proposal will be led by Nuclear Power Engineering Section and Integrated Nuclear Infrastructure Group (Dept. of Nuclear Energy) with support from the following IAEA Departments/sections:

Department of Technical Cooperation

Nuclear Knowledge Management Unit (Dept. of Nuclear Energy)

Division of Nuclear Installation Safety (Dept. of Safety & Security)

(Other IAEA Departments/functions, such as Dept. of Safeguards, OLA, may have a lesser involvement)

Schedule

Consultants' meetings June/Nov 2011, May 2012- Document complete Dec 2012

1. Initial Consultants' Mtg Sept 2011, completion of model upgrade Feb 2012; completion of rollout Feb 2013
2. Commence Autumn 2011 – completed mid 2013
3. Commence Autumn 2011, platform available Autumn 2012, project concludes 2014
4. Commence Autumn 2011, Phased through to completion end 2013

Budget

	2011	2012	2013	2014
<i>[Office]</i>				
--consultant	70 000	240 000	160 000	100 000
--travel	220 000	250 000	130 000	100 000
--other	380 000	760 000	760 000	400 000
(LANL)	250 000	100 000		
Subtotal (per year)	920 000	1 350 000	1 050 000	600 000
PSC	69 247	101 613	79 032	45 161
Total	989 247	1 451 613	1 129 032	645 161

Grand total: \$4 215 054

TC footnote a

--travel

--procurement

--consultant

--other

Improving Public Knowledge about Nuclear Power including Waste

Rationale

For countries introducing nuclear power, the IAEA's 'milestones approach'¹ stresses that "strong, continuing government support is necessary through all phases of a nuclear programme. Government support can only be sustained through a positive political atmosphere. A positive, stable political atmosphere requires a reasonable degree of... public involvement [which] is best achieved through an open and honest dialogue between proponents of the nuclear programme (e.g. government, utilities and the owner/operator) and other stakeholders. The principal and most influential stakeholders are societal opinion leaders, e.g. national and local government officials, heads of business and industry, the media and leaders of non-governmental organizations. However, all concerned citizens should be provided with relevant information and have opportunities to participate in the dialogue."

The first two conditions for Milestone 1 in the area of stakeholder involvement are "to:

- conduct surveys or public opinion polls to determine the degree of knowledge and receptiveness to the local use of nuclear power [and]
- develop public information tools that respond to the surveys and clearly explain the reasons for the government interest in and the societal benefit... resulting from the use of nuclear power."

While the scope of this project is public knowledge and information on all aspects of nuclear power, special attention will be given to the final disposal of spent fuel and high level radioactive waste for three reasons.

- First, a number of the Member States that have expressed interest in exploring or introducing nuclear power have specifically emphasized the importance of addressing perceived public concerns about nuclear waste.
- Second, for established nuclear power countries, much of the rationale above for newcomers applies equally to countries that have nuclear power but no agreed approved sites for the final disposal of spent fuel and high level radioactive waste.
- Third, in addressing the 54th IAEA General Conference (2010) the Director General listed, as one of his four priorities in the nuclear energy field, expanding the Agency's activities in sharing best practices and disseminating information on waste management and disposal.

Objective

The objective is that the Member States participating in this project make progress in achieving infrastructure milestones associated with public knowledge and information not only by meeting the first two conditions cited above for Milestone 1 in the area of stakeholder involvement, but also by generating techniques, materials, trained personnel, and lessons learned about surveys and information campaigns that are of lasting benefit to both the participating Member States and other Member States introducing nuclear power.

¹ IAEA, *Milestones in the Development of a National Infrastructure for Nuclear Power*, IAEA Nuclear Energy Series NG-G-3.1, 2007.

Outcomes

- Better information about public knowledge and opinions related to nuclear power and nuclear waste in participating countries.
- Improved public knowledge about nuclear power and waste in participating countries.
- Improved survey and public information capabilities in these countries.
- A package of materials, conclusions and lessons learned that could be used by other Members States.

Description

The project comprises two major activities.

- Public surveys followed by customized information campaigns conducted with partners in interested Member States.
- A summer school for primary and secondary teachers who teach courses related to science, energy choices, natural resources and the environment.

Public surveys and information campaigns

To improve public knowledge in a country, one first needs to know (1) the state of knowledge within the country and (2) what information is important to people. For each country, the design and execution of the surveys will be done largely by a partner organization in the country that has experience with such surveys. However, the project will also share information across countries and engage international experts outside the selected countries.

An initial consultancy will be convened to identify potential countries and partner organizations and to assemble potentially applicable insights on surveys and public information campaigns. The consultancy will include experts on opinion surveys and public information, particularly on energy issues and nuclear power and particularly for countries launching nuclear power programmes. It will also include experts from other UN organizations with experience in surveys and public information campaigns in developing countries.

Subsequent steps will be as follows.

- Survey design and preparation: Partner organizations will be recruited, any necessary arrangements with their governments will be negotiated, and contracts will be arranged for the design and execution of the surveys, for any required training of people needed to execute the surveys and for the analyses of the survey results.
- Surveys: The surveys will be conducted and the results analysed. These steps will be mainly the responsibility of the partner organizations as contracted in the different countries.
- Survey Analysis: The initial analyses of survey results will be reviewed by a second consultancy and the final analyses shared among all partner organizations.
- Information campaigns: Working with the national partner organizations, contracts will be arranged for the design and execution of public information campaigns based on the survey results, including costs for personnel, printing, production, equipment, travel (if the best way to reach target audiences is through traveling speakers and demonstrations) and meetings (for additional or adapted IAEA public information sessions).
- Follow-up surveys: Working with the national partner organizations, contracts will be arranged for the design and execution of follow-up surveys to measure the impacts of the

public information campaigns. The partner organizations will have the main responsibility for conducting the surveys and analysing the results as contracted in the different countries.

- Final package: The final analyses of the follow-up surveys will be part of a final package of materials, conclusions and lessons learned that could be used by other Members States.

Summer school for teachers

Even prior to conducting the project's surveys, many at the IAEA and in Member States have concluded that an important source of information for students and for those they interact with is school teachers. Teachers are, by definition, authorities in the eyes of their students, and teachers of courses related to science, energy choices, natural resources and the environment are an influential source of information on these aspects of nuclear power. The Agency will contract for the organization of this summer school, which will provide information and materials on nuclear power, including waste, that can be used in curricula and specific lessons. It will also seek to increase the inclination of teachers to take advantage of other resources available through the Agency and to identify additional information and material that the Agency might provide that would be useful to teachers. Preparations for the summer school will take place in 2013 for sessions to be held in 2014 and 2015.

Schedule and Budget

The proposed budget assumes five partner countries and no cost sharing for in-country contracts by the partner countries. If 50% cost sharing is assumed (i.e. \$235 000 contributed by each participating country to in-country costs), the number of countries could be increased from 5 to 10. The total proposed 4-year budget is \$4 114 913.

	2013	2014	2015	2016
<i>Public surveys and information campaigns</i>				
Initial planning consultancy	25 000			
Travel to establish partners	24 000			
Design survey (5 countries)	350 000			
Conduct and analyse surveys (5 countries)		375 000		
Consultancy to review results and coordinate subsequent steps		25 000		
Design information campaigns and material (5 countries)		375 000		
Conduct information campaigns (5 countries)			500 000	250 000
IAEA Public Information Seminars (3 x \$50 000)			150 000	150 000
Design follow-up evaluation surveys (5 countries)			150 000	
Conduct follow-up evaluation surveys (5 countries)				350 000

<i>Summer school for students</i>				
Preparation (material and course design)		75 000		
Support for participants from developing countries			100 000	100 000
Support for non-Agency lecturers (experts in primary/secondary instruction and media)			50 000	50 000
<i>Management (25% of other direct costs)</i>	193 688	193 688	193 688	193 688
<i>Subtotal (per year)</i>	528 688	1 043 688	1 143 688	1 093 688
<i>PSC (7%)</i>	41 488	73 058	80 058	76 558
<i>Total</i>	634 176	1 116 746	1 223 746	1 170 246

Grand Total: \$4 114 913

Strengthening the Capacities of Future Owner-Operator Organizations to Become Intelligent Customers for the first Nuclear Power Plant

Background:

Once a Member State has decided to launch a nuclear power programme and reached Milestone 1 in the approach described in the IAEA Nuclear Energy Series Guide NG-G-3.1, *Milestones in the Development of a National Nuclear Infrastructure for Nuclear Power*, the future owner-operator of the first nuclear power plant will likely be established based on one of three possibilities: 1) an atomic energy commission or nuclear research facility will become the future owner, 2) an existing fossil utility will take on the nuclear project, or 3) a new entity will be established without nuclear or utility experience. In any case, this organization will have the responsibility of leading the development of the nuclear power plant project.

Management, technology and safety will be key areas of importance as the future owner-operator builds its organization and prepares the capabilities needed to carry out the bidding process. This proposal focuses on developing guidance materials and delivering services to build capabilities in management, feasibility studies, technology assessment, design reviews and safety assessment.

While it is generally understood that the future owner-operator will receive support from the vendor consortium after the contract is signed, these are areas where pre-contract support is needed while the organization is being developed. Even though nuclear material will not be introduced for several years from this stage, the organizational culture that is established during the planning will influence the safety culture around future operations. The organization needs to develop sufficient capacity to understand the technology options available, and to begin building capacity for safety assessment and design reviews.

Objective: Support future owner-operator to be prepared for the bidding process and to manage construction as a “knowledgeable customer”.

Activities:

The projects described in this proposal address specific areas that are needed for future O/O to become intelligent customers. The projects build the capacities for:

- A. Developing the organizations, processes, and procedures necessary for managing the NPP project.
- B. Performing feasibility studies for NPP projects.
- C. Performing assessments of available technology options for nuclear power systems according to national criteria.
- D. Developing understanding for performance of design reviews that will be necessary to install, operate, and maintain nuclear power systems.
- E. Performing the safety assessments required for safe operation and licensing of nuclear power systems.

A. Developing the organizations, processes, and procedures necessary for managing the overall NPP project

Background

Planning and implementing a nuclear power project requires good project management capabilities in the planning phase of the project. Getting the management right is an important aspect to fostering the development of a good safety culture. For the most part, managers in new owner-operator organizations are not expected to have experience managing nuclear power projects. Often the manager may not have someone with whom s/he can confer regarding strategic decisions, resolution of issues, and general practices. An on-going mentoring relationship with an experienced project manager will greatly facilitate managerial development, and because the manager sits at the top, organizational development as well. This project will support the development of appropriate management systems, project management capabilities and provide on-site mentoring.

Objective

This project will support primarily the future owner-operator organization to develop and strengthen its project management capabilities, establish the management systems appropriate to nuclear power to become a 'knowledgeable customer'.

Outcomes of the project

The project is will support future owner/operators to manage the project activities related to building their nuclear infrastructure focused on the transition from Milestone 1 (decision-making and establishment of the organization) to Milestone 2 (ready to launch the bidding process). This includes internal coordination between organizations within the member state as well as becoming an intelligent customer capable of interfacing with external organizations such as vendors.

Description

The project will enhance the knowledge, skills and capabilities to manage complex projects and to establish, implement and improve the management system necessary to build the nuclear infrastructure in the Member State through:

1. Direct Assistance: Providing coaching services and direct expert assistance in (i) the management of a new nuclear power plant project or nuclear infrastructure project, and (ii) the establishment, implementation, assessment and continual improvement of management systems for nuclear facilities and activities. To achieve this, the project will engage and provide a consultant or an expert (at the P5 level) for each target MS, (NOTE: this can be performed under TC projects). Three countries that are in Phase 2 will be selected for a pilot project and the expert(s) will visit the MS on a periodic basis and also be available for consultation remotely through the means of telecommunications technology throughout the period of the engagement.

Estimate: 3 Consultants x ~ \$110K each (\$330k per year for two years)

TOTAL: \$660K

2. Documents and Networks: Sharing of information and experience on common challenges and good practices to resolve them, through:

- The development of NE series document to provide guidance and good practices on how to overcome the challenges in project management and implementing management systems to support infrastructure development,
- Workshops, expert missions and scientific visits to provide first-hand experiences in project management and management system implementation,
- Assisting and supporting the development of a network of experts in project management and management systems to promote on-going sharing of information and the collection of case studies on, and instructive examples of, nuclear infrastructure project management and management system development.

Estimate: 1 document: ~ \$30K to complete; 1 workshop or meeting x \$50K each year for 3 years ~ \$150K; networking and case studies (1 consultancy (CM) ~ \$30K, 1 technical meeting (TM) ~ \$30K, and 1 consultant ~ \$20K) ~ \$80K
TOTAL: \$260K

Main Participants

Three Member States with significant progress in Phase 2. The counterparts will be from organisations involved in their respective national nuclear infrastructure building programmes. The main IAEA participants will be from INIG, NPES, NSNI, TC and TCAP.

Schedule*

The project will start in 2011 and terminate in 2014. The activities, for each MS, will consist of:

Engaging consultants: 2011

Conducting a detailed topical needs analysis: October - November 2011

Developing and agreeing a programme of activities for each MS: October 2011

Executing the agreed programme: November 2011 – December 2014

(*NOTE: A detailed schedule of activities will be developed should the concept and preliminary proposal be found acceptable)

Project A - Management

Budget (USD\$)				
	2011	2012	2013	2014
consultants	150 000	70 000	310 000	50 000
documents		30 000		
network	20 000	20 000	70 000	
workshops/meetings		50 000	100 000	50 000
other				
Total	170 000	170 000	480 000	100 000
7% PSC Costs	11900	11900	33600	7 000
Total with PSC cost	1819000	1819000	513600	107000
Total Project A	984 400			

B. Performing Feasibility Studies for Nuclear Power Plant Introduction

Background

As part of the planning phase, a feasibility study will be taking into consideration potential site locations, industrial infrastructure, human resources, competence, cost impact, capability to finance, and its social, economic and environmental conditions. A comprehensive feasibility study is a complex undertaking that will be used to justify the project and secure financing. Understanding the elements of and performing a well-prepared feasibility study is important because the level of investment funds required may in some cases considerably affect government budgets and priorities, as well as energy market regulations.

Objective

The project objective is to enable MS to develop the capacity to perform the needed feasibility studies to provide all the technical, economical, financial, regulatory, social, environmental aspects of a nuclear power plant project.

Outcomes of the project

- A feasibility study guidance document will be developed that will cover both the preparation work as well as the scope of the feasibility report itself.
- Strengthened capabilities to prepare a detailed feasibility study in the future owner-operator organization through expert missions, workshops and reviews

Activities

The development, using an external consultant and input from external experts, of an NE Series report on the process for how to conduct a feasibility study as well as the content required.

Main Participants

- Within the Agency : NPES, PESS and INIG
- MS: New comer countries and considering expanding Nuclear programme.

Schedule

Items	Time	Description
First CS meeting	2011	To prepare and decide the scope and draft report
Second CS meeting	1Q 2012	To prepare the extended outline
A technical meeting	3Q 2012	To make a consensus on the extended outline and get the country reports
Final CS meeting	1Q 2013	To finalize a new NE series report on Feasibility study
Regional training courses – 3 times	2Q 2013 ~ 2Q 2014	To disseminate approaches and teach the scope of FS for Africa, Pacific Asia and Latin America region

Project B - Feasibility Studies

Budget (USD\$)				
	2011	2012	2013	2014
Consultants	50 000	50 000	25 000	
documents				
workshops/meetings	125 000	75 000	25 000	25 000
other				
Total	175 000	125 000	50 000	25 000
7% PSC Costs	12250	8750	3500	1750
Total with PSC Costs	187250	133750	53500	26750
Total Project B	401250			

C. Assessing Nuclear Power Technologies for Near Term Deployment Options**Background:**

Member States embarking on nuclear power for electricity generation will need to assess technologies for the selection of nuclear power plant (NPP) options to determine the most suitable designs. In order to do this, Member States will need a detailed understanding of the near term NPP technologies available to meet the needs of the country.

The Agency is currently preparing a guidance document to describe the process of performing a technology assessment for NPP option selection. Technology Assessment and Selection is a structured evaluation and decision-making process that enables a Member State to compare and contrast complex technology options against the backdrop of their energy programme development objectives. Several of the elements of infrastructure development are key input to this process. However, the majority input derives from the applicable technology option's design, licensing, safety, operation, performance, and economics evaluations. These will be performed by the Member States since the Agency's guidance will be technology neutral and this will not favor one technology over another.

Scope

This project will develop and deliver training and tools to build Member State capacity related to the assessing near-term nuclear power plant technology options. A firm understanding of the NPP technology options will enable Member States to perform the assessment and selection and prepare them as intelligent customers to begin the NPP procurement process.

Objectives

1. The project will provide seminars to foster better understanding of the fundamental aspects of NPP design to support informed decision making regarding available NPP designs and applications. It will also support the future owner-organization and the NEPIO in development of specific national needs and requirements.
2. Develop capacity through education and training on technology assessment and effective use of Agency guidance documents and simulation tools. Simulation exercises and focused training tools will be developed to build greater understanding of the available technology options and analysis of technical issues that affect them. The simulator

product available at the Agency in the Advanced Reactor Simulator (ARS), contains detailed simulation models of LWR and HWR design concepts. Training workshops will be conducted in cooperation/collaboration with in-house department/organizations and implemented through TC.

3. An integral part of the project is the development/enhancement of currently available IAEA software/simulator programs and other supporting documentation.

Project Outputs:

- 1 Annual Workshop for NPP technology options
- 1 Annual Training course on NPP technology design and operation focused on developing experts using training simulators available through the IAEA
- 1 Annual Workshop on NPP technology training to support technology assessment and selection to be held as a Regional workshop. Workshops conducted under regional TC Projects may be offered as requested.
- Facilitating international collaboration on projects aimed at capacity building on near-term NPP technology options
- Status reports on currently available NPP technologies for near-term deployment including the data pertinent to Technology Assessment and Selection
- Updated versions of tools and related documentation, adapted specially to support this NPP technology training program, including the Advanced Reactor Simulator (ARS) and the Advanced Reactor Information Systems (ARIS). NOTE: the ARS is focused on reactor technology that is currently available.

Project Outcomes:

- Increased understanding of Member States regarding technology options available for near term deployment
- Strengthened capacity for Member States to compare technology options in the decision-making process in order to complete detailed feasibility studies and developing bid specifications.

Timetable:

- 2 Consultancies (Early 2012) in support of Workshop preparations
- Workshops: Three in 2012 beginning 6 months after approval

Annual Cost breakdown:

Consultancies (2):	\$20 K
(Preparation/Training)	

Workshops (3):

-Non-staff travel	\$360K (financing participants from developing countries i.e. \$120 K per workshop)
-Staff travel	\$20K (for Regional Workshop)
Procurement/Equipment	\$100K
Computer Hardware	
Software Development	

Licenses related to ARS

Project C -Technology Assessment

Budget (USD\$)				
	2011	2012	2013	2014
Consultants	50 000	50 000		
documents				
workshops/meetings	200 000	200 000		
other				
Total	250 000	250 000	0	0
7% PSC costs	17500	17500		
Total with PSC Costs	267500	267500		
Total Project C	535 000			

D. Capacities to Perform Design Reviews**Background**

As Generation III and Generation III⁺ reactors are being designed, certified, licensed, constructed and deployed, an increasing number of countries are planning to expand or to enter the nuclear power production field and prepare their domestic infrastructures.

Newcomers, as well as expanding countries, will require a mature design support team as they deploy their new nuclear power plants. Initially there will be a need to complete a thorough review of the selected NPP technology for the purpose of ensuring that the design meets the legal, environmental, safety, contractual and technical requirements and that any necessary design changes and site specific adaptations are identified and defined (NOTE: See related NE proposal on Technology Assessment). Before the main NPP contracts are signed, additional contracts must be signed with various equipment manufacturers for long lead items and the Owner/Operator (O/O) must establish a design interface to handle these relationships. This is an area where architectural engineering company will have to take the technical lead on behalf of the O/O to review design, equipment engineering and procurement.

At the same time, the O/O becomes engaged with aspects of the detail engineering scope including the design of the buildings and structures on site, all design changes and the latest vendor information as it becomes available. At this time any additional design gaps are filled in order to bring the design to its site specific nominal configuration. Gaps could be on-line wiring, shop drawings, field engineering scope, lighting, sanitary, potable water etc.

Objective

This proposal will develop a document to provide guidelines for developing the necessary design support capabilities and O/O will need for interfacing with the regulator, and for development of the site specific detail engineering and customization work. All this must maintain a focus on the applicable safety standards, safety guides, codes and regulatory

requirements and best design engineering practices to newcomer or expanding countries (NOTE: See related project proposal for Safety Assessments).

Although some work scope may in part be contracted out by the O/O to a third party, as the future licensee, the O/O will always hold the overall project responsibility and often is the single point of contact interfacing directly with the regulator, even on design packages executed by others. This project will include training that will help future O/Os with the preparation and the construction phase and with the avoidance of costly errors.

Outcomes of the project

The report will provide the design review and management process guidelines that will cover all aspects of the design support function of a nuclear power project during its implementation phases. This includes the pre-construction activities such as the planning, design and set up of the infrastructure, the site preparation, the provision of utilities and services needed to support construction, the construction and commissioning phases themselves and the management of licensing activities. Nuclear Safety Department will be consulted in the process of developing the implementation programme. The following outcomes are expected from project;

- **Capabilities on the overall design review process**

The O/O's review of the overall design must ensure that the technology is fully compatible with the laws and regulations of the country and of the local jurisdiction, with the safety, licensing and environmental requirements, with the project goals, with all site specific requirements, interface requirements and with the social conditions of the area surrounding the site where the NPP is to be deployed.

- **Capabilities on design changes and site specific customizations**

Design changes and site specific customizations of structures, systems and components are a normal part of the construction and operation of a NPP. During this phase detail design is carried out, vendor information is incorporated, the site layout is finalized and the design of the buildings and structures on site is detailed.

- **Capabilities on quality management**

In addition to legal and technical requirements there are Quality Requirements driven by a quality control program, which will also affect all related design functions. Quality requirements are usually expressed in a set of procedures regulating project and design documentation.

- **Capabilities on document and records management system**

The document and records management system should be capable of issuing releases for construction packages, error free distribution lists, drawings lists, material lists. In parallel a material management system should be available to manage a stock code numbering system, material inventory, requests and supplies, the movement of components and bulk materials as well as issue bills of material, and procurement requests.

Description

The development of an NE Series report on design review capabilities and process to implement a first NPP will be needed to use an external Consultant and input from external experts

Main Participants

- Within the Agency: NPES, NPTDS, INIG and NSNI
- MS: New comer countries and considering expanding Nuclear programme.

Schedule

Items	Time	Description
First CS meeting	2011	To prepare and decide the scope and draft report
Second CS meeting	1Q 2012	To prepare the extended outline
A technical meeting	3Q 2012	To make a consensus on the extended outline and get the country reports
Final CS meeting	1 Q 2013	To finalize a new NE series report on Design review process
Regional training courses – 3 times	2Q 2013 ~ 2Q 2014	To disseminate approaches and teach the scope of design review process for interregional and Pacific Asia region.

Project D - Design Reviews

Budget (USD\$)				
	2011	2012	2013	2014
Consultants	50 000	50 000	50 000	
documents				
workshops/meetings		125 000	75 000	25 000
other				
Total	50 000	175 000	125 000	25 000
7% PSC	3500	12250	8750	1750
Total with PSC	53500	187250	133750	26750
Total Project D	401250			

E. Enhancing Safety Assessment Competency in Embarking Countries through On-The-Job Mentoring

Objective

Member States that are actively preparing the launch of a nuclear power programme are facing the challenging task of developing the necessary safety assessment competency and capacity to ensure that key safety infrastructure is in place when needed. An essential element of this infrastructure is in particular the capacity for safety assessment which is essential for the Operator, who has primary responsibility for safety, and for the Regulator in reviewing the safety case during the licensing process. Thus, planning and timely

establishment of adequate national capabilities for safety and more specifically for safety assessment is crucial for independent decision making on the development of a nuclear programme. Safety assessment capabilities affect universities, research institutes, nuclear operators and regulators and technical support organisations. The necessary technical and human resources in all those institutions or organisations need to be developed or enhanced. Safety assessment is key for the demonstration of safety and the NPP licensing and commissioning process. Therefore the development of national safety assessment knowledge and capabilities needs to be started as soon as a serious decision for developing a nuclear programme is taken.

The proposed project will support the development of safety assessment capacity and competency in Member States through mentoring tailored to their needs, through knowledge-sharing assignments and exchange of expertise utilizing the framework and advisory functions of the Global Nuclear Safety Assessment Network (GSAN). This recently established IAEA network, sponsored by the government of Norway, facilitates cooperation among experts worldwide for collaboration on safety assessment methods. This PUI project would thereby leverage funding from the Norwegian source and extend its scope for increased impact.

Outcomes of the project

It is expected that the outcome of the project would be enhanced capacity for independent, well-informed review of safety cases presented by vendors, equipment suppliers and operators through the successful transfer of good practices in the application of safety assessment methods. Experienced safety assessment experts from well-established nuclear power programmes would be placed for 2-3 month periods to assist newly formed teams of local safety assessment professionals to increase the potential of traditional projects in the follow ways:

- Knowledge transfer to newcomer country teams in various fields of safety assessment (SA) through the mentoring process;
- On-the-job confidence building and hands-on experience with the support of mentors for local safety assessment experts in evaluation of the Safety Analysis Report (SAR), review of analysis, interpreting results, and performance of limited audit analyses.
- Support during challenging stages of the newly launched power programme, e.g. bid evaluation from the safety point of view.
- Exposure of experts from all participating countries to international experience and knowledge in the area of SA, through joint activities including SA networks, planning and conduct of international exercises, discussion of good practices in SA methodology, and use of SA tools.

Description

The project is a knowledge sharing initiative focused on newcomer safety assessment professionals. It is leveraged on the Global Safety Assessment Network (GSAN) Programme recently established at IAEA and sponsored by Norway that promotes cooperation among experts worldwide on harmonization of safety assessment methods through participation in safety assessment projects, international exercises, and information sharing on common problems.

Mentors – Helping to expanding opportunities for hands-on experience in developing and managing nuclear power programs

Safety Assessment Mentors will be selected from countries with established nuclear power generation programmes and placed in selected newcomer countries to support increased

knowledge and awareness of safety assessment skills and techniques, providing sustained in-country guidance to newcomer country SA specialists during 2-3 month periods or more flexibly.

Three to four recipients would be selected as pilot countries from a group of newcomers with serious and sustained plans to build nuclear power facilities in the next 10-20 years. Those being considered could include but are not limited to Vietnam, Jordan, Belarus, Turkey, United Arab Emirates, and Poland. These activities would be carried out with both owner-operator and regulatory staff, with a senior member of one of these organizations acting as host and programme coordinator for the selected country.

Safety Assessment Mentors will be placed in a given country to support competency building efforts of the newcomer country in such areas as:

- application of advanced safety assessment tools;
- evaluation of safety analysis reports (SAR);
- setting up & maintaining GSAN activities in newcomer countries;
- on site conduct of joint international exercises through GSAN;
- coordination/delivery of SA training workshops;
- training in-house trainers for support in domestic safety assessment training;
- evaluation of SA competency progress;
 - reporting on country capacity building efforts;
 - participation in regional/international meetings for exchange of knowledge and experience among newcomer countries.

Technical Programme Coordinator

A US cost-free expert (CFE) will be placed at IAEA HQs to act as Technical Coordinator of this initiative and supply the necessary management, communications and technical support needed to guide the project to a successful conclusion. The CFE will also be concerned with matching technical needs, training approaches, coordination with IAEA Member States, reporting and feedback mechanisms, and other important tasks which will ensure a successful project. IAEA staff will assist in developing and monitoring technical training programmes using the IAEA Safety Assessment Education and Training Programme (SAET) curriculum to facilitate the work of the Safety Assessment Mentors.

It is understood that the placement of Safety Assessment Mentors would be on an “as needed” basis and would depend upon availability. Receiving countries that have needs in different safety assessment areas would request assistance through the coordinating CFE. It is also understood that SA Mentors would be open to providing support to different developing safety assessment teams in a given country, i.e. operators, regulators and TSOs.

The Cost Free Expert would actively collaborate with the TC programme on implementation of project activities, and could identify additional areas for training beyond mentoring that could be the subject of subsequent assistance.

Main Participants

- Safety assessment professionals at Operator, TSO, and Regulatory Bodies in identified Member States participating in this initiative, requesting mentoring and training in performance of safety assessments.
- Technical Cooperation Coordinators and staff, TC Programme, IAEA
- Section Head, Safety Assessment Section, Division of Nuclear Installation Safety, NSNI, IAEA
- Technical Officer, Safety Assessment Section, Division of Nuclear Installation Safety, NSNI, IAEA

- US Cost Free Expert/Technical Coordinator, Safety Assessment Section, Division of Nuclear Installation Safety, NSNI, IAEA -

Schedule

September - December 2011

Programme planning and arrival of the US CFE to launch coordination activities. Identification of technical needs of Member States and submission of MS requests to the Coordinator. Joint agreements for placements of Experts as Safety Assessment Mentors prepared and signed. Development of TORs for Safety Assessment Mentors. Programme Report delivered.

January 2012 – June 2012

Subsequent identification/selection of Safety Assessment Mentors for placements in receiving countries. Programme Report delivered.

July 2012 – August 2012

Safety Assessment Mentors begin their assignments. Initial coordination and training meetings at IAEA HQs Vienna, and subsequent placement in countries.

September – December 2012

Programme monitoring and support provided by US CFE. Progress reports from Safety Assessment Mentors and receiving countries submitted. Programme Report delivered in December 2012.

Jan – April 2012

First group of Safety Assessment Mentors complete their tours and visit IAEA for de-briefing and feedback sessions.

Receiving countries report on progress made during the tours.

May 2012 – July 2012

Second group of Safety Assessment Mentors take up assignments. Initial coordination and training meetings with US experts at IAEA HQs Vienna, and subsequent placement in countries. Programme Report delivered in June-July.

August – December 2012

Programme monitoring and support provided by US CFE. Progress reports from Safety Assessment Mentors and receiving countries submitted. Programme Report delivered in December.

January – March 2013

Second group of Safety Assessment Mentors complete their tours and visit IAEA for de-briefing and feedback sessions.

Receiving countries report on progress made during the tours.

April – June 2013

Third group of Safety Assessment Mentors take up assignments. Initial coordination and training meetings with Safety Assessment Mentors at IAEA HQs Vienna, and subsequent placement in countries. Programme Report delivered in June-July.

July – December 2013

Programme monitoring and support provided by US CFE. Progress reports from Safety Assessment Mentors and receiving countries submitted. Programme Report delivered in December.

January – March 2014

Third group of Safety Assessment Mentors complete their tours and visit IAEA for de-briefing and feedback sessions.

Receiving countries report on progress made during the tours.

April – June 2014

Compilation of all programme inputs. final reporting and closure of project.

Note : Missions to recipient countries by IAEA staff will be conducted periodically to check on status and progress. Annual meetings of Programme Teams from IAEA and recipient countries foreseen.

Project E-Safety Assessment

Budget (USD\$)				
Year	2011	2012	2013	2014
<i>[Office]</i>				
<i>Consultant – US CFE (P.5)</i>		150 000	150 000	
<i>Travel - (CFE + IAEA staff)</i>	25 000	50 000	50 000	25 000
<i>Coordination and training meetings</i>				
<i>Development of network and educational platforms</i>	10 000	40 000	40 000	10 000
<i>Fees Mentors</i>	40 000	50 000	50 000	30 000
<i>DSA & Travel Mentors</i>	70 000	100 000	100 000	30 000
Total	145 000	390 000	390 000	95 000
7% PSC	10150	27300	27300	6650
Total with PSC	155150	417300	417300	101650
Total Project E	1091400			

Note: Salaries of Safety Assessment Mentors could be assumed by donor countries on a secondment basis. Travel and living expenses would be covered by the project.

Summary Budget for Projects A - E

<i>Budget (USD\$)</i>					
	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>Totals</i>
Project A (Mgnt)	170 000	170 000	480 000	100 000	920 000
Project B(FS)	175000	125 000	50 000	25000	375000
Project C (Tech Assess)	250 000	250 000	0	0	500 000
Project D(Design Review)	50000	175 000	125 000	25 000	375000
Project E (Safety Assess)	<u>145 000</u>	<u>390 000</u>	<u>390 000</u>	<u>95 000</u>	<u>1 020 000</u>
					3 190 000
Subtotal	790 000	1 110 000	1 045 000	245 000	<i>3 190 000</i>
PSC (7%)	55300	77700	73150	17150	
<i>Total</i>	845300	1187700	1118150	262150	
<i>Grand total</i>	<i>3 413 300</i>				

Small and Medium Sized Reactor Development and Deployment for Developing Countries

Rationale

Many developing countries have small electricity grids and would like to deploy small and medium sized reactors (SMRs) to address their electricity needs. There are several SMR designs that are currently available and have many years of operating experience. Additional SMRs are at different stages of development, design and regulatory approval. In the past the Agency has provided information about different SMR technologies and their development status. Developing countries need support in assessing both the currently available SMR options and those being developed for near term and longer term deployment. Selection of any reactor for deployment requires an assessment of the grid, the regulatory status, the economics, the design's constructability, reliability, operability and maintainability, non-electric applications and several issues related to the institutional and infrastructure situation in a country. Substantial experience exists for assessing and evaluating these issues for reactors of all sizes. More emphasis needs to be given to developing additional tools and guidance for issues unique to SMRs. Additionally, there is need for more interactions between the developers of new designs (generally in the developed world) and the countries considering SMR deployment

Objectives of the Project

The project will enable developing countries with small electricity grids to assess both the currently available SMR designs and those SMRs under development. The project will consist of two parts. The first part will develop an SMR specific evaluation toolkit and the second part will disseminate knowledge about SMRs and experience through training workshops covering the issues that have to be considered and resolved for successful implementation of SMRs in developing countries. Development of the SMR technology assessment toolkit would rely on work done for other reactor types but would address issues specific to SMRs. The toolkit would address lessons learnt from the current and past deployment of SMRs globally e.g. economics, construction (modular versus local), financing, operability and maintainability. It will also consider institutional innovations that can facilitate the introduction of SMRs.

Approach and method

Extra-budgetary (EB) funds will be used to supplement existing regular budget activities in Project 1.1.5.5 related to common technologies and issues for SMRs. The project will build on the results of Subprogramme 1.1.4 and other projects in Subprogramme 1.1.5. In particular, EB funds will be used for

- consultancy meetings to develop the SMR assessment toolkit and to document the toolkit as an IAEA Nuclear Energy Series report, and
- workshops for the dissemination of the toolkit and training for Member States.

Consultancy meetings and one general workshop are planned to develop the toolkit. The cost would be \$175 000 to be funded from EB funds. The training workshops would cost an additional \$100 000.

Outcomes:

Comprehensive guidance to support developing countries considering or embarking on nuclear power with SMR options.

Cost projection: \$275 000

- 2011: Consultants' meetings and contracts for the development of the toolkit: \$100 000
- 2012: Technical meeting(s) for evaluating and validating the toolkit's performance: \$75 000
- 2013: Training workshop for Member States using the toolkit: \$100 000

Duration of the project: 3 years

	2011	2012	2013
Consultants	100 000		
Technical Meetings		75 000	
Training Workshop			100 000
Subtotal (per year)	100 000	75 000	100 000
PSC	7 527	5 645	7 527
Total	107 527	80 645	107 527

Grand Total: \$295 699