Strategic Approach for the Promotion of an Active Participation in the IAEA Programs in the Fields of NPP Operating Performance and Life Cycle Management

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1. Introduction

Among the cooperation programs with the International Atomic Energy Agency (IAEA), the Coordinated Research Program (CRP) has been implemented with the aim of solving many problems facing the Member States by integrating various different levels of each country's technical capability into the areas which the Agency further needs technology development. The current nuclear R&D trend over the world has been reflected well in implementing the CRP and the Member States have greatly benefited from this program by solving the urgent problems facing them with the launching of coordinated research programs.

The purpose of this paper is to present the general features of the current IAEA programs and their future prospects in the fields of nuclear power, thus responding to a need to achieve a consolidated understanding of the Agency's programs for an effective implementation of the respective national R&D projects in Korea. In addition, the benefits from a participation in the IAEA programs have been analyzed and their importance has been emphasized. A strategy for the promotion of an active participation in the program and its efficient implementation has also been developed.

2. IAEA Program related to NPP Operating Performance and Life Cycle Management

The main idea of the IAEA program related to NPP operating performance and life cycle management (LCM) is to enhance a NPPs competitiveness and to obtain the optimal plant service life, including a decommissioning, through an elevated level of Member State capabilities for utilizing the already proven engineering and management practices developed and transferred by the Agency.

The activities for 2004-2005 build upon the progress achieved in the previous biennium and focuses on the available management strategies for attaining continuous process improvements in operating NPPs for an advanced performance and an integrated approach to NPP LCM, including licence renewals and the optimal application of the scarce resources. Guidance documents will be centred on: effective management of I&C modernization projects, impact of modern technology on I&C systems, steam generator replacements, applications to reactor pressure vessel integrity assessment of master curve testing; decisions on power uprates and the economics of decommissioning. Databases such as the Power Reactor Information System (PRIS), Country Nuclear Power Profiles, Nuclear Economic Performance Information System (NEPIS), and NPP Life Management, will be further enhanced and preserved to support these activities in the Member States. New databases will be constructed for an electronic catalogue of the training services within the nuclear industry and an international database on plant life extension costs will be developed.

The regular budget for the program amount to $1,526,000 in 2004, taking into account an increase in the budget of $99,000, or 6.9% when compared with 2003, with a decrease of $36,000 in 2005 from 2004. The extra investment resulted from a strengthening of the activities in the arena of a continuous process improvement for the NPPs' operating performance. Three projects are being implemented under the framework of the IAEA program in the field of the NPP operating performance and LCM, i.e. i) Continuous Process Improvement of NPP Operating Performance, ii) Integrated NPP LCM including Decommissioning, and iii) Databases to support the NPP Performance and LCM and Improving the Human Performance, Quality and Technical Infrastructure.

The main outcome of the first project "Continuous Process Improvement of the NPP Operating Performance" will be: guidance documents on the management of a continuous process on improvements in NPPs, I&C software modernization; on-line calibration technology for longer instrument calibration intervals; and updated guidance on NPP outage management to reflect the new challenges. The following six technical cooperation projects are also being implemented with an extra-budgetary contribution fund: i) Prototype Development of Reactor Protection System and Implementation for High Pressure and Temperature Test Loop (ARG/4/089), ii) Systematic Approach to Training for Angra NPPs (BRA/4/051), iii) Strengthening Owner's Capabilities for Commissioning and Start-up of Bushehr NPP (IRA/4/035), iv) Modernization of the Preventive Maintenance Programme of the Laguna Verde NPP (MEX/4/052), v) Loose Part Monitoring for NPP Safety (PAK/4/043), and vi) Optimization of NPP Performance and Service Life (RER/4/025).

The expected outputs of the second project "Integrated NPP LCM including Decommissioning"

will be: guidance documents on specific aspects of the reactor pressure vessel (RPV) integrity assessment, verification of the WWER steam generator tube integrity, state-of-the-art methodologies for monitoring the condition of NPP components, strategies for an effective predictive maintenance, and the economics of a plant life extension. The following ten technical cooperation projects are also being implemented with an extra-budgetary contribution fund: i) Strengthening of In-service Inspection through Modern Non-destructive Testing Methods ARM4004 (ARM/4/004), ii) Planning and Management of Decommissioning Kozloduy NPP Units 1 and 2 (BUL/4/008), iii) Development of Ageing Management Programme for NPPs (CPR/4/026), iv) Evaluation of Radiation Damage Attenuation in WWER Reactor Pressure Vessel and Core Internals (CZR/4/009), v) License Renewal of Paks NPP Operation (HUN/4/014), vi) Integrity Assessment and Life Extension of the Laguna Verde NPP (MEX/4/053), vii) Improvement of Primary Circuit Component Integrity (RER/4/024), viii) Strengthening Capabilities for NPP Performance and Service Life Including Engineering Aspects (RER/4/027), ix) Technical Support for the Improvement of Cernavoda NPP Operation Management (ROM/4/026), and x) Action Plans for NPP Lifetime Management (UKR/4/013),

The third project "Databases to support the NPP Performance and LCM and Improving the Human Performance, Quality and Technical Infrastructure" will result in the following updated databases: Power reactor Information System (PRIS) available on the Agency web page and on CD-ROM, Country Nuclear Power Profiles, and the Nuclear Economic Performance Information System (NEPIS). Annual publications on "Nuclear Power Reactors in the World and Operating Experience with NPPs in Member States" will be produced. An international database on NPP life management, databases on NPP concrete structures and on the management of I&C modernization projects, as well as an e-catalogue of nuclear industry training services will also be available [1,2].

3. Strategy for the Promotion of an Active Participation in the IAEA Programs

3.1 Benefits from a Participation in the IAEA Programs

In order to induce nuclear related institutions in Korea to actively join the IAEA programs, the benefits from its active participation has been analyzed as follows: i) mutual cooperation on common international issues, ii) expansion of the research scope and the application of new technology by participation in a demonstrative research, iii) upgrade of the level of the research work, iv) wide exchanges of high technologies and access to cutting edge technology, v) enhancement of the efficiency and effectiveness to implement domestic researches, vi) opportunity to participate in the other related IAEA missions, etc.

3.2 Strategy for the Promotion of an Active Participation in the IAEA Programs

Based on the aforementioned benefits from a participation in the IAEA programs, a strategy for the promotion of its active participation has been developed as follows: i) inducement of a participation in the relevant IAEA programs for an effective implementation of a domestic research, ii) active participation in the related IAEA events, iii) constructive suggestions for new international projects, iv) strengthening of a wide reputation, v) development of various channels through web-sites and nuclear related societies for the promotion of its participation, etc.

3. Conclusion

The most significant trend in recent years for the NPPs currently in operation has been the steady increase in availability factors through improvements in operational practices, engineering support and strategic management. The relevant IAEA program will contribute to achieving such an environment in interested Member States by enabling the exchange of experience and by developing guidance on proven engineering and management practices.

After providing support for the IAEA CRP program, the participating domestic organizations in this program have been greatly expanded, much more than expected and its economic and social effects have been considerably improved. It is expected that the suggested recommendations such as the analysis of the benefits for participation in the program, ways to expand participation in the new projects and for its effective operation will be a great asset for establishing a nuclear policy in the future. In addition, the analysis of problems which are barriers to applications for a new program by analyzing the current status of the CRP programs that the IAEA has already implemented or is now implementing will be utilized in understanding which areas the IAEA will focus on and in identifying the projects which Korea should play a leading role in their implementation, thus leading to an increase in the acceptance rate of Korea's applications to the IAEA CRP program.[1]

REFERENCES

[1] IAEA, Project Summaries for the proposed 2005~2006 Programme, 2004. 11.
[2] IAEA, The Agency's Programme and Budget 2004~2005, August 2003
[3] IAEA, The Research Contract Programme: Annual Report and Statistics for 2003, May 2004

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