

Project INT/4/141: Promoting Technology Development and Application of Future Nuclear Energy Systems in Developing Countries

Workshop on "Steps for Conducting Nuclear Power Plant Technology Assessments"
IAEA Headquarters, Vienna, Austria, November 17-20, 2008

Summary and Conclusions

Background

As the number of countries considering the deployment of additional nuclear power plants (NPP) is increasing, more Member States (MS) have turned to the IAEA for information and assistance in the preparation of their NPP programme. As a consequence, the NPTDS Water Cooled Reactors Unit has implemented an activity on "Technology Assessment" whose goal is to provide MS with the process and the technical expertise to be able to evaluate the technical merits of the various nuclear technologies available and to select the one that better fits their specific needs. The annual workshop on Technology Assessment, first organized in 2007, is a key component of the Technology Assessment activity, and a part of the coordinated effort across the IAEA in providing assistance to emerging nuclear programmes.

Technology Assessment is defined as an exercise conducted by a country to determine which Nuclear Energy System (NES) technologies meet the needs and requirements of the country. NES technologies are defined to include Nuclear Power Plant (NPP) designs and associated fuel-cycle and supporting technologies. Technology Assessment also has the function to provide technical rationale and input to several activities conducted during the preparatory phase of introducing NES into the country. Such activities include the decision to launch a programme for the utilization of nuclear energy for power generation and other peaceful applications as well as several elements of NES infrastructure development process (assessment of national capabilities, definition of the degree of national participation in the nuclear power programme, identification of appropriate sites for the NPP, establishment of a fuel cycle policy, formulation of national NES deployment strategy and plan, etc). The ultimate goal of Technology Assessment, however, is the final selection of NPP designs and associated NES technologies including possibly preparation of bid invitation documents and bid evaluation.

The second Technology Assessment Workshop was held on 17-20 November 2008.

Both the 2007 and the 2008 Technology Assessment workshops were supported by TC Project INT/4/141 on "Status and Prospects of the Development and Applications of Innovative Reactor Concepts for Developing Countries".

Purpose

The Workshop was intended to bring together relevant experts and potential users of Nuclear Energy Systems (NES) to exchange information focusing on:

- (1) The approach and process of planning and conducting Technology Assessments of NES, focusing on Water Cooled Reactor-based Nuclear Power Plant (NPP) designs; and
- (2) General concerns and needs of Member States related to technical assessment of NES during the planning phase to initiate and/or to expand a nuclear power programme.

Work done

More than 50 experts from 35 countries enthusiastically participated in the second Workshop. They exchanged information on planning and conducting technology assessments of nuclear reactor designs, with a focus on water-cooled reactor technology. The Workshop also addressed general concerns and needs of Member States during the planning phase of initiating and/or expanding a nuclear power programme.

The programme of the Workshop was divided in three types of sessions:

- 1) Lectures, which discussed in depth the various stages of a typical Technology Assessment. The lectures were grouped in four blocks:
 - a. Introductory lectures, which provided an overview of the current role of nuclear technology in the world, described the activities taking place at the IAEA in support of emerging nuclear programmes, summarized the nuclear reactor technologies currently available, and introduced the overall technology assessment process.
 - b. Lectures on formulating national needs, which is the first step in a typical technology assessment. These lectures covered issues such as economics and energy planning, site selection, electric grid assessment, fuel cycle considerations, regulatory framework and licensability, user requirements, etc.
 - c. Lectures on assessment of NPP designs, which included discussions on technology maturity, constructability, standardization, operability, maintainability, maneuverability, inspectability, plant performance, project management, cost estimation, national capacity development, etc. The basic structure of a request for vendor information was also covered.
 - d. Lectures on overall process of technology assessment, which integrates the knowledge acquired through the technology assessment process into a prioritization of the evaluated technologies, taking into account risk assessment and other quantitative and qualitative techniques.
- 2) Case studies of technology assessments. Three practical examples of technology assessments conducted by NPCIL (India), Exelon (USA) and the Republic of Korea were reported, providing several messages to the Workshop participants, including the need to consider long-term needs, formulation of appropriate strategy, structured method of evaluation and international cooperation.
- 3) Presentations by Workshop participants, describing their countries' nuclear power programme plans as well as their experience related to technology assessment. The following countries made the presentations: Brazil, Egypt, Ghana, Indonesia, Lithuania, Libya, Malaysia, Portugal, Slovenia, Syria, Ukraine, Uruguay and Venezuela.

An IAEA draft report on ‘Technology Assessment in the Introduction of Nuclear Power’, presented at the Workshop, benefited from participants’ comments and input. This report, which is expected to be finalized during the first half of 2009, will provide Member States with a methodology for conducting technology assessments of nuclear power plant technologies.

Conclusions and recommendations

The Workshop was conducted successfully. The evaluation forms reflect that 50% of the attendees’ expectations were exceeded, and 72% of them recognized that 75% or more of the information provided during the Workshop was new and relevant to their country’s situation. All of the lectures, case studies and country presentations presented at the Workshop were well prepared and informative. Participants were actively engaged throughout the Workshop and the discussions were open and lively.

Recommendations were brought up at the end of the Workshop, to include several additional topics in the Technology Assessment report and in subsequent Workshops. These topics include

- 1) Technology assessment issues related to quality assurance, technology maturity, small and medium size reactors and affordability, and spent fuel disposal.
- 2) Relationship between the NEPIO and the organization performing a technology assessment.
- 3) Increase in the number and diversity of case studies to better utilize the experience from other utilities/countries.

The Workshop agenda, all presentation materials and the draft report are available at the Workshop website <http://www.iaea.org/NuclearPower/Technology/Assessment/WS2008.html>;

IAEA Division of Nuclear Power <http://www.iaea.org/OurWork/ST/NE/NENP/index.html>

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