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#### ENVIRONMENTAL ASPECTS OF A NEW NPP

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## INTRODUCTION

- Protection of the environment is a major consideration in the processes for approving industrial activities in many countries.
- Concept of sustainability: The present generation should not compromise the ability of future generations to fulfill their needs and should leave them a healthy environment.
- Nuclear power should support sustainable development by providing much needed energy with relatively low burden on the atmosphere, water and land use.



#### **ENERGY AND ENVIRONMENT**

- Environmental aspects of energy production and use have become of paramount importance
- Serious consideration is given to the environmental implications of man's demands for energy
- Individual nations are not isolated in this respect and the actions of one country may well result in environmental damage in a neighbouring State
- Nuclear Power stations do not emit fly-ash or noxious gases into the atmosphere as fossil-fuel-operated plants do
- Radioactivity released from the products of nuclear fission has been the main focus of public concern despite the stringent control measures and precautions taken



#### **NUCLEAR POWER AND ENVIRONMENT**

- Radioactive releases from reactors depend on the reactor type.
- Radionuclides released in the airborne effluents consist of: noble gases (133Xe), activation gases (41Ar, 14C, 16N and 35S), tritium vapor and gas, halogens and particulates.
- Discharges in the liquid effluents include tritium, 137Cs, 134Cs, 131I, 133I, 58Co and 60Co besides a number of activated corrosion products.
- Compared to the risks from gaseous emissions produced by fossil-fuel-operated power plants, the risks from discharges from nuclear power plants during normal operation are negligibly small.
- However, thermal pollution is considered to be more pronounced (50% more) with nuclear plants than with fossil-fuel plants.
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## DEFINITIONS

- "Environment" is defined as including the following (all) components:
  - ✓ human beings;
  - ✓ non-human biota;
  - abiotic components, including soil, water and air, natural resources and landscape;
  - ✓ interactions among these components.
- "Stressor" is defined as any physical, chemical, or biological entity that can induce an adverse response.
- "Environmental effects" is defined as any detrimental change caused by stressors.



#### **ENVIRONMENTAL ASSESSMENT**

#### Include:

physical, chemical or biological changes in the environment;
health effects on people, plants and animals;
effects on quality of life of people, plants and animals; use/depletion of resources;
cumulative effects resulting from the influence of the system in conjunction with other influences on the environment.



#### **IMPACT ASSESMENT STUDIES**

- Impact assessments are carried out to assess the consequences of the individual projects [by Environmental Impact Assessment] or of the policies and programs [by Strategic Environmental Assessment]
- Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socioeconomic, cultural and human-health impacts, both beneficial and adverse.
- Environmental Impact Assessment (EIA) is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making.



#### **EIA SCOPE AND PURPOSE**

- International Association for Impact Assessment (IAIA) defines an Environmental Impact Assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made."
- The purpose of EIA is to ensure the protection and conservation of the environment and natural resources including human health aspects against uncontrolled development.
- EIA is subject to public comments on the potential environmental impacts of the project.



#### **MILESTONES APPROACH**

#### NUCLEAR INFRASTRUCTURE DEVELOPMENT PROGRAMME







#### MAIN PLAYERS IN NUCLEAR POWER



#### **ENVIRONMENTAL AND NPP SITING**

- Strong connection between environmental protection and the site selection process.
- Environmental analysis process and concern for environmental protection begins with the initial siting process as one of the factors associated with site selection assessment criteria.
- Consideration of environmental issues early in the site selection process should result in a selected site with is acceptable from the point of view of environmental and socioeconomic impacts, with no other site significantly superior.
- Safety and other factors also are considered in the site selection process, not solely environmental impacts.



#### **EIA PROCESS**

EIA process consists of several steps which result in development of three reports:

1. Collection of Initial Environmental Information (IEA)

- 2. Environmental Scoping Report (ESR)
- 3. Environmental Impact Assessment (EIA) Report

The EIA Report is subsequently used in the development of the Environmental Management Plan and in the preparation for Bids Invitation Specification (BIS).



#### **INITIAL ENVIRONMENTAL INFORMATION (IEI)**

- During the initial siting survey when many sites are evaluated, Initial Environmental Information (IEI) is collected for all potential NP sites and contributes to the choice of candidate sites.
- Typically, the IEI is a desktop survey and collection of available data of environmental relevance for these potential sites.
- No subsurface data collection is required at this step.
- Analysis of available information may be presented as a part of a siting report or as a separate document.
- IEI is used in determining each site's environmental suitability for a nuclear power plant.
- IEI should explain the current site conditions and compile all the data available.



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## **ENVIRONMENTAL SCOPING REPORT (ESR)**

- Environmental Scoping Report (ESR) is a plan for how the EIA will be carried out.
- It may also be called as "Terms of Reference for EIA" or "EIA Program" in some Member States.
- It builds on the information provided in the Initial Environmental Information (IEI) Report and identifies the requirements for additional information and analysis in order to complete a comprehensive EIA report.
- The ESR also aims to identify all aspects for which there may be impacts to be assessed in the EIA.
- The ESR provides a public participation and communication plan and identifies the key stakeholders.



#### **ENVIRONMENTAL IMPACT ASSESSMENT (1)**

- Environmental Impact Assessment (EIA) is a process to identify and assess all the environmental and socioeconomic impacts of an NPP project.
- Objective of the EIA is to satisfy questions regarding impacts of the Project with respect to environmental and human health.
- It adds critical information to the license/permit decisionmaking process.
- In additional, some financing arrangements by financial institutes require the completion of an EIA, so it is important to understand the requirements associated with the specific uses of the EIA.



#### **ENVIRONMENTAL IMPACT ASSESSMENT (2)**

- EIA process also has the practical function of increasing the interaction between and among the Project developer and stakeholders, as environmental issues are brought to light, discussed and resolved.
- EIA Report presents the analysis and findings of the EIA process.
- EIA Report describes the baseline conditions of the environment and surrounding population, identifies the impacts of the Project during all its phases on the environment and population, and analyses whether the impacts are significant.
- If the impacts are significant, the EIA Report presents mitigation measures to address the impacts, and a monitoring plan.



### **ENVIRONMENTAL IMPACT ASSESSMENT (3)**

- EIA also includes a draft Environmental Monitoring Program for impacts determined to be significant as well as presents measures for prevention or minimization of significant impacts.
- EIA report represents a holistic description of the project's environmental consequences to decision-makers and increases the transparency of the nuclear development process.
- EIA report is a companion document to the Safety Analysis Report (SAR) which addresses the safety aspects of the site and the proposed project.
- Environmental commitments, limitations and conditions resulting from EIA process approval shall be included in the Bid Invitation Specification for NPP Vendor evaluation.



#### ENVIRONMENTAL MANAGEMENT PROGRAM

- Environmental Monitoring Program (EMP) will be compiled in the permitting phase (licensing process), utilizing recommendations made in the EIA report.
- EMP is approved by relevant authorities, either separately or as a part of relevant permits.
- Objective of monitoring is to provide ongoing information relative to significant impacts, so that mitigating steps can be taken if the monitored impacts exceed expected limits.
- Environmental Management Plan (EMP) is one comprehensive document on all requirements for maintaining environmental protection, including monitoring, reporting, mitigation measures, and processes for implementing corrective actions.



#### **ENVIRONMENTAL PROGRAM ROADMAP**



#### **ENVIRONMENTAL SCOPING REPORT PROCESS**



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#### **EIA REPORT PROCESS**



#### **USE OF THE EIA REPORT**



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## **STAKEHOLDERS INVOLVMENT (1)**

- EIA addresses many of the issues of practical concern to stakeholders.
- EIA is regarded as one of the mechanisms for stakeholder involvement.
- Main purpose in involving the stakeholders in the EIA process is to identify and consider all the environmental issues that are of significance to the various stakeholders.
- Two-way communication approach should be applied, making the environmentally-related reports as identified in this document public and then having a process to receive comments from statutory and non-statutory stakeholders that are then considered in the EIA process.



#### **STAKEHOLDERS INVOLVMENT (2)**

- One Competent Authority may be designated as a focal point to coordinate all the EIA process in the government.
- This Competent Authority should be identified under Phase 1 activities, which is designated or otherwise recognized by the law and regulations during phase 2, and must have the quality of "independent party," i.e., not responsible for development of the project itself.
- All the comments received through the EIA process should be evaluated and a record made as to their disposition.
- A time limit for the process should be established and publicized as part of the overall process to the stakeholders.



#### **STAKEHOLDERS INVOLVMENT (3)**

- There should be an early start for a Stakeholder Involvement Programme, ideally somewhere around the time when the Member State decides to investigate nuclear as an option for its energy mix.
- Early steps can be general in nature (such as educational about nuclear energy).
- Participation of the stakeholders facilitates and improves the comprehensive nature of the environmental assessment.
- If the EIA process includes consultations with other countries based on the policy and the law of the Member State, the timelines for stakeholder involvement from the neighbouring states would have to take into account the differences between countries in the legal and regulatory systems.



#### IAEA GUIDANCES [EXAMPLES]







