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Workforce Planning for new Nuclear Power Programmes

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IAEA
Atoms for Peace: The First Half Century
1957–2007
BACKGROUND TO WORKFORCE PLANNING DOCUMENT

• IAEA developed new “Milestones” document, published in September 2007

• Identifies 3 distinct phases, each with its own milestone, to be completed in preparation for a first nuclear power plant

• Provides detailed guidance on timely preparations for a nuclear power programme

• Intended to help Member States to assess progress and prioritise actions necessary to order, license, construct and then safely operate a nuclear power plant
Preparing for assuming commitments & obligations

Infrastructure development program

MILESTONE 1
Ready to make a knowledgeable commitment to a nuclear programme

MILESTONE 2
Ready to invite bids for the first NPP

MILESTONE 3
Ready to commission and operate the first NPP

~ 10 – 15 years

PHASE 1
Considerations before a decision to launch a nuclear power programme is taken

PHASE 2
Preparatory work for the construction of a NPP after a policy decision has been taken

PHASE 3
Activities to implement a first NPP

Maintenance and continuous infrastructure improvement

1st. NPP Project

Feasibility study

Bidding process

Commissioning

Operation / decommissioning
### KEY INFRASTRUCTURE ISSUES

- National position
- Nuclear safety
- Management
- Funding and financing
- Legislative framework
- Safeguards
- Regulatory framework
- Radiation protection
- Electric grid
- Human resource development

- Stakeholder involvement
- Site and supporting facilities
- Environmental protection
- Emergency planning
- Security and physical protection
- Nuclear fuel cycle
- Radioactive waste
- Industrial involvement
- Procurement

*Note: All 19 issues have a Human Resource component*
IAEA Nuclear Energy Series – NG-T-3.10

- Developed to provide guidance to Member States (MS) in the identification of, and to develop Workforce Plans for, the Human Resources needed to implement a New Nuclear Power Programme
- Includes actual Case Studies to illustrate how other Member States implemented their first Nuclear Energy Programme
SCOPE OF THE DOCUMENT

• Focuses on ‘nuclear related’ competencies, while recognising significant non-nuclear resources also required, but assumed to be within Member State’s capability

• Addresses the Workforce requirements for each of the three phases focusing on 3 main organisational entities identified as having specific responsibilities within the “Milestones” document:
  — NEPIO (Nuclear Energy Programme Implementing Organization)
  — Regulatory Body
  — Operating Organisation
SCOPE OF THE DOCUMENT (cont’d)

• Focuses on ‘permanent’ resources (as above) and does not address construction, and other, resources, which are addressed in other IAEA documents.

• Assumes Turnkey project and therefore resource levels based on those needed to be an “Intelligent Customer”.

• As with the “Milestones” document, this document assumes MS has an existing national infrastructure for radiation, waste and transport safety.
WORKFORCE PLANNING:

“The systematic identification and analysis of what an organization/nation is going to need in terms of the size, type, and quality of workforce to achieve its objectives.”

Identifies the steps that should be taken to get the right number of the right people in the right place at the right time.
INTELLIGENT CUSTOMER:

- An organisation (or individual) that has the competence to specify the scope and standard of a required product or service and subsequently assess whether the supplied product or service meets the specified requirements.
Workforce Planning Process

1. Define the Objectives of the national Nuclear Power programme
2. Determine the HR needs of the programme based on these Objectives
3. Compare HR needs to existing and expected national HR resources (Gap Analysis)
4. Can Gaps be addressed?
   - If No, then: Determine how gaps will be addressed
   - If Yes, then: Develop workforce plan
5. Review/Revise workforce plan as phases progress
1. Introduction

2. Nuclear Energy Strategy – an indication of how the chosen strategy may affect workforce planning requirements

3. Analysis of Infrastructure activities – supported by matrix of 3 phases and 19 Infrastructure Issues to identify competence requirements and resources

4. Developing a Workforce Plan - some general considerations regarding when and how to recruit
5. Staffing considerations – a phase by phase review of the resources needed by the 3 key groups leading into the operations phase

6. The role of Support Organisations – an indication of the role of Educational, Research & Development and other Support Organisations

7. Knowledge Management for New Nuclear Power

8. Summary: How to get started

9. Overview of Case Studies
CASE STUDIES

• A range of actual case studies to give practical examples of how Member States implemented their Nuclear Energy programmes

• Case Studies may cover individual phases or whole programme

• Case Study Contributions: China, Republic of Korea, India, UAE, Armenia
WORKFORCE PLANNING MATRIX

- The main activities to be undertaken to address each Infrastructure issue, together with an indication of the responsibilities of key organisations in completing these activities;
- An indication of the competencies required to complete these activities successfully;
- Probable educational/professional requirements necessary to support achievement of these competencies, and;
- Suggestions for the Workforce Planning needed to deliver these competencies within the project.
### Sample of Competencies Matrix

#### Infrastructure Issue 10. Electrical Grid Phase 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsibilities of key organizations</th>
<th>NP specific competencies</th>
<th>Probable education sources/professions</th>
<th>Inputs regarding Workforce Planning, education and training</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Study of grid capability/capacity re nuclear power | NEPIO:  
- Take a lead role in the study  
- Grid Operator:  
- Provide information regarding the stability and reliability of the grid, and anticipated grid growth/changes and suitability for NPPs | Knowledge of grid characteristics that are important re an NPP  
Thorough understanding of electrical O/P characteristics of an NPP and their impact on existing grid/necessary upgrades | Nuclear power engineer  
Electrical Power Engineer with Nuclear Power training module | At least one nuclear power engineer with expert level competency  
At least one power engineer with expert level competency and Nuclear Power training | Core competence is Electrical Power Engineering, but training in specifics of NPP output characteristics would be necessary to address grid capability/upgrade requirements |
| Study of grid interconnection possibilities | Grid Operator:  
- Provide information re grid characteristics and the issues related to their interconnection | In-depth knowledge of principles for, and lessons learned, regarding grid interconnections | Power engineer | One Power Engineer with expert level competency  
One or more with working level competence | |
Human Resource Development-Phase 1

• Knowledge and skills needed to support a nuclear programme identified by NEPIO

• Two fundamental aspects of Human Resource development to be considered:
  – What level of National involvement is desired?
  – What level of National capability exists or could be developed?

• Workforce/Staffing Plans prepared

• Workforce Plans needed for all organisations and should be integrated upwards
During Phase 1, NEPIO undertaking:
• Feasibility studies and developing understanding of commitments associated with Nuclear Power.
• Analysis of national capability
• Development of 1st Workforce Plan

NEPIO 25 – 50 personnel, depending on expert support.
Core regulatory functions also established at this time for the development of regulations, for licensing, review and assessment, inspection, enforcement and public information.
Lack of experience in phase 1 may be alleviated by:

- Contracting out whole work packages to experienced consultants, including requirements to utilise/train national staff in delivering the work package.
- Contracting with consultants to become ‘temporary’ staff working with nationals to deliver work packages, while developing national staff.
- Engaging senior consultants to ‘coach’ national staff in specific areas of competence.
- Organising national conferences/workshops where vendors and specialist support organisations can present their capabilities and services.
RECRUITMENT CHALLENGES IN PHASE 1

Opportunities to gain experience outside MS include:

• Establishing Bi- and Multi-lateral relationships with governments, regulatory agencies, vendors, utilities, educational institutions, etc.

• IAEA Training courses, Fellowships and Internships.

• Formal courses of overseas study (e.g. vocational, under- and post-graduate programmes).

• Building staff training and development assignments into potential contracts with vendors, service providers, etc.

• Developing ‘strategic alliances’ with vendors/equipment suppliers whereby national organisations obtain licenses to manufacture components in-country, which can include training and qualification in the country of origin.
Human Resource Development-Phase 2

In preparation for inviting Bids to construct a first NPP:

• Sufficient human resources are in place to be an “Intelligent Customer”

• A Systematic Approach to Training (SAT) of human resources needed for plant operation is initiated

• HR issues, including SAT requirements, are addressed in requirements for suppliers (turnkey assumed)

• Workforce/Staffing Plan(s) updated
RECRUITMENT CONSIDERATIONS

• Attracting expatriate personnel who have worked in the nuclear sector abroad.

• Attracting experienced foreign personnel, either as employees (if permitted by national labour laws/regulations) or as consultants.

• Recruiting experienced personnel from appropriate national industries such as fossil fired power generation, process/production, oil and gas industries, who will already have many of the required competencies to work in the nuclear industry.

• Remember recruitment is a two-way process – allow for loss of staff to other industries/countries
NEPIO resources peak during Phase 2, as responsibilities are handed over to Regulatory Body and Operating Organisation.
Resource Requirements for Phase 2 (cont’d)

Regulatory Body resources build during Phase 2 to enable it to develop necessary regulations, licensing arrangements and carry out its oversight responsibilities.
Operating Organisation commences staffing during Phase 2 due to allow time for training prior to commissioning
Human Resource Development- Phase 3

- All human resources to commission and operate the first NPP are in place
- Education and training programmes for continuing flow of qualified people are in place
- Workforce/Staffing Plan(s) updated
1. NEPIO = 10 --> 50 (Depending on Expert Group Support) --> 0 (close to)
1. NEPIO = 10 --> 50 (Depending on Expert Group Support) --> 0 (close to)
2. REG BODY = 10 --> 50+Tech Support
1. NEPIO = 10 --> 50 (Depending on Expert Group Support) --> 0 (close to)
2. REG BODY = 10 --> 50+Tech Support
3. OP ORG = 0 --> 20 to 30 --> 600 to 1200
ONGOING REQUIREMENTS

• Post-commissioning, SAT based training programmes should be in place in all organisations producing a ‘pipeline’ for new staff

• Succession Management arrangements in place for all positions

• Workforce Planning should allow for follow-on NPPs if appropriate

• Long-term Workforce Planning arrangements should allow for full Lifecycle requirements including Plant Life Maintenance and eventual decommissioning
Summary: How to effectively consider HR from the beginning?

- Use an integrated, systematic approach toward considering and implementing a NP programme (The “Milestones” Approach)
- Develop workforce/staffing plans that are based upon the roles and responsibilities for the activities in each of the 3 Phases, particularly focusing on the three key organisational entities
- Require SAT for all training programmes
- Include SAT, and knowledge capture and transfer requirements in supplier(s) contracts
- Maintain this integrated workforce planning approach through the entire lifecycle of the facilities/programmes
Thank you – Any Questions?

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