INPRO Dialogue Forum

DRIVERS AND IMPEDIMENTS FOR REGIONAL COOPERATION ON THE WAY TO SUSTAINABLE NUCLEAR ENERGY SYSTEMS

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Long Term Human Resource Planning and IAEA Guidance & Support

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SESSION OVERVIEW

• Overview of Human Resource needs for a nuclear power programme
• Breakdown of Workforce types
• Key challenges
• IAEA guidance and support
KEY CHALLENGE FOR HUMAN RESOURCES

• Key challenge is to achieve initial competence, and then sustainability, of Human Resources to support a nuclear power programme

• Requires the coordination, and cooperation, of all national stakeholders (government, education sector, industry, international bodies)
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

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

1st. NPP Project

INFRASTRUCTURE DEVELOPMENT PROGRAMME

~ 10 – 15 years

Maintenance and continuous infrastructure improvement
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
ORGANIZATIONS WITH HR REQUIREMENTS

- Nuclear facilities (including NPPs, fuel cycle, radwaste)
- Government agencies, NEPIO (Ministries, etc.)
- Owners/Operating Organizations (e.g. headquarters)
- Educational institutions
- Regulators (incl. nuclear)
- Technical Support organizations
- R&D organizations
- Specialized training organizations
- Equipment Vendors, Suppliers, Construction
- Organizations involved in nuclear or radiation activities
- International and professional organizations

Human Resources for the Nuclear Field

IAEA
Atoms for Peace: The First Half Century

BRM/INPRO_HR  30/07/2012
WORKFORCE PLANNING:

“The systematic identification and analysis of what an organization/nation is going to need in terms of the numbers, 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.
IAEA FOCUS ON WORKFORCE PLANNING

• Addressing the Workforce requirements for each of the three phases focusing on 3 main organisational entities indentified as having specific responsibilities within the “Milestones” document:
  — NEPIO
  — Regulatory Body
  — Operating Organisation

• Focus especially on Phases I & II, recognising that Vendor(s) may provide significant assistance for Operating Organisation during Phase III.

DEFINING THE OBJECTIVES OF THE NUCLEAR ENERGY PROGRAMME

1. **Define the Objectives of the Nuclear Energy programme as this will influence the competencies to be acquired by the Member State.**

2. **Member States must be realistic about the gaps in national capability and the potential to close them.**

3. **For effective Workforce Planning define the roles, responsibilities and functions of all the stakeholder organizations (even if not established) in Phase 1.**

**Process Flow:*
- Define the Objectives of the national Nuclear Power programme
  - Determine the HR needs of the programme based on these Objectives
  - Compare HR needs to existing and expected national HR resources (Gap Analysis)
  - Can Gaps be addressed?
    - Yes
      - Determine how gaps will be addressed
      - Develop workforce plan
    - No
      - Review/Revise workforce plan as phases progress
1. NEPIO = 10 --> 50 (Depending on Expert Group Support) --> 0 (close to)

- **MS1**: Site Investigation, Bid Preparations
- **MS2**: Design, Construct, Comm’n
- **MS3**: Multi Units
1. NEPIO = 10 --> 50 (Depending on Expert Group Support) --> 0 (close to)
2. REG BODY = 50 - 150 + Tech Support

RESOURCE REQUIREMENTS FOR REG BODY

1. Phases:
   - Phase 1: Site Investigation, Bid Preparations
   - Phase 2:
   - Phase 3: Design, Construct, Comm'n

2. Unit Types:
   - 1 Unit
   - Multi Units

Years (Indicative only)
RESOURCE REQUIREMENTS FOR OP ORG

1. NEPIO = 10 → 50 (Depending on Expert Group Support) → 0 (close to)
2. REG BODY = 50 → 150+Tech Support
3. OP ORG = 0 → 20 to 30 → 600 to 1200 (2-Unit site)
Key Education and Training Considerations

- Majority of permanent workforce is needed for the Operating Organisation, once NPP is commissioned; typical workforce for a 2-Unit NPP is 600-1200 personnel
- Around 65 - 80% of workforce are required at non-graduate level i.e. ‘Technicians’
- Of the graduate workforce (20 – 35%) only around 20% (or ~ 5% of total workforce) need a Nuclear engineering background
- Training/experience requirements for very specialist roles can be 5-10 years
- In Regulatory Body, % of Graduates is much higher (> 50%) but specialist Technicians still needed
Example Distribution of Disciplines for the Nuclear Workforce

2-year Associate Degree Backgrounds
- Mechanical Engineers
- Electrical Engineers
- Chemical Engineers
- Engineering Technology
- Nuclear Engineers
- Non-licensed Operators
- Maintenance
- Instrumentation & Control
- Mechanical Systems
- Electrical Systems
- Chemistry

4-year Degrees Other Engineering Disciplines
- Nuclear Engineering Degree
- Engineering Technology
- Chemical Engineers
- Electrical Engineering
- Mechanical Engineers

Source: Lee Peddicord
TAMU, USA
Timing of Workforce Employment Before Plant Operation

Years Prior to Initial Plant Operation

- 2-Year Degrees
- 4-Year Degrees

Source: Lee Peddicord TAMU, USA
US DEMAND FOR NP ENGINEERS BY DEGREE

Data is from the NEI’s 2008 Work Force Survey.
Additional Nuclear Engineers would be accepted if they were willing to work in systems engineering, design engineering and the operations department.

Slide courtesy of NEI
KEY CHALLENGES

• Capacity Building and Sustainability
  – Developing, and maintaining, an appropriate secondary and tertiary education system
  – Established appropriate, complementary, tertiary education and training
  – Managing ‘brain drain’, esp for developing countries

• Cooperation of key stakeholders at the national level

• Establishing Regional Cooperation
  – Every Member State wants to host facilities
  – Need to look at developing complementary centres of excellence

• Developing ‘Intelligent Customer’ capability in terms of relationship with, and support from, vendors for Human Resource development needs

• New document planning with ‘working level’ guidance on staffing 1st NPP

• Workforce Planning Workshops offered in cooperation with TC Department at National and Regional level, tailored to meet MS’ specific needs
• Nuclear Power Human Resources (NPHR) Modelling Tool developed:
  – Originally developed by LANL and donated to IAEA by US Government
  – Generic model for a nuclear workforce, including Education system, Regulatory Body, Construction workforce, and Operating staff
  – Training provided by IAEA to enable MS to tailor model to their own national situation
  – 1st training course held in April 2012, next in Q1 2013
  – Priority given to ‘advanced’ newcomer countries.
• TM on Capacity Building and HR Development 9-12 Oct, in Vienna.