

APPROACHES TO EDUCATION AND TRAINING FOR KENYA'S NUCLEAR POWER PROGRAM

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Summary

1. Review of status and development of E&T for the nuclear power program in Kenya
2. Review of challenges in nuclear E&T, and the initiatives being undertaken to mitigate them
 - *Recommendations for strategic action*
3. State of nuclear skills in the context of key drivers of the global revival in nuclear energy
4. Point of view: Education in Applied Nuclear & Radiation physics at Nairobi
 - *Its growth has helped identify the gaps, and relevant practical approaches for realizing the broad spectrum of technical capacity to conduct a national NPP*
5. Proposed approach to support the E&T infrastructure necessary to allow the country to plan, construct, operate, regulate, and safely and securely handle nuclear facilities sustainably
6. Specified E&T initiatives in the context of the national industrial development strategy and nuclear energy policy and funding for the complete life cycle and technology localization

Kenya's E&T Situational Matrix

E&T requirements constrained by distinctive characteristics of nuclear energy and its fuel cycle

NPP lacks the needed well trained and certified competent manpower (both from institutions & nuclear facilities)

Master plan is needed to support sustainable legal and regulatory framework for NPP

The nuclear renaissance complicates matters (for non-NPP states – life extensions)

E&T plan should be first step

E&T strategies should recognize the interdisciplinary dimension of nuclear energy

Effective nuclear man-power development program is that which is planned in advance

Nuclear Industry: Basic

Regulatory Transformation

Wide Stakeholding

Energy Security

Lack of institutional and human infrastructures is identified as the country's key E&T issue.

Experience gained elsewhere can provide useful information and has been utilized in this study

NPP already proving to be a quintessential candidate for ignorant politicization

State of Institutional Capacity

- Alarming low quantity /quality nuclear technology programs at universities: only Kenyatta and Nairobi have graduate programs but in basic nuclear & radiation physics
 - *Scope is too narrow considering the interdisciplinary nature of nuclear energy*
 - *No research reactor for education, research and training*
- Nairobi's Institute of Nuclear Science and Technology is [only] mandated (1979) to train in nuclear science techniques and applications (limited size and student output)
 - *Reshape their studies into a Masters in Nuclear Science and Engineering (starting point)*
- Department of Physics (Nairobi) started Applied Nuclear & Radiation Physics (2002)
 - *Has been rekindling the flames of nuclear education and training to meet the needs of NPP*
- Promotion of a safeguards, safety and security culture not yet part of programs
- Research not geared towards safety, reliability, cost, emergency preparedness and response, non-proliferation, HL waste management, and international co-operation
- Nuclear energy absent in university curricula of law, engineering, economics, etc.

Gap Analysis and Needs Assessment

- National study categorized by nuclear industrial sector
- Covering both professional and trade skills to identify the skills gaps relevant for E&T programs
 - *Critical for adapting E&T programs to professional “learning outcomes”*
- Nuclear education has been identified as highest risks for NPP

- Detailed information at the level of industrial sector, and of various disciplines
 - *Stakeholders then decide if institutions are able to supply the numbers and judge which courses need strengthening*
- Evaluation of existing organizational, educational, industrial capabilities for meeting the needs
- Benchmark HR requirements and identifying bottlenecks in the supply chain
- Draw up a chart relating to occupations in to facilitate capacity building
- Regularly update a QA database on the short, medium and long-term needs of HR.

HRD Strategy

Strategy for HRD

Kenya Nuclear Electricity Board (KNEB) mandated, among other promotional functions, to review and approve a capacity building plan for the new NPP.

Recent Act of Parliament provides KNEB with the requisite law relating to the development of nuclear science and technology

Should be a friendly partnership among universities, government, and industry

Relevant skills cut across the complete spectrum of the nuclear industry and include regulatory, legislative organizations, operators, R&D, engineering firms and educational institutions.

1. Generic capacity building at the national level in nuclear sciences and technology

Overriding E&T goal should be to create, develop and promote career pathways through adaptation of the existing programs to the needs of nuclear energy industry.

2. Development of personnel to perform functions in stakeholder organizations to implement the NPP

International Cooperation

- ❑ Cooperation is inevitable: Eg. EU's European Nuclear Education Network.
- ❑ E&T plans could be partly based on a similar courses developed by the IAEA
- ❑ Bilateral agreements are one way to benchmark, learn best practices and acquire foreign training to rapidly transfer and localize technology.
- ❑ Texas A&M University is this year training the second cohort of Kenyans in *Nuclear Power Plant Technology* (Very basic - requires build on to advanced programs).
- ❑ Activities of international nuclear education networks can play a crucial role: We are member of the international nuclear security education network (INSEN).

Proposed E&T Strategy for NPP

- Cooperation between key stakeholders and universities to develop E&T curricula.
- Strategic research agendas (SRA) - private-public partnerships to play a key role
- Target young graduates (NKM) from different backgrounds (engineering, science, law, economics...)
- KNEB should serve as a think-tank and bring together all stakeholders to discuss plans.

Government

promote development of utility-led nuclear education and training

encourage more specialized craft nuclear technology programs

support broader applications of nuclear science to medicine, biology, etc. via fellowships

formulate a strategic national human resource development (HRD) strategy, considered within the broad context of the national industrial development plan.

WG on Education, Training and Knowledge Management (ETKM)

identify a course of action and steps required;

*collate infrastructural facilities;
coordinate secondment from industry to academia (and vice versa);*

promote co-operation between universities and stakeholders;

ensure availability and effective use of infrastructure for nuclear education

Universities

jointly offer nuclear education programs and build national networks.

foster joint research and promote the exchange of research results.

facilitate mobility of students and mutual recognition of courses.

Conclusions and Reflections

- E&T infrastructure that is relevant to NPP identified as the most critical challenge
- Kenya lacks indigenous capacity to operate, regulate and maintain a NPP
- Needed: infrastructure of university research and teaching in partnership with industry
- Effective E&T require a mix between classroom and hands-on experience at facilities
- National workforce plan needed to develop a HR base across implementing institutions
- Plan should go hand in hand with the development of a regulatory framework
- Plan should involve stakeholders' networks and all relevant industrial sectors
- Key to success is (however) concrete 'nuclearized' leadership and good practices:
- The following are [urgently] needed
 - Atomic Energy Act of Parliament (peaceful uses of atomic energy)
 - Nuclear Energy Corporation (planning, design, construction, operation, maintenance, and management of nuclear power plants)
 - Nuclear Regulatory Authority (safety regulation, security, conventions and treaties)

Thank you for your attention

Asante sana



More information

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