Status, HR and Capacity Building Activities for Ghana’s Nuclear Programme

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Introduction

**Ghana's Nuclear Journey**

**1963 - 1967**
- Ghana's 1st 2MW Research Reactor Project was launched and Atomic Energy Commission established.
- Project was abandoned due to political challenges.

**1974 - 1996**
- GAEC revived with the mandate to research and advise the government on nuclear sciences for socioeconomic development.
- Ghana commissioned of a 50 kW research reactor.

**2007 - 2012**
- Nuclear Power included into Ghana’s energy mix following the recommendation by Cabinet.
- Establishment of Ghana Nuclear Power Programme Organization for coordination to coordinate the implementation of Ghana’s nuclear agenda.

**2013 - 2015**
- Nuclear Power Centre established under GAEC to address Nuclear Infrastructure Development issues.
- Nuclear Regulatory Authority Act 2015 (Act 895) promulgated.
- Nuclear Regulatory Authority (NRA) launched and staffed.
- Ghana signs Inter-Governmental Agreement (IGA) with Government of Russia.

**2020**
- NPG signs MoU with Ghana Association of Journalists and Ghana News Agency for coordinated information dissemination on the nuclear programme.
- Nationwide nuclear power perception survey conducted.
- Nuclear Regulatory Authority submits first batch of regulations to Attorney General for review.

**2018 - 2019**
- Nuclear Power Ghana (NPG) established as an Owner Operator Organisation.
- Four candidate sites identified.
- Ghana invited and hosted an IAEA Follow-up Phase I INIR Mission.
- The Follow-up mission concluded that Ghana has completed all studies needed for the government to make a knowledgeable commitment.

**2016 - 2017**
- Nuclear Power Center upgraded into an Institute under GAEC.
- Ghana signs Inter-Governmental Agreement (IGA) with Republic of China.
- Ghana invited and hosted an IAEA Phase 1 INIR Mission.
- Mission identified twelve (12) recommendations and eight (8) suggestions.

**2021**
- Ghana signs Nuclear Cooperation MoU with United States of America
- Request for Information (RFI) on Nuclear Power Plant Technology developed and issued to prospective vendor countries
- Fifteen (15) RFI responses received (9-SMEs and 6 Large reactors) and evaluated

**2022**
- Ghana begins nuclear power Technical Cooperation with Japan and United States of America
- RFI evaluation report submitted to Energy Ministry for further engagement
- Historical and field data for preferred site ranking collected and analysed
Introduction

Ghana’s decision for considering nuclear power includes:

- Declining Gas Reserves
- Limited Hydro Resources
- Climate Action
- To boost its industrialization agenda
- Hopefully provide cheaper tariffs for industries
- To be an energy hub for the sub-region
- To provide jobs for the youth
Current Status of Ghana’s Programme

- Preferred and backup sites for the first project identified
- Documentation for site approval license almost ready
- Detailed site characterization to start soon (by end of quarter 2)
- RFFI sent out to some vendor countries (evaluation of responses to be completed by end of quarter 3)
HR ASSESSMENT
National HR Development Plans

- The need to develop highly skilled and qualified human resources within the country.

- The success and sustainability of Ghana’s NPP require sustained human resource flow for the plant's entire life cycle.

- Education and training are critical to achieving this skill development required for the nuclear programme.

- Roadmap for NPP development envisages a comprehensive plan for national workforce development.
Ghana’s Educational & Training Structures

- What are the skills and qualifications required to support the programme?
- The existing tertiary institutions have the capacity to upgrade and introduce new programmes with supervision from relevant government institutions.
- Crafts are mostly acquired via an apprenticeship.
- COTVET was established by an Act of Parliament to bring uniformity to the quality and standardise technical training while harmonising training and qualification based mainly on competency.
Ghana’s Educational & Training Structures

- Globally, atomic energy research institutions play a key role in competency building for nuclear power programmes.
- In Ghana, only GAEC plays this role.
- Upgrading and equipping other national scientific and engineering research institutions will go a long way to support the Programme.
- Establishment of national and international cooperation to bridge the capacity gap.
- A well developed research and training institution can play the role of TSOs within the framework of the NPP.
Challenges Identified and Mitigation Measures

Comprehensive nuclear education programme
  o Mitigation: Develop and implement a comprehensive education at all levels through the life-cycle of the plant to ensure sustainability

Comprehensive Training Programme:
  o Mitigation: Develop and implement continuous training programmes

Institutional Establishment and Facility Upgrade
  o Mitigation: Equip relevant institutions to implement the comprehensive scheme to train, verify and sustain a high level of competent and certified personnel

Teaching and learning
  o Mitigation: Develop and implement appropriate national schemes to promote STEM in basic education in the country
Challenges Identified and Mitigation Measures

Transfer of Knowledge

- Mitigation: Facilitate transfer of knowledge from ageing nuclear expert to the next generation of workers

Knowledge Share

- Mitigation: Promote research and development to capitalize on transfer of know-how

Recruitment Strategy

- Mitigation: Develop and implement appropriate national schemes to attract and retain HR with clear career prospects

Research and Development in Energy

- Mitigation: Integrate research and development at university, scientific research institutions, and industry
COMPETENCY AND CAPACITY BUILDING
# National Strategy for HR Development

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<th>Capacity Building Organisation</th>
<th>Support Network(s)</th>
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<td><strong>Owner/Operator</strong></td>
<td>Vendor Country Operator</td>
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<td>EPC Contractor</td>
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<td>Vendor Country TSO</td>
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<td>Vendor Country Education and Training Institute</td>
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<td><strong>Local Education and Training Institutions</strong></td>
<td>The IAEA and other established nuclear countries</td>
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<td>Vendor country Education and Training institution</td>
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<td><strong>Industries</strong></td>
<td>IAEA and other established nuclear countries</td>
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<td><strong>Regulatory Bodies (NRA, EPA, etc)</strong></td>
<td>Vendor Country Industries</td>
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<td>Vendor Country Regulators</td>
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<td><strong>Technical Support Organisation (TSO)</strong></td>
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Proposed Framework for Competency Development
ONGOING CAPACITY BUILDING ACTIVITIES
US FIRST Programme

- Workshop on Stakeholder Engagement and Communications
- Workshop on Nuclear Safety and Licensing
- Workshop on the 3S
- Technical/Scientific Visits
US, Japan and Ghana announced a Trilateral cooperation

US DoE to support Ghana establish a training centre

Initial discussions on the training facility were held and some areas of cooperation agreed

Series of training workshops have started for 2023.
About 12 workshops/training were held in the 2022 Japanese fiscal year

Topics cut across different infrastructural issues and areas of specific interest to Ghana

Scientific/Technical visits formed part of the activities for last year

Cooperation renewed for 2023

Different activities outlined for this year including

- national workshop in Ghana,
- Scientific visit to Japan
- Series of training workshops
IAEA Related Activities

- Participation in several training/workshops
- Scientific Visits/Expert missions/Fellowships
- Participation in several Coordinated Research Projects (CRPs)
- Participation in inter-regional projects
- Participation in IAEA-organised meetings
- Experts and consultants for the agency
Students from Ghana continue to enjoy scholarships for Masters and PhD programmes in nuclear science/engineering from other developing partners including:
  - South Korea
  - China
  - Russia
  - USA
  - Canada etc.
Concluding Remarks

• The Ghana Nuclear Programme provides the opportunity for the development of the country
• The HR needs have been assessed using the IAEA Nuclear Power Human Resource (NPHR) model.
• Ghana has the required basic infrastructure that can be improved to achieve success in its nuclear power programme.
• Some deficiencies in education and training systems have been identified
• Some initiatives have begun to include nuclear science and technology in our educational system at various levels.
• Ghana benefits from some bilateral relations to build the capacity and competencies of our workforce.
• We are open to more cooperation from other advanced nuclear countries in this area.