An Overview of Nigeria's Nuclear Energy Programme in the INPRO Methodology area of Infrastructure

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8th INPRO Dialogue Forum, Vienna, 26-29 August, 2014.

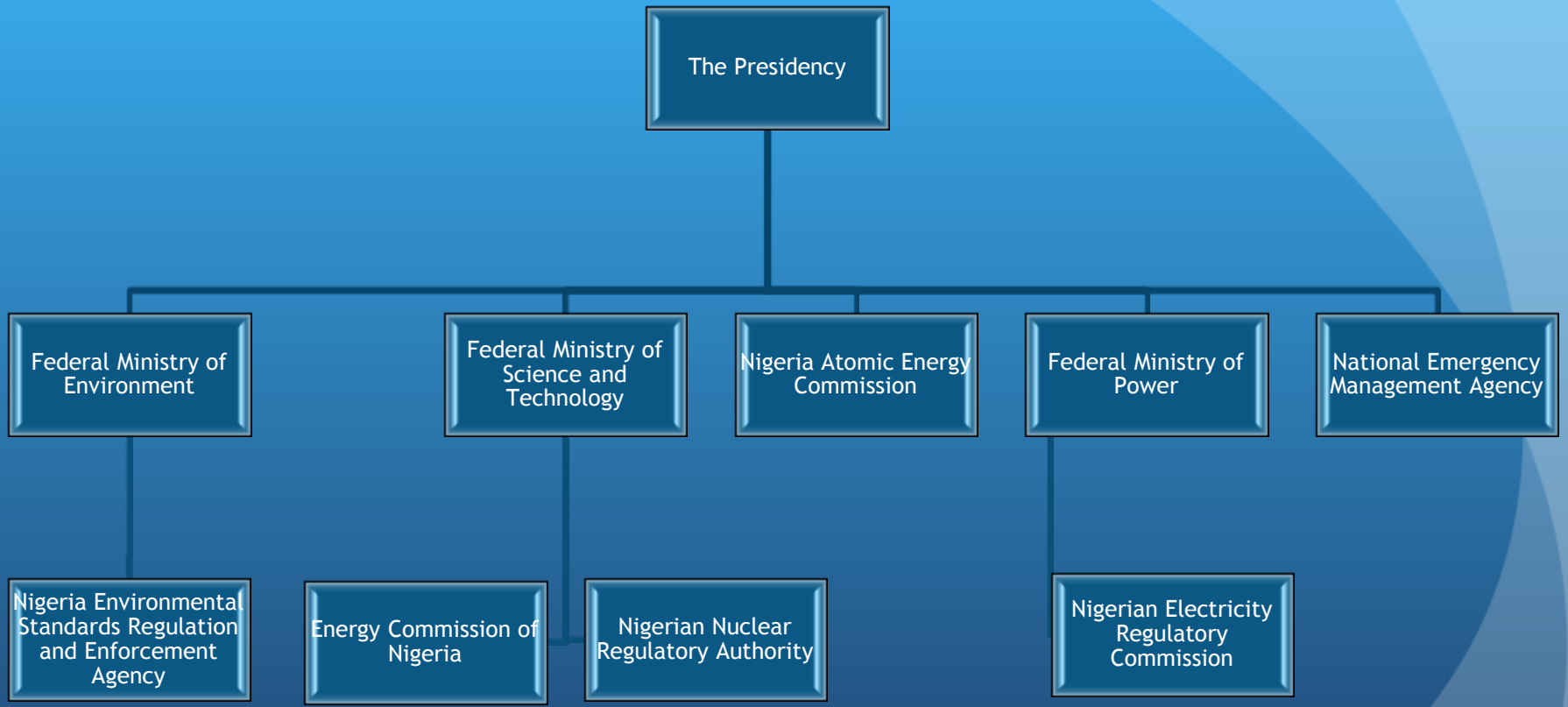
NIGERIA: Basic Statistics

- Population: 174 million (2014 est.)
- Total Installed Electricity Capacity: 10,396 MW
  - Thermal: 81%; Hydro: 19%
- Available Capacity: 6,056 MW
- Electricity Access: 51% Rural: 10%
- Per capita electricity consumption: 153kWh/cap (2012)
- National Nuclear Electricity Targets:
  - mid 2020s: 1,000 MW; 2030s: 4,000 MW
- Huge natural fossil fuel reserves: crude oil and natural gas
- Considerable renewables: solar, wood biomass
- Also some coal reserves and hydro power

Legal and Institutional Infrastructure (UR1)

- The Nigeria Atomic Energy Commission (NAEC) is the National Focal Point for the promotion and development of atomic energy; established by Act 46 of 1976.
- The Nigerian Nuclear Regulatory Authority (NNRA) is national regulator and licensing authority; established by Act 19 of 1995. Empowered to develop and enforce regulations governing all operations in the nuclear industry.
- Energy Commission of Nigeria (ECN) created by Act No 62 of 1979, with statutory mandate for strategic planning and coordination of policies on energy.
- Other relevant stakeholder institutions include:
  - National Electricity Regulatory Commission (NERC)
  - National Environmental Standards and Regulations Enforcement Agency (NESREA)
  - National Emergency Management Agency (NEMA)

Institutional Framework



Legal and Institutional Infrastructure (UR1)

- A draft law for implementation of the nation's nuclear energy programme has been developed and subjected to several reviews.
- Laws of the regulatory body have been reviewed to adequately equip the regulator to regulate and license nuclear power plants.
- Relevant international treaties/protocols/conventions have been signed. Domestication of these is currently receiving attention.
- A draft regulation on the *Safety and Regulatory Requirements for Licensing of Sites for Nuclear Power Plants* has been developed by the regulatory body.
- Draft document on *Regulations on the Safety of Research Reactors* has also reached an advanced stage.
- The *National Radiological Emergency Response Plan* has been developed and is currently being integrated into the National Disaster Response Plan of the National Emergency Management Agency (NEMA)

Legal and Institutional Infrastructure (UR1) …contd

- Nuclear energy programme is being implemented under a strategic plan with three major phases:
  - Manpower training, capacity building and infrastructural development
  - Design certification, siting, regulatory and licensing approvals
  - Construction and start-up

Industrial and Economic Infrastructure (UR2)

- Efforts are being made to map out areas of possible involvement and participation of local industries in the first reactors
- It is planned that local participation would increase in subsequent plants, following the South Korean model
- Site selection: Two out of seven sites identified earmarked for possible siting of nuclear power plants. Preliminary survey and evaluation have been carried out for these.
- The 2 sites are awaiting detailed characterisation before recommendation to government.
- Liberalisation of the electricity sector – 6 generation companies, 11 distribution companies and 1 transmission company.
- A National Integrated Power Project embarked upon by GoN to increase generation capacity to 20GW in 2015.
- The electricity grid is being expanded and redesigned to meet the challenges of increasing need for electricity generation up to 2030.

Political support and public acceptance (UR3)

- Government has demonstrated its continued support for the nuclear energy programme by providing necessary funds to prosecute the strategic plan developed by Nigeria Atomic Energy Commission.
- Government will be directly involved in the financing of the first plant, most likely a turnkey project.
- Involvement of stakeholder institutions in all major activities
- NAEC has developed programmes aimed at sensitizing the public and increasing public acceptance of the nuclear energy programme. These include:
  - Radio and television documentaries
  - Information bulletins and pamphlets
  - Town-hall meetings, exhibitions, seminars and symposia

Human resources (UR4)
Need for Nuclear Professionals

Dearth of nuclear professionals in Nigeria

- Education: Universities and research institutes
- Health care delivery: health physics, nuclear medicine
- Industrial sector
- Nuclear regulatory –regulators, inspectors, etc
- National Nuclear Energy programme
- Ministries, departments & agencies: decision making

Human Resource (UR4)

- One of the mandates of NAEC is to develop the necessary manpower for Nigeria's nuclear energy programme.
- Curricula have been developed for undergraduate and postgraduate programmes in Nuclear Engineering and Nuclear Science; also for technical and vocational institutions.
- Four universities identified to host nuclear engineering and nuclear science degree programmes at undergraduate and post graduate levels

Human Resources (UR4)- Masters' Programme Implementation Strategies

- Challenges:
  - Expertise and infrastructure not sufficient to teach all the courses in all four designated universities
  - Cumbersome moving the few experts around to teach in each of these universities
- Solutions:
  - Core courses in nuclear science and engineering offered at a centralised location for four participating universities.
  - Some courses taught with assistance of IAEA under TC project
  - Seek bilateral agreements with foreign institutions for students placement
- First batch of students have now concluded their Masters' Programmes in the universities

Summary

- A roadmap for implementation and development of Nigeria's nuclear power programme has been proposed and accepted by government.
- GoN has demonstrated firm commitment to the nuclear energy programme by taking responsibility for development of necessary infrastructure to facilitate implementation of the programme.
- Concrete plans have been established for human resource development in the field of nuclear science and engineering, for the nuclear energy programme and other sectors of the economy
- Considerable progress has been made in developing the necessary legal and institutional infrastructure for the country
- Two candidate sites have been identified for siting of nuclear power plants. Preliminary studies have been conducted for these sites.
- An INIR mission is being planned before end of this year.

Thank you for your attention