STEPS TOWARDS A NUCLEAR POWER PROGRAM IN KENYA.

Prof. Erastus Gatebe
Chairperson

erastusgatebe@gmail.com

Ministry of Health, Kenya
Outline of Presentation

- Nuclear power vision
- Technical capacity of the KRPB
- Structure and organization
- Capacity building strategy and implementation plans
- Kenya Regulatory Activities
- Conclusions
Why Nuclear?

- Increased Power Demand - Vision 2030 Flagship Project
- Expected to exceed conventional energy sources supply;
  - ICT Park
  - Second container terminal and a free port at the Mombasa Port
  - Standard Gauge Railway (Juba-Lamu), Lamu port
  - Special Economic Zones
  - Iron and Steel smelting industry in Meru area
  - Standard Gauge railway (Mombasa- Nairobi-Malaba, Kisumu)
  - Light rail for Nairobi and suburbs
  - Resort cities (Isiolo, Kilifi and Ukunda)
Nuclear to Power Vision 2030

Kenya Vision 2030
A globally competitive and prosperous nation with a high quality of life by 2030

**Economic**
To maintain a sustained economic growth of 10% p.a. over the next 25 years

**Social**
A just and cohesive society enjoying equitable social development in a clean and secure environment

**Political**
An issue-based, people-centered, result-oriented, and accountable democratic political system

**Key Enabler:**
A vibrant power sector that meets electricity required to drive flagship projects and programs

A sustained economic growth of 10% per annum from year 2015
The National Economic and Social Council (NESC), recommended in April 2010 adoption of nuclear power programme as a national priority.

1. Nuclear power incorporated in the country’s energy blueprint

2. A NEPIO, NEPC was established in 2010 and elevated to a Board, KNEB, 2012

3. KNEB carried out PFS and other preliminary technical studies

Mandate of the Board is to oversee the implementation of nuclear power programme in Kenya.
Peak Power Demand Projection for Kenya (MW)

Source: Least Cost Power Development Plan 2011/2031
The Radiation Protection Board was established in 1986 through the Radiation Protection Act, CAP 243 Laws of Kenya.

Members of the Board are appointed by Cabinet Secretary for Health; these include (i) the Chairman, (ii) Director of Medical Services, (iii) Secretary / Chief Radiation Protection Officer (CEO)
Public officer nominated by Minister for Labor, Higher Education, Industry, Agriculture, National Council for Science, Technology & Innovation,

2 Specialist members,

Kenya Defense Forces, National Intelligence Service, National Police Service, Ministry of Foreign Affairs & International Trade, Kenya Revenue Authority (Customs)
RADIATION PROTECTION BOARD
MANDATE

1. Protection of Radiation Workers, Members of the Public & the Environment from the harmful effects of Ionizing Radiation

2. Regulate the use of nuclear and radioactive materials including protection from accidental or intentional diversion

3. Publicity & Advocacy

4. Collaborative programmes (local and international - Research & Development)
Kenya is among the African IAEA member states that have made a policy decision to go nuclear. However, a knowledgeable decision is pending but efforts towards this is/are being made.

- Already, Kenya has a trained manpower base of about 50, half of which are experienced but may require regulatory training for nuclear power.
- Therefore, there is need to strengthen national capacity for planning, developing, managing and regulating an infrastructure for new or expanding nuclear power programs.
- Towards capacity building, Kenya has made arrangements, including MoUs, with local and foreign institutions of higher learning for manpower training in preparation for a nuclear power program.
- Among the institutions are the University of Nairobi, KINS and KINGS in south Korea as well as institutions in China.
1. As an Embarking Nation, the Radiation Protection Act is being revised to include regulation of Nuclear Material, NPP’s and related activities (Miscellaneous amendment 2018).


3. The board has steered the STC Bill(2018) for dual use items.

4. Non ionizing Radiation
Kenya’s NPP is Based on Milestone Approach

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

**MILESTONE 2**
Ready to invite bids for the first nuclear power plant

**MILESTONE 3**
Ready to commission and operate the first nuclear power plant

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

**PHASE 2**
Preparatory work for the construction of a nuclear power plant after a policy decision has been taken

**PHASE 3**
Activities to implement a first nuclear power plant

**OPERATION OF THE FIRST NUCLEAR POWER PLANT**

First nuclear power plant project

PRE-PROJECT

FEASIBILITY STUDY

PROJECT DECISION MAKING

BIDDING PROCESS

CONSTRUCTION

COMMISSIONING

10 – 15 years

We are here
Prefeasibility Study of Kenya’s NPP

- PFS analyzed nineteen (19) infrastructure issues as guided by the IAEA milestone approach.

- The Pre-Feasibility Study (PFS) identifies issues, considerations and preparatory steps required to introduce a nuclear power programme in the country.

- Wide stakeholder-participation involving international partners, Kenyan government, private sector institutions and civil society.
Integrated Nuclear Infrastructure Review (INIR) Mission – Phase I

- Independent review by experts on Kenya’s progress in nuclear power development.
- Conducted by a team of ten (10) international experts from 24\textsuperscript{th} to 31\textsuperscript{st} August 2015
- Participation from 40 organizations in Kenya
- Finding: Kenya has made significant progress in its preparations to make a knowledgeable decision about introducing nuclear power
- 15 Recommendation, 8 Suggestions and 4 Good Practices
- Final Report presented on 21\textsuperscript{st} April 2016
Study is necessitated by the need to determine requirements for the interface of nuclear power plant(s) to the Kenyan grid.

Study is being undertaken in partnership with relevant energy sector stakeholders – KETRACO, KPLC & REA
Reactor Technology Assessment

- Assessment of various nuclear technology options available in the world against the country conditions
- Aimed at determining feasible options for the country’s NPP
- Preliminary Draft report has been completed.
**Strategic Environmental Assessment (SEA)**

- Process by which *environmental* considerations are required to be fully integrated into the preparation of Plans and Programmes prior to their final adoption.
- This is a legal requirement (EMCA)
- The process is supervised by NEMA (National environmental regulator) and RPB as the lead agency
Nuclear Policy, Legislation & International Treaties

- The Boards (RPB & KNEB) have finalized the Nuclear & Radiation Safety Bill (2017) & Nuclear Policy through Stakeholders and public workshops.
- The Boards Build consensus with other stakeholders to have a common position nuclear legislation bill currently in place.

Ascension of International Treaties

- Convention on Nuclear Safety (the CNS) – A cabinet approval is expected any time;
- The Convention on Early Notification of a Nuclear Accident (the Early Notification Convention);
- The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (the Assistance Convention); and
Memorandum of Understanding (MoU) with established nuclear power countries

- Aimed at enhancing collaboration in the development of Kenya’s nuclear power program
- Signed MoUs with Slovak Republic and the Peoples Republic of China, Republic of Korea and The Russian Federation
- Focus of MoUs is capacity building and technical support in upfront activities for Kenya’s nuclear power program and for regulatory oversight
PLANNED ACTIVITIES

SHORT & MEDIUM TERM PLANS
Activities to be Enhanced

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<td>3. Feasibility Study – Nuclear Power Plant</td>
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<td>Activity</td>
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<tr>
<td>1. National industrial involvement survey</td>
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<td>2. Funding requirement study and development of financing plan</td>
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<td>3. Ascension of all relevant nuclear conventions and treaties on nuclear</td>
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<td>4. Development of secondary nuclear legislation</td>
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<td>5. Implementation of infrastructure for nuclear safety, safeguards and security</td>
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<td>6. National human resource survey</td>
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# Establishment of Nuclear Power Program Institutions

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<td>1. Enhancing Regulatory body (RPB)</td>
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<td>2. Owner/Operator</td>
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<td>3. Research &amp; Development Institution and Technical Support Organization</td>
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<td>4. Radioactive waste management institution</td>
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Current challenges

• The Board is seeking government assistance to carry out:

  1. needs assessment survey;
  2. nuclear capacity and capability assessment in the country;
  3. a comprehensive mapping exercise for Kenya on the Naturally Occurring Radionuclide Materials (TE-NORMS)
  4. Establish a resource Centre for nuclear security
Conclusion

- IAEA has been a great partner in the development of Kenya’s nuclear and radiation safety program;

- It is expected that in the next two years, Kenya will have the core capacity for regulating a nuclear power program.

✓ Sustainable development is more of a global than moral imperative which is inextricably linked to knowledge intensive technologies and innovations.

✓ the applications of nuclear technologies are potentially the key drivers for sustainable development but must overcome many roadblocks in their development, deployment and diffusion.
THANK YOU