Challenges and Opportunities for Small Modular Reactor Financing in Kenya

By Winfred Ndubai
Director, Strategy & Planning

IFNEC WEBINAR
May 2021
Presentation Outline

National Energy Focus and NPP Milestones

Kenya’s Consideration of Small Modular Reactors (SMRs)

SMR Competitiveness

SMR Financing Opportunities and Challenges

Concluding Remarks
National Energy Focus

Powering the Nation

Adequate Power
Reliable Power
Competitively Priced

Exponential Economic Growth
Kenya’s NPP Milestones

**Roadmap for phase 1**
- Political Decision and nuclear energy inclusion in Kenya’s energy Mix
- NPP Strategic Plan (Roadmap)
- Technical Studies (PFS, grid, siting)
- National Policies (Nuclear policy, Rad waste and NFC, NS&PP, HRD)
- Legislative & Regulatory (National nuclear law, treaty ascension)
- Missions (INIR, EPREV, IRS)

**Roadmap for phase 2**
- Setting up a comprehensive legal & regulatory framework
- Continuous Capacity building programs
- Full implementation of PFS findings
- Feasibility Study.
- Complete Development of all NPP Infrastructure

Commissioning of the first NPP in Kenya
Kenya’s Consideration of Small Modular Reactors (SMRs)

- Nuclear power generation has been incorporated in the country’s long-term energy plan.
- Initial nuclear power capacity considerations was projected to be from large reactors (LRs) due to optimistic power demand growth ~ Kenya Vision 2030.
- Revision of additional capacity to incorporate SMRs attributed to slower than expected growth in power demand.
- Country seeks to accrue added benefits related to SMR technologies.
Positioning of Kenya for SMRs

• Relatively small national power grid ~ 3000MW
• Reduced impact of capital costs ~ enhanced affordability
• Modularization – cost savings for multiple units on same site, spaced investment
• Numerous and diverse technologies
• Smaller and simpler technology options
SMR Competitiveness

- SMR competitiveness, relative to LRs, is lowered due to reduction in economies of scale
- Despite size and diseconomies of scale disadvantage, SMR competitiveness is enhanced by factors such as:
  - Possible shortening of construction time
  - Potential for load following and cogeneration (desalination, district heating, hydrogen production)
  - Modularity allowing incremental construction of reactors
  - Factory fabrication potentially reducing maintenance costs during operation due to improved quality of components
SMR Financing Opportunities

• Opportunities for the Country;
  ▪ Cost savings from design simplifications
  ▪ Lower capital requirements on average compared to LRs
  ▪ Reduced interest during shorter construction time
  ▪ Cost of financing can be reduced by possible shortening of construction time
  ▪ Financing can be enhanced by power purchase agreement with off taker (*where PPAs apply*)
SMR Financing Challenges

• Potential challenges for SMR Financing;
  ▪ Proven technology requirements
  ▪ Cost consideration due to risks associated with a first project and SMR technology
  ▪ Lower profitability relative to LRs – diseconomies of scale (*this can be eliminated incrementally*)
Concluding Remarks

• Generation tariff (LCOE) competitiveness
  • Need for detailed analysis of metrics that can improve SMR competitiveness in the Kenyan power system

• Consideration of SMR competitiveness may be driven by factors other than size
  • Need for detailed analysis of the extent to which other factors such as decarbonization and integration with variable renewable energy generation may influence investors’ decisions
Thank You!

Questions?