Topic C-1: Siting

- **Description:**
  - Site specific parameters affecting the plant design.

- **Importance factor rationale:**
  - Interaction between site characteristics and the features of the proposed SMR design may be a strong differentiator; for example, design features that have been included in a certified design in country origin to be deployed in user countries with significantly different site characteristics and external events/hazards.

- **To be discussed by Group-C:**
  - Site size requirements, boundary conditions, site structure plan: single or multi-unit SMR plant.
  - Heat sink temperature, condenser cooling water source and extent of water resources
  - Specific natural hazards in MENA region: seismic, flooding, sand storms; dry/wetlands.
Topic C-2: Licensing

• Description:
  • The official process of authorization granted by the regulatory body to the applicant to have the responsibility for the siting, design, construction, commissioning, operation or decommissioning of a nuclear installation.

• Importance factor rationale:
  • The actual operating performance of the 3 SMRs of different design & technology currently in final-stage of construction will only be known after 2019 – 2020.

• To be discussed by Group-C:
  • Available support after plant commissioning, including plant operation and maintenance for deployment in embarking countries
  • The need of full-scope simulators and operator training programme
  • Issues, challenges and new approach for on-line and off-line maintenance programme for near-term deployable SMR with new design features, e.g. in-vessel steam generators, underground construction, and so forth.
**Topic C-3: Regulatory Framework**

- **Description:**
  - Framework of system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

- **Importance factor rationale:**
  - Considering specific design, technology and siting features of SMR: Emergency Planning Zone (EPZ) size, Graded Approach and Defence-in-Depth were identified as the key enabling issues/challenges for deploying an SMR currently being addressed in the SMR Regulators Forum.
  - Sharing regulatory experience amongst nuclear power countries preparing to license SMRs and capacity building for embarking countries interested in SMR are crucial for successful deployment.

- **To be discussed by Group-C:**
  - Region-specific, i.e. MENA’s potential safety case for SMRs.
  - Additional safety requirements due to regional site characteristics.
  - Participating countries’ current and near-future activities on emergency preparedness and response, particularly EPZ size determination.
Key Findings - Siting considerations

• Public opinion and politics is key
  • Environmental and site conditions are seemingly secondary considerations – at this point of time

• Main drivers for site selection:
  • Regional access to water – coastal sites preferred
  • Security
  • Proximity to protected areas (e.g., heritage sites, holy places, tourist areas, fishing zones)
  • Proximity to hazards (e.g., shipping lanes, oil fields)

• Site considerations in embarking countries are already helping to substantiate FOAK designs
Key Findings - Licensing

- Embarking countries are considering legal and regulatory framework development at the same time they are selecting sites
  - No licensing experience in embarking countries
- FOAK SMR challenges
  - New technologies have not been validated in experienced nuclear countries
  - Challenge with public acceptance if unanticipated problems or delays occur
  - Multiple uses and types of SMRs require coordination among ministries/countries
- Recognize importance of training and spent fuel management
Key Findings - Regulatory framework

- Embarking countries have regulations for controlled nuclear materials but these don’t include nuclear power
- Governments are considering establishing the regulator for NPPs
- Regulatory framework may be imported alongside the vendor technology – needs to accommodate research reactors and SMRs
- Opportunity and challenge for nuclear to set the standard for regulating other industries
Conclusion

• Thank you very much
• Asante Sana
• Shukran jazelan
• Kamsahamnida
• Merci
Siting – public opinion and politics is key

- Kenya, coastal and lake deployment options – infinite heat sink, population, Seizmicity, faulting, hydrology and metrology etc. Ranking of attributes following by a MADA (multi-attribute decision analysis). 3 regions identified. Note that politics is key to decision making. Practicalities include the need to develop infrastructure in the northern candidate site and they are taking advantage of oil development infrastructure. A regulatory body is currently being established and is a key point. Security is also a consideration and is a point against siting on the northern coast next to somalia. Lake Victoria is an issue as it is the source of the blue nile and the lake is shared with uganda and tanzania. Lake tukana is located in the rift valley with high volcanic activity and also feeds into ethiopia. Grondwater contamination is also a key concern.

- Saudi – requirement for desalination and electricity / heat for refineries / industry. Sites on the coast. External hazards being considered and will be finalised when sites are selected.

- Tunisia – the main requirement is for electricity security of supply and cost reduction. Issues of siting next to coast. Seizmicity in the north is high and public opinion is yet to be overcome in the south where there are already issues with heavy industry.

- EPZ is important if there is a requirement to site near to industry plants. New regulation of distance from holy sites with possible a 100km exclusion could come into force in Saudi Arabia. EPZ issues include considering the safety of neighbouring industrial plants, would need to expand if additional units are added and consider critical systems. Its important for vendors to demonstrate safety at close proximity to plants or people to increase their market reach.

- SMART design is being adapted for Saudi Arabia. For inland sites they would turn to a dry cooling design, with consideration of dust storms – operational cost implications are unknown at present and would need to be studies. Coastal sites are much more suitable. Other industrial plants could advise on maintenance issues – potential for new learning from extreme environments here.

- How do extreme environments challenge nuclear codes and standards. Is there an opportunity for reducing conservatisms with long term testing of materials and/or taking data from petrochemical plants?
Additional Thoughts

• Licensing

  o Experience in new designs including HTRM in china 2019, CAREM in Argentina 2019, Russian barge mounted design, Nuscale 2026 in the US, SMART in Saudi in 2026 will be key to understanding issues including maintenance, inspection. There wont be examples of complete licencing process until 2026. So what new entrants do now is important including training operators, maintenance regimes etc.

  o Tunisia – Each region in Tunisia will make the decision about building a plant. The site selection will require permission from local authorities to change land use. STEG is a state owned company that will likely be the company that deploys the nuclear plant. There is a law created for agencies on safety and waste management, however there is no licencing process yet to be defined.

  o Saudi Arabia – working with Finland and Korea to set up their regulatory body. The regulatory body is not yet independent from K.A. CARE which is the research / deployment body. But this is likely to evolve.

  o Important that in licencing you need to evaluate other aspects such as security, safeguards and environmental assessment.

  o IAEA guidance suggests one regulator for all nuclear material.

  o Kenya has regulations for conventional nuclear sources but these don't consider nuclear power. The parliament is considering setting up the regulator, There could be a case for the regulatory framework to be imported alongside the vendor technology.