Challenges in Legal Regulation of Life Cycle of Small Modular Reactors and Transportable Nuclear Power Plants

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General information on SMR/TNPP

- Small Modular Reactor or Small/Medium Sized Power Reactors

- TNPP - factory manufactured, transportable and/or relocatable nuclear power plant which, when fuelled, is capable of producing final energy products such as electricity, heat and desalinated water (IAEA publication: Legal and Institutional Issues of Transportable Nuclear Power Plants: A Preliminary Study)

- Development of Gen III+ / IV leading to development of new technologies, including modular reactors

- Modular reactors possess enhanced safety and smaller footprint than conventional reactors
SMR classification

1) Size – Small (<300 Mw) / Medium (<700 Mw)

2) Siting & Deployment area - Land based / Floating (Submersible)

3) Technology - High Temperature/Water cooled/ Fast Neutron/Molten Salt etc.

4) Fuel – Factory fueled/Fueled on site

5) Usage model – Domestic use / Export (EPC, BOO(T) etc.)
Legal Framework

International Instruments

Generally applicable to SMRs, no change required

Laws

Applicable to SMRs

Regulations

Require amendment to be applicable or new legislation required
Areas of Nuclear Law

- Nuclear Liability
- Nuclear Safety
- Safeguards
- Nuclear Security
Applicable instruments:

- Convention on Early Notification of a Nuclear Accident (*fully covered*)
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (*fully covered*)
- Convention on Nuclear Safety (*not covered*, but may be voluntarily reported)
- IAEA Regulations for the Safe Transport of Radioactive Materials (*require analysis, may require amendment*)

*However, non-land based SMRs are not specifically mentioned in international instruments*
Possible issues:

- Radioactive materials are required to be transported in package
- SMRs are not excluded from the scope of CNS, but regulations expressly apply only to land-based NPPs

Possible solutions:

- States may voluntarily include information about non land based SMRs in their national reports under CNS
- IAEA and national regulations may require modification to indicate that SMRs are “packages”
Applicable instruments:

- Convention on the Physical Protection of Nuclear Material (CPPNM) (partly covered by the original CPPNM, fully by Amendment)
  - Amendment to CPPNM broadens application scope:
    ✓ Physical protection of facilities
    ✓ Requirements for physical protection in domestic use, storage and transport...etc.

- International Convention for the suppression of acts of Nuclear terrorism (fully covered)

- International Convention for the suppression of terrorist bombings (fully covered)

- UN Security council resolutions 1373, 1540, 1673 etc. (fully covered)
Possible issues:

- Physical protection requirements of the supplier state and host state may differ
- Transfer of responsibility for nuclear security and physical protection after transportation of SMR may be complicated

Possible solution:

- Physical protection requirements of the host state should be taken into account early on the design stage
- Issues can be addressed in an agreement between the Supplier State and the Host State
Applicable instruments:

- Treaty on the Non-Proliferation of Nuclear Weapons (NPT)
- Regional treaties (Pelindaba Treaty and Cairo Declaration, Rarotonga Treaty, Treaty of Bangkok etc.)
- Safeguards Agreements with the IAEA (CSA and VOA + Additional Protocol)
- Etc.

ALL INSTRUMENTS ARE APPLICABLE
Possible issues:

- NWS is not obliged to make SMR eligible for safeguards under VOA and IAEA is not obliged to select it for safeguards implementation
- Multi state projects when conflict of territory/control issue arises; which safeguards agreement will be applied?

Possible solutions:

- Issues can be addressed in an agreement(s) between the Supplier State and the IAEA and the Host State and the IAEA or in a single agreement between the states and the IAEA
Applicable conventions:

- Paris Convention (and Brussels Convention) + Revisions
- Vienna Convention + Revision
  - VC is applied to “any nuclear reactor other than one with which a means of sea or air transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose”
  - Official Records of the 1963 International Conference on Civil Liability for Nuclear Damage: “The fact that they [reactors] could be transported should not exclude them from the Convention”
- Convention on Supplementary Compensation for Nuclear Damage (CSC)
Possible issues:

- When the Supplier State and Host State are parties to different TPL conventions the exact moment of liability transfer is unclear, as there is no practical “unloading of nuclear material”
- The amount of liability under the revised TPL conventions may be burdensome for the project

Possible solution:

- Issues can be resolved by introduction of interpretations of TPL conventions and addressed in an agreement between the Supplier State and the Host State
- Host states may establish a lower liability amount in certain cases but will have to provide compensation up to the limit
Conclusions

- SMRs and TNPPs are generally covered by the existing International Nuclear Law instruments.
- Few conventions and treaties may require additional interpretation.
- Some “soft” law instruments require additional analysis and may require amendment.
- A thorough analysis of national laws and regulations is required and further revision and optimization is likely to be performed.
Thank You for Attention!