IAEA-INPRO collaborative Project on Transportable Nuclear Power Plants

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The International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) assists Member States in implementing sustainable nuclear energy, one of the ways being by initiating collaborative projects on transportable nuclear power plants.

Definition:

A transportable nuclear power plant (TNPP) is a factory-built, mobile, and/or relocatable nuclear facility that, when fuelled, can generate end-use energy products like electricity, heat, and desalinated water.

A TNPP offers a novel solution to growing energy demands, being particularly suitable for diverse settings such as remote and harsh environments.

History

Historically, marine-based nuclear power started in the 1960s where the United States launched a floating nuclear power plant, the Sturgis, in January 1967 in the Panama Canal where it provided electricity for the city and canal operations until 1976.

Rosatom commissioned the Akademik Lomonsov in May 2020 in northeast Russia to supply electricity to the city of Pevek, consisting of 2 KLT-40S nuclear reactors, for 70 MW electricity and 50 Gcal/h heat. The refuelling schedule is 3-3.5 years with a fuel cost 1.5 times lower in the overall cost of electricity production.

IAEA International Symposium on Floating Nuclear Power Plants (FNPP)

The first IAEA International Symposium on FNPPs, 14-15 November 2023, attracted 168 participants from 44 Member States and four International Organizations. This event united a diverse array of stakeholders crucial to the development and deployment of FNPPs, including representatives from the nuclear and maritime industries, regulatory bodies, maritime classification societies, and legal experts. INPRO, alongside NS and other departments, played a pivotal role in organizing the symposium.

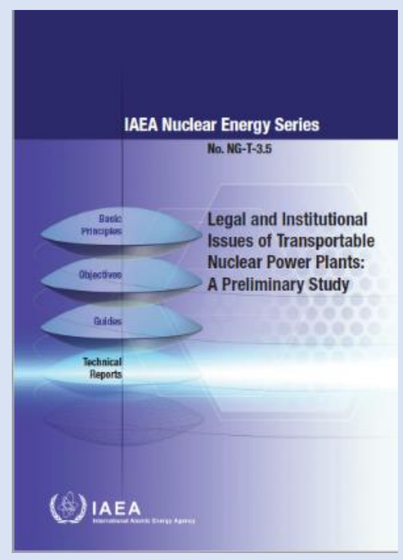
The symposium yielded several significant outcomes, most notably raising awareness among key stakeholders about challenges and the importance of enhanced coordination and awareness – building.

There was a consensus on the need to unite major stakeholders within a coordinated or cooperative framework. The symposium highlighted four key focus areas for future FNPP projects:

1. Industry Cooperation: Collaboration between developers and shipyards for efficient production.
2. Regulatory Cooperation: International collaboration for export licensing and safety standards.
3. Industry/Regulatory Coordination: Early alignment to ensure regulatory readiness.
4. Safety, Security, and Safeguards (3S): Early integration into design to address unique FNPP challenges.

Case Studies for TNPP-1

The INPRO collaborative project conducted a preliminary study from 2008 to 2013, on Transportable Nuclear Power Plants (TNPP-I) documented in the NE Energy Series Technical Report No. NG-T-3.5.



The study aimed to examine legal and institutional challenges, including ownership and contracts for TNPP deployment, identify challenges, and analyse the impact of TNPPs on the infrastructure of recipient countries.

Two TNPP options were considered:

- factory-assembled, fuelled, and tested reactors,
- factory-assembled and pre-tested reactors with on-site fuelling.

Two scenarios for legal and institutional frameworks were analysed:

- The supplier operates and the host state regulates,
- The host state entity operates and regulates.

INPRO Case Study on TNPP-2

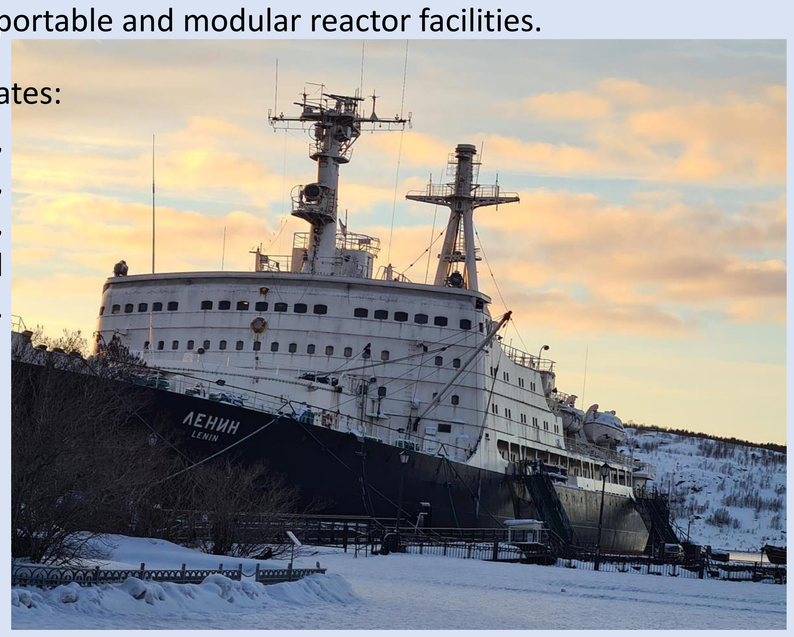
The INPRO collaborative project on Transportable Nuclear Power Plants (TNPP-II) initiated in 2015, marks a collaborative effort between member states and various IAEA departments.

The study aimed to This comprehensive study aims to explore the legal and institutional complexities involved in the export deployment of a specific type of TNPP with a factory-fuelled, tested, and sealed reactor. Additionally, it examines broader aspects of transportable and modular reactor facilities.

Participating Member States:

Armenia, China, France, Finland, Indonesia, Romania, Russian Federation, and the USA.

The study is currently in the publication process.



Preliminary Conclusions:

- The case study TNPP-1 analysed various aspects of FNPPs, including infrastructure, safeguards, legal, safety, regulation, security, and international legal instruments. It highlighted the need for IAEA verification, legal clarity, and coordination for nuclear security.
- Export challenges for transportable nuclear modules (SMRs) span their entire lifecycle, requiring compliance with international norms and IAEA standards, focusing on legislative, safeguards, safety, licensing, and security issues.
- Four focus areas for FNPP projects: industry cooperation for efficient production, regulatory cooperation for international collaboration, early industry/regulatory coordination for licensing readiness, and the integration of safety, security, and safeguards from the design phase and throughout the lifecycle.

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