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SUSTAINABILITY ASSESSMENT OF INFRASTRUCTURE FOR SMALL MODULAR REACTOR DEPLOYMENT IN VIET NAM USING INPRO METHODOLOGY

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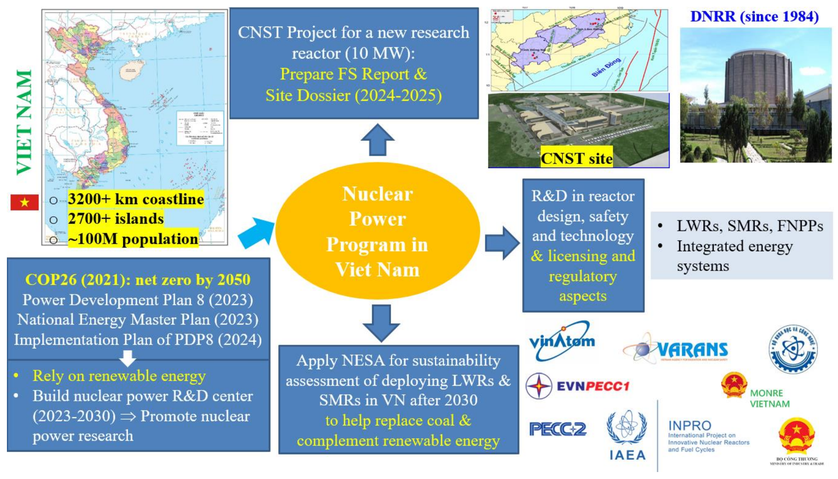
I. INTRODUCTION

This work

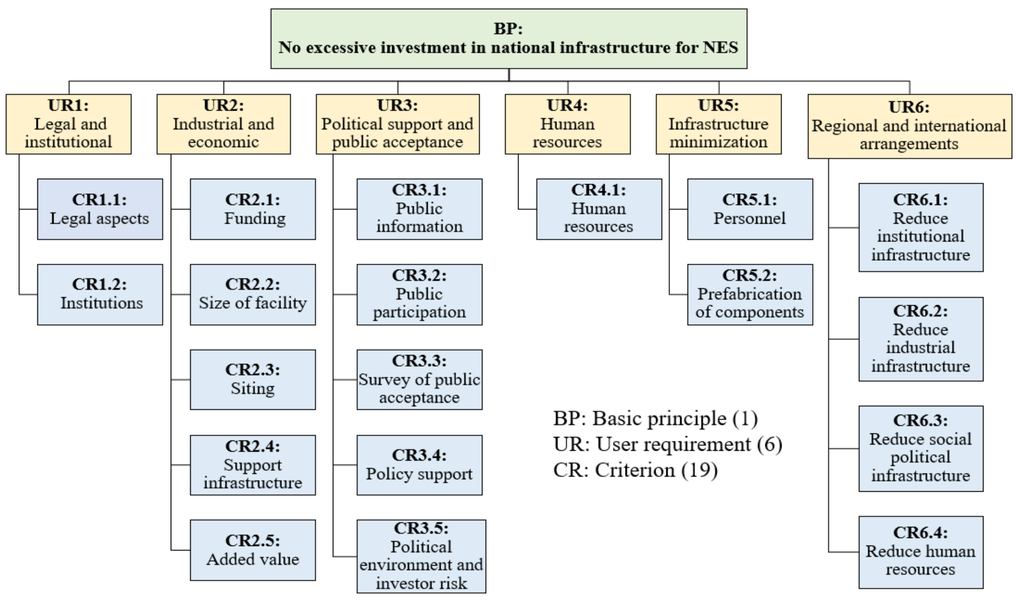
Performed a limited-scope sustainability assessment of infrastructure for possible future SMR deployment in Viet Nam using INPRO methodology



✓ To identify current infrastructure issues which need to be solved to facilitate SMR deployment in Viet Nam (VN)

II. ASSESSMENT METHODOLOGY

- Selected Technology: LW-SMRs
- Based on existing nuclear infrastructure (Ninh Thuan (NT) NPP projects)



Main input data: from Agency's Integrated Nuclear Infrastructure Review (INIR) Mission for VN during 2012-2014 with necessary updates from current status

III. RESULTS & DISCUSSION

III.1.UR1 : Legal and Institutional Infrastructure

UR1: An adequate legal framework should be established	
CR1.1: Legal aspects	➢ **CR1.1 is mostly met** ➢ Legal framework & regulations (from NT NPP projects) follow international standards. **For future NPP projects (including SMRs)** ➢ AE Law is recommended to be amended considering IAEA INIR recommendations ➢ Timely issue missing regulations before startup of planned NPP projects
CR1.2: Institutions	➢ **CR1.2 is mostly met** ➢ State organizations for nuclear power program were established during NT NPP projects • Follow international standards • Structure can be utilized & optimized for future SMRs deployment

III.2. UR2 : Economic and Industrial Infrastructure

UR2: The industrial & economic infrastructure of a country with a NES should be adequate	
CR2.1: Funding of infrastructure	➢ **CR2.1 is met.** ➢ Approved Master Plan for nuclear power infrastructure (from NT NPP project) is recommended to be revised and updated in case of future SMRs deployment.
CR2.2: Size of nuclear facility	➢ **CR2.2 is mostly fulfilled.** ➢ Should establish a clear plan for final radioactive waste disposal. ➢ Revise PDP8 and Master Plan VIII to evaluate impacts of including SMRs in energy mix on overall grid stability
CR2.3: Siting	➢ **CR2.3 is met** ➢ Site selection and evaluation were performed for NT NPP projects • Follow international standards • Can be inherited for SMRs deployment scenarios
CR2.4: Support infrastructure	➢ **CR2.4 is fulfilled.** ➢ Had a master plan for developing national nuclear infrastructure. ➢ Support infrastructure of the country should be reassessed and minimized in case of SMRs
CR2.5: Added value	➢ **CR2.5 is partially met.** ➢ Approved "*National Project on Public Information and Communication for the Development of Nuclear Power in Viet Nam up to 2020*" ➢ Associated activities were performed by relevant ministries and organizations. ➢ Added value of nuclear power programme has not yet been quantitatively studied. • Carry out a study in the case of SMRs.

III. RESULTS & DISCUSSION (cont'd)

III.3. UR3: Political Support & Public Acceptance

UR3: Adequate measures should be taken to achieve and maintain public acceptance of an NES	
CR3.1: Public information	➢ **CR3.1 is mostly met** ➢ Had a clear policy and actions on public information and communication . • Resume past activities if country comes back with a nuclear power program
CR3.2 - Public participation was not assessed.	
CR3.3: Survey of public acceptance	➢ **CR3.3 is largely satisfied** ➢ The political risk of policy support can be learnt from NT NPP projects and need to be considered for the case of SMRs. ➢ Public acceptance and political support can be easier to be obtained for SMRs
CR3.4: Policy support	➢ **CR3.4 is considered partially met.** ➢ Nuclear power and its innovations, such as SMRs, can play a role in Viet Nam's energy transition to reach the net zero target. ➢ Carefully consider nuclear option in the energy mix
CR3.5: Political environment and investor risk	➢ **CR3.5 is not assessed** (still has no plans for building NPPs) ➢ In case of SMRs • Can be completed in significantly shorter time and lower budget

III.4. UR4: Human Resources

UR4: The necessary human resources should be available	
CR4.1: Human resources	➢ **CR4.1. is mostly satisfied** ➢ Established a national programme, education & training system on human resources development • Can be reactivated and updated for use in case of deploying SMRs.

III.5. UR5: Minimization of Infrastructure

UR5: The NES should be designed to minimize the necessary infrastructure	
CR5.1: Personnel	➢ **CR5.1.1 was not assessed** (no available information)
CR5.2: Prefabrication of components	➢ **CR5.2 is met** when deploying SMRs • Fabricated in factory in country of origin & transported to construction site. ➢ Carefully consider the participation of national industry in SMR projects.

III.6. UR6: Regional & International Arrangements

UR6: Regional & international arrangements should provide options to minimize the infrastructure	
CR6.1: Options to reduce institutional infrastructure	➢ **CR6.1 is fulfilled.** ➢ Consider the simplification & international harmonization of licensing to reduce investment in institutional infrastructure & facilitate the deployment of SMRs. • Using graded approach, • Harmonization of prescriptive & goal-setting regulatory approaches • Adoption of standards of supplier country
CR6.2: Options to reduce industrial infrastructure	➢ **CR6.2 is satisfied.** ➢ This options should be considered when deploying SMRs • Type of contracts, way of managing spent fuel
CR6.3: Options to reduce social political infrastructure	➢ **CR6.3 is met.** ➢ Should consider enhancing regional/international cooperation • To help increase public acceptance & trust in nuclear power • Facilitate the SMR deployment if planned.
CR6.4: Options to reduce human resources	➢ **CR6.4 is fulfilled.** ➢ VN has been in good collaboration with various advanced nuclear countries & international organizations • Can be readily enhanced in case of deploying SMRs.

IV. CONCLUDING REMARKS

- The overall results are positive, currently existing national nuclear infrastructure can be utilized & adapted for deploying LW- SMRs.
- The country should prepare the legal & regulatory framework for SMRs to cover the novel features of SMRs.
- Provide policy makers with initial recommendations on how to develop adequate infrastructure for future SMR depoloyment

FUTURE WORKS:

- Improving the results by analysing more comprehensive & detailed input data.
- Performing a full-scope sustainability assessment of deploying SMRs in VN

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