

25th INPRO Dialogue Forum on Nuclear Energy Development in Embarking Countries

Breakout Session – Group 2

Strategic Planning for Embarking countries

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Topic 1: What are the key priorities for a newcomer country when planning its nuclear energy strategy? *(e.g. institutions, regulation, infrastructure, public trust)*

1. Diagnose National Challenges and Clarify Objectives

- Clearly define the present issues nuclear energy is meant to address: **energy security, energy affordability, decarbonisation, industrial development**, etc.
- Evaluate the **expected revenue streams** of a nuclear power plant, including possibilities for electricity exports, long-term financial viability, and macroeconomic impacts.
- Ensure alignment with **national development plans, security strategies**, and overall national goals.

2. Build Strong Governance and Policy Foundations

- Identify the **policies, regulations, and legal instruments** that must be put in place to support a nuclear programme.
- Ensure **strong government involvement** to guide decisions, coordinate institutions, and maintain continuity.
- Establish **cross-institutional working groups** to manage specific milestones and deliverables.

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3. Develop Human and Institutional Capacity

- Plan for the **human resources** needed throughout all phases of the nuclear programme (pre-project, construction, operation, decommissioning).
- Prioritize **capacity building**, education, and training programmes in universities, technical institutes, and utilities.
- Foster long-term institutional knowledge retention.

4. Strengthen Public Awareness and Stakeholder Support

- Develop clear strategies for **public communication**, transparency, and engagement.
- Build support among all stakeholders—local communities, industry, civil society, academia, and media.
- Ensure durable backing across the **entire political spectrum**, since nuclear power is a multi-decade commitment.

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5. Establish Robust Technical and Siting Foundations

- Identify suitable **siting options** based on safety considerations, environmental requirements, grid capacity, and local public support.
- Plan for **nuclear fuel strategy**, including supply security, fuel cycle options, and long-term commitments.
- Assess grid readiness and plan necessary reinforcements.

6. Develop Localization and Industrial Participation Strategies

- Formulate a **localization strategy** to involve domestic industries in construction, operation, supply chains, and maintenance.
- Recognize that nuclear is a **long-term industrial partnership**—select supply chains and technology vendors with geopolitical stability and reliability in mind.

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7. Build International Partnerships

- Cooperate with **experienced nuclear countries** and engage in peer-to-peer exchanges.
- Share lessons learned with other newcomer countries.
- Use the **IAEA** as a central platform for guidance, benchmarking, and exchange of experience.

8. Plan for Timely Delivery and Long-Term Programme Sustainability

- Ensure that implementation plans are designed to **meet national objectives on time** and within budget.
- Anticipate and manage long-term needs: operation, fuel, waste management, decommissioning, and continuous regulatory oversight.

Topic 2: How should nuclear energy be positioned in the long-term energy mix, and how can plans adapt to changing energy needs?

1. Start from Today's Energy Mix and Local Context

- Conduct a clear assessment of the current **energy mix**, infrastructure, and national energy priorities.
- Analyze demand patterns by sector: **where electricity is consumed**, how much, and which future end-uses will drive growth (industry, transport, buildings, data centers).

2. Understand Future Demand and Load Curve Evolution

- Identify how **load profiles will evolve** with electrification of transport, heating, and industry.
- Consider new high-demand users such as **data centers**, hydrogen production, and industrial clusters.
- Evaluate the impact of energy efficiency, digitalization, and social trends on demand variability.

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3. Consider Technology Characteristics and System Integration

- Compare technologies based on their technical attributes: **Intermittency** and variability of solar and wind, **Dispatch characteristics**, **Scalability and modularity** of SMRs, **Predictable baseload** from nuclear
- Recognize that nuclear **does not solve every system issue**, nor is it always the cheapest marginal kilowatt-hour, but it provides reliability, long-term price stability, and resilience.

4. Nuclear as a Pillar of Decarbonization and Net-Zero Pathways

- Nuclear is often essential for countries pursuing **Net Zero** or deep decarbonization
- Nuclear **system value**—especially for grid stability—should be integrated into planning tools.

5. Build a Holistic View of the Future Energy Mix

- Plan for the combination of **solar, wind, hydro, biomass, geothermal, nuclear, and storage**.
- Consider **hydrological shifts** (climate-driven variability), land availability, and environmental constraints.

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6. Value Grid Services and System Stability

- Nuclear provides essential grid services such as: Inertia, frequency control, voltage support, stable baseload in periods of low renewable output
- These contributions should be **recognized and valued** in long-term system planning and market design.

7. Evaluate Risks, Sensitivities, and Supply Chain Constraints

- Test long-term plans against uncertainties: variability in demand, fuel price volatility, renewable output fluctuations, hydrological uncertainty
- Consider global nuclear expansion and potential impacts on **uranium supply**, enrichment, and fuel fabrication capacity.
- Ensure plans are **realistic** given domestic financing and human resource capabilities.

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8. Address Socio-Economic and Regional Dynamics

- Consider the social impacts of structural changes—for example, transitioning from coal mining to nuclear-related employment.
- Stable nuclear supply supports **industrial development**, high-value manufacturing, and regional economic diversification.
- Plan for community engagement, workforce transition, and regional benefits.

9. Sustainability Through Programme Continuity

- To capture full benefits and retain institutional knowledge, a nuclear programme should involve a **series of units**, not isolated projects.
- Continuous construction maintains human capital, enhances localization, and reduces costs through learning.

Topic 3: What are effective ways to ensure stakeholder input is reflected in nuclear policy decisions?

1. Establish Transparent and Inclusive Stakeholder Processes

- Create mechanisms for **regular feedback** from stakeholders on key policy decisions. Involve finance, environment, interior, defence ministries, etc.
- Maintain transparency on goals, timelines, risks, and decision criteria to build trust.
- Ensure that both supporters and potential opponents are **kept informed and included** in the dialogue.

2. Engage Local Communities Early and Continuously

- Involve communities from the **earliest stages** of planning, especially those near potential nuclear sites.
- Address local concerns through open dialogue, community meetings, and accessible information.
- Demonstrate consistency, openness, and **institutional competence** to reassure local populations.

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3. Share Benefits Fairly and Visibly

- Design benefit-sharing mechanisms that deliver value to both the **immediate host community** and neighbouring regions.
- Develop local development strategies tied to the project: infrastructure, jobs, education, training, and services.
- Ensure communities see tangible advantages from hosting a nuclear facility.

4. Build a Comprehensive Public Engagement Strategy

- Develop a structured plan for communication and engagement: outreach campaigns, public consultations, education programmes, digital engagement channels
- Prioritise clarity, consistency, and evidence-based messaging.

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5. Demonstrate Competence and Follow International Best Practices

- Adopt and communicate adherence to **international guidelines and safety standards**, such as those from the IAEA.
- Highlight strong regulatory oversight, professional expertise, and a proven safety culture.
- Use independent assessments and transparent reporting to strengthen credibility.

6. Ensure Stakeholder Perspectives Influence Decisions

- Create formal pathways for stakeholder inputs to be incorporated into policy: advisory groups, public comment periods, structured feedback loops
- Document how inputs were considered and how they influenced decisions—this reinforces trust and accountability.

Recommendations for the IAEA

- Expand and Better Communicate the IAEA Learning & Training Platform
- Organize more meetings/events like the INPRO Dialogue Forum which is a good opportunity to exchange among Member States