INPRO DIALOGUE FORUM 8:
TOWARD NUCLEAR ENERGY SYSTEM SUSTAINABILITY
ECONOMICS, RESOURCE AVAILABILITY AND INSTITUTIONAL ARRANGEMENTS

INFRASTRUCTURE FOR NUCLEAR POWER DEVELOPMENT IN VIETNAM

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07 candidate sites, each site is potential to construct from 4-6 units.

The tentative capacity for each plant:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ninh Thuan 1 phase 1, unit 1+2</td>
<td>1000 × 2</td>
</tr>
<tr>
<td>Ninh Thuan 2 phase 1, unit 1+2</td>
<td>1000 × 2</td>
</tr>
<tr>
<td>Ninh Thuan 1 phase 2, unit 3+4</td>
<td>1000 × 2</td>
</tr>
<tr>
<td>Ninh Thuan 2 phase 2, unit 3+4</td>
<td>1000 × 2</td>
</tr>
<tr>
<td>5 tentative sites (4 ÷ 6 units for each)</td>
<td>1000 or 1300 ÷ 1500 (after 2025)</td>
</tr>
</tbody>
</table>
Development of civilian nuclear power plants (NPPs) is of peaceful purposes.

NPPs development is based on State-of-the-Art, Proven Technologies and follows the long term program to formulate the Vietnam’s NPP Industry.

NPPs development is to ensure human and environmental safety.

Intensive international cooperation in investment and technology transfer.

Mobilize the resources to develop successfully the NPPs Development Program.

Construction of NPP at the selected sites in the period in consistence with socio- economic development of the country.
DEVELOPMENT POLICY

- **Investment policy**
  - First four units of Ninh Thuan are assigned to Vietnam Electricity as Project Owner.
  - The next units will be considered to assign to other State Owned Corporations or Joint Ventures.

- **Technology policy**
  - Selection of modern, safety and proven technology as well as possibility of technology transfer.
  - Unit size: the first four units of 1,000 MW.
  - After 2025: higher unit size.

- **Localization policy**

- **Fuel policy**: up to 2030, the fuel is imported.

- **Radioactive waste management**:
  - Low radioactive waste and spent fuel are stored at NPP, Conducting sitting for long-term low and medium radioactive waste disposal.
Partnership with the countries owning nuclear technology, having rich experiences in construction, operation of NPP and international organization being ready to help Vietnam in building legislative system, transferring technology

- Firm commitments on the safe, secure and peaceful implementation of nuclear power for the long term.

- Cooperation with International Organizations and other countries in RCA and participation in FNCA of related Programmes.

- Cooperation in ASEAN: Nuclear Energy Cooperation - Sub Sector Network (Legislative Framework, PR, PA, HRD...)

Enlist the support of IAEA via TC Projects related to nuclear infrastructure development, TC Projects related to nuclear energy.
Site investigations and surveys, reactor type selection, total cost estimation, etc.

Developed in parallel with the development of infrastructure for construction of the two first NPPs, construction of PRC, etc.
INFRASTRUCTURE DEVELOPMENT STATUS

- **MILESTONE 1**: Ready to make a knowledgeable commitment to a nuclear programme
- **MILESTONE 2**: Ready to invite bids for the first NPP
- **MILESTONE 3**: Ready to commission and operate the first NPP

**WE HERE**

- **PHASE 1**: Considerations before a decision to launch a nuclear power programme is taken
- **PHASE 2**: Preparatory work for the construction of a NPP after a policy decision has been taken
- **PHASE 3**: Activities to implement a first NPP

**1st NPP project**

- Pre-project
- Project decision making
- Construction
- Operation / decommissioning

**10 - 15 years**
NUCLEAR INFRASTRUCTURE - KEY ISSUES

- Regulatory and legislative framework
- Human resources development
- Nuclear safety and safeguard
- Radiation protection and physical protection.
- Emergency planning
- Nuclear fuel and radioactive waste management
LEGISLATIVE AND REGULATORY FRAMEWORK

Law
- Atomic Energy (6/2008)

Decrees of the Government
- Regulation & Guidance on implementing some Articles of the Law (07/2010/ND-CP);
- Detailed Regulation & Guidance on Implementing Some Articles of the Law relating to NPP (70/2010/ND-CP)
- Developing Orientation; Regulation on nuclear control; Training & Development of HR; Environmental Monitoring & Warning System; Storage, Disposal Sites of Radioactive Waste; Measures to Guaranty Safety & Security; Capability Building for R&D & Technical support; etc.

Decisions of Prime Minister
- Radiation activities, Regulation on Radiation safety, Inspection, Control of Nuclear Materials, Nuclear safety for Sites of NPP, Forms of Investment monitoring & Evaluation Reports, etc.

Circulars

Codes & Standards
- Codes & standards equivalent to IEC, ISO, CODEX, etc.
National Appraisal Committee:
✓ Verify of FS and report the verification result to the P.M
✓ The Committee could employ local or foreign consultants to assist the Committee in verifying or reviewing the FS report.
STATE MANAGEMENT SYSTEM AND THE RELATIONS BETWEEN ORGANIZATIONS

Stakeholders:

- **Customer’s side:**
  - Central government (State Steering Committee, National Steering Committee on HRD);
  - Regulator (several organizations involved);
  - Local government;
  - Ministerial organizations;
  - TSO, National Nuclear Safety Council, National Atomic Energy Council;
  - Owner/Operator.

- **Supplier’s side:**
  - Consultant (FS, Technical Design, etc.);
  - Supplier/ Civil Contractor.

- **Others:**
  - Regional/ Int’l organizations.
  - Neighbor countries.
FS APPROVAL PROCEDURE

1. EVN
   - FS report

2. Owner’s consultant
   - Draft FS
   - Verify

3. MoST
   - Verification of FS SAR

4. MONRE
   - Verification of EIA report

5. MoIT
   - Comments on the basic design, technology,....

6. National Appraisal Committee
   - FS Appraisal
   - Comments

7. NNSC
   - Comments

8. NAEC
   - Comments
   - Provincial People’s Committee
   - Comments

9. Prime Minister
   - FS Approval
   - Comments
   - Prime Minister
HUMAN RESOURCES DEVELOPMENT

- Personnel for R&D, safety and security in atomic energy field.
- Personnel working in regulatory bodies to implement regulations, codes and standards for plant licensing, site approval, operator licensing, radiation protection, safeguards, waste management, decommissioning, etc.
- Expertise working in educational institutions.
- Personnel for nuclear power plant management of construction phase and operation phase.
  - Business and technical expertise for procurement and management
  - Expertise to conduct training programs for O&M
HUMAN RESOURCES DEVELOPMENT POLICY

✓ Long-term education and training:
  • Local education & training (assigned universities & training centers, training programs of MoET and MoIT);
  • Dispatching personnel abroad for Ph.D, Master/Engineer (Russia, Japan, Sweden, Czech Republic, France, Korea, etc.)

✓ Short-term training:
  • Dispatching personnel abroad for short training courses.
  • Workshops, conferences and training courses with the assistance of IAEA

Vietnam needs a strong support from nuclear developed countries in developing human resources related to project management, nuclear safety and security, waste management, fuel management, etc. via workshops, conferences and long-term training programs to meet the human resource demand timely.
STAFFING SCHEDULE FOR NPP PROJECT

- **Phase 1**: Milestones 1, 2, 3
- **Phase 2**: Bid Preparations
- **Phase 3**: Design, Construct, Commissioning

**Year**

- Year 0 to 16

**Number of persons**

- NPB
- Pre-Operation under NPB
- Operator Organization under EVN
STAFFING SCHEDULE FOR NPP PROJECT

- COD -5
  - Establishment of training center
- COD -3 (EPC)
  - Participate in the installation and commissioning activities
- COD -2
  - Establishing of the operational takeover procedure
- COD
  - Takeover of the operation
- COD + 2
  - OJT

- Operator training
- O&M staff training
- Radiation staff training
- Others
CHALLENGES

- **Lack of experience in nuclear field:** project management, technology, waste management, etc.
- **Weak infrastructure:** regulatory framework, HR, capabilities of R&D organization, ...
- **Tremendous finance:** Need a huge initial investment cost for NPP and country’s infrastructure
- **Safety culture and buildup of management system**
- **Public awareness and acceptance after Fukushima Daiichi**
- **Two projects implemented in parallel:** languages, HR development, adoption of codes and standards, technology transfer and localization.
SUMMARY

As a new emerging country in nuclear field, Vietnam has faced many difficulties and challenges with regard to the nuclear infrastructure.

For the up-coming steps of the construction of the two first NPPs, Vietnam calls upon the support from experienced countries and organizations in nuclear field to:

- Develop regulatory and legislative documents.
- Develop Human resources
- Verify the reports on Safety Assessment and Environmental Impact Assessment.