Industrial Involvement

Milko Kovachev
Head of Nuclear Infrastructure Development Section
Nuclear Power Division - Nuclear Energy Department

15th INPRO Dialogue Forum on Sustainable Supply Chains for Advanced Nuclear Power Systems, Vienna, 2-4 July 2018
Milestone Approach

- Nuclear Programme management guide
- 19 infrastructure issues
- The 18th is Industrial Involvement
Industrial Involvement Definition

Sum of the entire industrial capacity required to support a safe and reliable nuclear power programme

P1, NG-T-3.4

Rationale and vision for the peaceful uses of nuclear energy
- beneficial
- responsible
- sustainable
Industrial Involvement Definition

- Industrial involvement for the nuclear power plant
- Local industry involvement for the first nuclear power plant
- Additional local industrial involvement for the nuclear power programme as it expands and matures
- Local Industry capacity
- Spin-offs
Industrial Involvement in full fuel cycle

FIG. 3. Nuclear fuel cycle and associated facilities (courtesy of T. Bessex).
Major elements of Industrial involvement

Country needs to develop/prepare/conduct;

- national/local industries’ capacity surveys
- establishing policies, identifying target areas
- establishing industrial standards and quality assurance mechanisms
- capacity building activities and incentives
  - national R&D programme
  - establishing partnership with experienced companies for technology transfer
  - official long-term and low-interest loan for capital investment
- National/local, governmental/industries’ investment
- negotiation with EPC contractor, strategic partner
Issue 18 and other infrastructure issues

- Management: Management systems (QA)
- Funding and Financing: Government investment (incentives)
- Safety: Step-by-Step Approach
- Human resources: Whole supply chain
- National position: Localization policy
- Procurement

Industry involvement
NPP Project and Industrial Involvement

- **Expectation to NPP Project**
  - Introducing stable energy source
  - Trigger off national industries development

  -- Technology development

  Self effort
  Technology transfer

Participating in/Starting NPP related business

Spin-off
Embarking on non-nuclear business

- **NPP requires:**
  Advanced technology, high quality standards, special materials, long term schedules, safety culture applied to the entire supply chain
Benefits and progressive development

Turnkey Contractor (Vendor)
- Secure supply chain
- Reduction of manpower resources
- Logistic savings
- Local requirements

 Government
- Job creation
- Support to high skilled job development
- Impact on GDP growth
- Justifying NPP project

National/Local Industries
- Technology transfer
- Partnerships
- Access to world market for nuclear power/non-nuclear areas (spin-off)

Develop local supply chain in safe, quality, economic, effective way

Turnkey Contractor (Vendor)
- Local industry capacity screening
- Partnership building
- Contract
- Technology transfer
- Subcontractor’ qualification

Government
- NPP programme size
- Local industry capacity survey
- Long term localization goal and roadmap
- Funding/Incentives to industry upgrade

National/Local Industries
- Management system - Nuclear safety culture, QA
- Upgrade investment
- Industry standards certification
Risks of local industrial involvement

• Cost
  ✓ Requiring national/local investment for capital investment (machine tools, moulds), the cost of developing industrial capability
  ✓ Technical know-how affects productivity
  ✓ Unit cost= (fixed cost + variable cost) / number of product
  ✓ Threshold?

• Quality

• Stability of delivery
  ✓ One day delay of the construction causes additional expenditure of a couple of M$ per day

• EPC turnkey contractor is taking the overall responsibility during construction phase including for selected contractors
Organizations typically involved

- Government
- Owner/Operator (Licensee)
  - Nuclear regulatory body (and other relevant regulators)
  - Engineering, procurement and construction contractor
  - International suppliers
  - Local industrial organizations

Timeline:
- Design and planning
- Manufacturing and procurement
- Construction and installation
- Operation and maintenance
**Supply Chain**

1. **Tier 1**: Owner-Operator, Architect Engineer
2. **Tier 2**: Vendor, Programme and procurement management
3. **Tier 3**: Major equipment suppliers (reactors/steam generators/turbines);
4. **Tier 4**: Secondary equipment/service suppliers (e.g. valves and pumps)
5. **Tier 5**: Component suppliers
6. **Tier 6**: Raw materials, primary components and primary services
EPC contractor Selects suppliers

Cost (equipment/service, shipping), Quality, Delivery (Dates, stability)

EPC contractor

Domestic Suppliers  Foreign Suppliers
1) Breakdown NPP’s Components into group of manufacturing companies.

2) Select relevant industrial firms which are likely to be able to participate in the construction of the nuclear power plants as well as component manufacturing.

3) Survey the selected institutions by sending questionnaires and interview, and evaluate the current capability of the industry in respective areas.

4) Evaluate whether particular services required for construction of the first NPP can be supplied by National industries.
Industrial involvement : Phase 1
(Consider to Decide)

- NEPIO (Nuclear Energy Project Implementation Organization) to assess;
  - Local industrial capabilities,
  - Interest of business / industrial leaders in participating in the NPP project considering the special requirements
  - Investment for intended upgrading of industrial facilities

- NEPIO to develop;
  - Short term and long term policies on the area/level of local participation that is practical and desired

- NEPIO to initiate dialogue with potential vendor(s)
Industrial involvement : Phase 2
(Prepare to Contract)

- NEPIO to consider;
  - Which local suppliers can reliably supply commodities, components and/or services.
  - Which upgrades in skills & capabilities are realistic in the time-frame required to support NPP construction.

- NEPIO to determine;
  - Bid specification which should include information about domestic industry capabilities & requirements related to technology transfer.

- NEPIO to implement policy regarding capacity building, incentives, etc.
Industrial involvement : Phase 3
(Construct to Commission)

- NEPIO to implement;
  - Industrial Involvement Policy continuously

- Owner/Operator to conduct;
  - Reassessment of the supply sources to support operation and long term sustainability

- Local manufacturers to obtain
  - Necessary qualification for not only construction but also operational support by Owner/Operator
IAEA Supports in Industrial Involvement

- Industrial involvement highly depends on the circumstance of each receiving country. ⇒ There is no silver bullet.

- IAEA assistance on Industrial Involvement
  
  **Sharing Knowledge and Experience**
  
  - Technical Meeting in France and China (2013, 2014), and in Korea (12-15, Dec 2017)
  - Training Course in France (2014, 2016)
  - National Workshop (Ghana, Turkey, Egypt, etc)

  **Publishing Tech Documents**

  - "Industrial Involvement to Support a National Nuclear Power Program", IAEA Nuclear Energy Series No. NG-T-3.4 (2016)
INIR Mission Findings

Phase 1

• NEPIO report should include survey and policy
• National industrial involvement policy should be defined, potential suppliers should be screened and specific plan for improvement should be defined
• Setup a target utilizing the result of survey
• More international experience learned should be collected and studied

Phase 2

• Potential supplier list be updated and included in the specification for contracting
• Capability to meet specific requirements be analysed and be the base of national programme for industrial involvement
• Invite vendor to be involved in audits of management system
• Develop regulations on application of international codes and standards
• Consider a target for first and future units
Summary

• NP programme will trigger off developing national industries through self-efforts and technology transfer
• NP requires high level technology and effective industrial relation. Only national/local industries that can meet such condition can join the programme.
• NEPIO has an important role to develop industrial involvement policy, conduct industrial capacity survey and facilitate capacity building of domestic industries
• The IAEA offers continuous services to help MS on Industrial Involvement.
Thank you!