TM on Localization and Industrial involvement for Nuclear Power Plant Construction

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Thanks your contributions for TM

- **Host organization : SNPTC**
  - Chairman Mr. Wang Binghua
  - Ms. Zhang Zhang
  - Ms. Cheng Xiaohong (Working at Vienna)

- **Invited Experts**
  - Canada, China, France, Korea, UAE

- **IAEA secretary**
  - Masahiro Yagi,
  - Ki Sig Kang
My wishes to All participants

- Understand the basic concept on Localization & industrial involvement;
  - Key Issues to establish a strategy on Localization

- How to apply the basic concept on Localization & industrial involvement through NPP project;
  - Method of National industry survey and categorization of equipment to be localized,

- Relation between human resource management programme and localization
  - Case studies
Localization and Industrial Involvements

Ki Sig Kang
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Nuclear Power Division
Localization/ Industrial Involvement

What are your approaches to apply localization / industrial involvement?

Without localization, is it possible to operate multi-units?
Localization/ Industrial Involvement

Human  Technology  Service
Local Suppliers and Turn Key Contractor

NEPIO/ Government

Local Suppliers

Turnkey Contractor

Turnkey contractor will rely on Local suppliers involvement during the construction of the NPP

industry involvement & development is a key objectives for a nuclear power programme.

The government and NEPIO should be prepared to support L|ocal suppliers initiatives
Benefits of Localization

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

- Local Industries
  - Leaned high skill competencies
  - Technical transfer
  - Partnerships
  - Access to world market

- Government
  - Balance trade impact
  - High employment
  - Impact on GDP growth
  - Support to high skilled job development

ESWP Drain Pipes
Air Filters
Pullies
Sleeves
Side effects of Localization

- **Cost**: Provide the support to potential domestic suppliers,
  - Requiring some additional equipment and technical know-how.
  - Cost of creating prototypes and the cost of developing industrial capability
  - Strong government support and local industry ability and incentive
  - HRD at construction & installation phase is vitally necessary

- **Quality**: Upgrade Quality assurance and control of the potential local suppliers
  - Expanding infrastructure and a

- **Technology**: Transferring technical knowledge of complex equipment
  - Manufacturing know-how is not
  - Transfer can be accomplished with technology transfer agreements
  - Precision components of nuclear grade Shafts
  - Support Studs
  - Hexagonal Nuts
  - Bolts
Localization/Industrial Involvement

Steps

1. National industry survey
2. Establishment of a strategy
3. Localization plan
4. Technology transfer plan

- Upgrade and expand the country’s industrial facilities and programs
- Investment necessary
- Categorization of local companies

IAEA
Successful Localization Procedures

- Strong national commitment to the nuclear power programme
  - Continuous investment under the government leadership
- Synergy between the nuclear power programme and the other national development programmes
  - Strategies for securing manpower and establishing a self-reliant education system
- Industry Initiative with a business Plan
  - Clear definition of responsibilities and rights in NPP contracts
- Localization through Technology Transfer
A scope of progressive levels of LP

1. Local labor and some construction materials
2. On-site non-specialized purposes for the civil work.
3. Full or partial responsibility for the civil work, Some engineering work
4. Non-critical parts of the balance of plant (BOP)
5. Extend their normal product line to incorporate nuclear designs and standards
6. Locally manufacture heavy and specialized nuclear components

Technology Requirements
Nuclear Island / Conventional Island

Nuclear Island
- Primary System
- Primary Side Auxiliaries
- NI-Electrical Supply and I&C
- Heating, Ventilating, Air Conditioning (HVAC)

Conventional Island
- Steam Turbine Generator incl. aux system and I&C
- Cooling Water System
- CI-Electrical Supply
- Heating, Ventilating, Air Conditioning (HVAC)

Balance of Plant
Experiences on Construction
Installing 1,000 ton generator rotor at 6x400MW Son La Hydro Power Project
Workers Fabricating Steel Structures at a Workshop
Experiences of Fabrication and Installation of Steel Structures, Pipes, Equipment
Experience in fabrication & installation
Potential installation works by National Contractors

FABRICATED 10,600 TONS OF STEEL STRUCTURES

OVER 30 PRESSURIZED VESSELS HAVE BEEN FABRICATED

Steel Structures, Pressurized Vessels, Equipment Components of various process systems can all be fabricated by contractors for Entire Nuclear Power Project (???)
Localization : Phase 1

- Nuclear Energy Project Implementation Organ (NEPIO) to assess;
  - Survey of national and local industrial capabilities,
  - Participating in the NPP project considering the special requirements necessary,
  - Necessary investment for intended upgrading of industrial facilities.
Localization : Phase 2

• In preparation of bid invitation specification (BIS), Owner/Operator/Utility to consider;
  o Which national or local suppliers can reliably supply commodities, components or services to safety related or non-safety portions of the NPP,
  o What upgrades in skills and capabilities are realistic in a time frame to support nuclear construction,

• Determine BIS in accordance with those decisions.
Localization: phase 3

- **Owner/Operator/Utility**
  - Reassessment of the sources of supply to support operation
  - If the national and local industrial structure has progressed sufficiently, the supply of spare parts, consumable supplies, maintenance services and services can be allocated accordingly

- **Local manufacturer**
  - Necessary qualification
  - Human development
  - Localization (technology transfer)
Project Contract Structures

- "Super turnkey"
- "Normal turnkey"
- "Split-package"
Turn Key Contract for Construction

ITB-Turnkey

NI
+
CI
+
BOP(A/E)

Contract-Turnkey

NI
+
CI
+
BOP(A/E)
Turn Key Contract

- Maintain the consistency of management
- Guaranty of performance and construction by vendor
- Risk reduction of construction time delay
- Quick response of licensing issues
- Utilized Standard technologies from vendor
- Easy control of sub-contractors by vendor

- High contract price
- Limited involvement of project management, design and construction
  - Limitation of technical transfer and localization
- High risk of delay of supply of main components
  - Increase of price
- High risk of failure of project if vendor has not enough capabilities
How to put requirements in the BIS or during Bid evaluation?
Composition of general terms and conditions

Chapter 1 General Clauses
- Article 1: Definitions
- Article 2: Contract Documents
- Article 3: Changes to the Contract
- Article 4: Force Majeure
- Article 5: Suspension and Termination
- Article 6: Termination
- Article 7: Insurance
- Article 8: Property Right & Confidentiality
- Article 9: Infringement of Patent Rights
- Article 10: Interpretation
- Article 11: Governing Law
- Article 12: Disputes and Arbitration
- Article 13: Assignment

• Article 14: Subcontract
• Article 15: Responsibility
• Article 16: Non-waiver of Right
• Article 17: Back Charges
• Article 18: Rejection
• Article 19: Replacement
• Article 20: Expediting
• Article 21: Title Passage and Storage
• Article 22: Delivery
• Article 23: Transportation Documents
• Article 24: Packing and Marking
• Article 25: Notices
• Article 26: Language and Unit
• Article 27: Effectiveness of The Contract
Composition of general terms and conditions

Chapter 2 Special Clauses for the Supply
- Article 1: Scope of Supply
- Article 2: Delivery Schedule
- Article 3: Test, Inspection and Performance Test
- Article 4: Guaranty and Compensation
- Article 5: Licenses, Authorizations, Codes, Standards and Regulation
- Article 6: Quality Assurance
- Article 7: Technical Support Services
- Article 8: Technical Training
- Article 9: Project Management
- Article 10: Spare Parts

Chapter 3 Financial Clauses
- Article 1: Contract Amount
- Article 2: Price Adjustment
- Article 3: Payment
- Article 4: Performance Bond
- Article 5: Taxes

• Appendix A: Scope of Supply and Division of Responsibilities
• Appendix B: Delivery Schedule
• Appendix C: Technical Description
• Appendix D: QA Program
• Appendix E: Drawing and Documents
• Appendix F: Technical Support Services
• Appendix G: Training
• Appendix H: Tests
• Appendix I: Codes, Technical Standards and Regulations
• Appendix J: Spare Parts and Consumables
Approved Vendor List

- **Sourcing**
  - Establish the Master supplier list
  - Visit and Contact
  - Request for Interest sent

- **Pre selection**
  - Supplier Pre-Selection according to RFI’s Feedback analysis
  - Supplier Pre-Assessment visit (Quality management, design, manufacturing,..)

- **Pre Qualification**
  - Action Plan definition and follow up
  - Product or process qualification tests as necessary
  - RFQ for detailed technical assessment

- **Qualification**
  - Before contract, when the Qualification is satisfactory, approval of the Supplier (Approved Vendor List)
How to become an NPP supplier

- **Target the right product**
  - Required technical capabilities
  - Safety culture implementation

- **With the right quality requirement**
  - Supplier & product should be qualified
  - Quality requirements understanding
  - Documentation management

- **At the reasonable cost**
  - Supplier should be competitive

- **On-time**
  - Manufacturing activity control
  - Supplier should have a proven reputation for on-time delivery
Experience Feed-back
Key points for successful localisation

• Technical assistance
  • At the beginning (specific organization)
  • Ensure understanding, follow-up and survey

• Mutual flexibility → establish a true cooperation
  • For Main Supplier: adaptation to local standards and methods
  • For Local Suppliers: adaptation to nuclear requirements, ...

• On-time investments → anticipated cooperation
  • By the main Supplier to provide the required assistance
    • By the local Suppliers in terms of production means, organization, ...

• Continuous cooperation between Main suppliers, Customers and Local Authorities
  • Same priorities towards Local Suppliers Experience
Localization Timeline (example)

1.1 Small scale N-Safety Grade components (heat exchangers, transformers, switchgears)
1.2 Construction (raw materials, labor)
1.3 Engineering (detailed engineering)
1.4 N-Safety grade pipes & pumps
  • Turnkey installations have less EPC localization

2.1 Pipes (Safety Grade)
2.2 Valves (all types)
2.3 Pumps (Safety Grade)
  • Local supplier manufacturing facilities take 36 ~ 60 months to build and obtain Safety grade certification

3.1 Construction (skilled labor, construction equipment)
3.2 Engineering (nuclear expertise)
  • Uplift in localization from switch to split package model

Project 1
- Localization rate: 25%

Project 2
- Localization rate: 40%

Project 3
- Localization rate: 65%

Joint-Venture / Technology licensing

Localization limited to the first wave given phasing of turnkey installations

Partnership
A set of integrated standards applicable to the whole phases of design, manufacturing, installation, testing, operation and maintenance

Design and Construction Codes for Class 1 Vessel

ASME B&PV Code Section III 2007 Edition
- Subsection NB: Class 1 Components
- Article NB-1000: Introduction
- Article NB-2000: Material
- Article NB-3000: Design
- Article NB-4000: Fabrication
- Article NB-5000: Examination
- Article NB-6000: Testing
- Article NB-7000: Overpressure

Related Appendices

Technical requirements

Administrative Requirements
Admin., Conformity Assessment, QA

SAFETY & RELIABILITY
OF NPPS
IAEA Activities on Industrial Involvement/ Localization/ Establishing Supply Chain
Development of a new Guidelines

Existing technical document
Published in 1988
Information Exchange and Direct Service

- **National Workshops**
  - Vietnam (2014)
  - Algeria (2013)
  - Jordan (2013)

- **Group Fellowship Training Course**
  - 12 participants
  - France (EDF/I2EN)
  - October 2014

Technical Meeting in France, November 2013
Recommendations & IAEA assistance

- Clear Road Map to complete NPP construction
  - Formulate plans for appropriate local industrial involvement

- Clear categorization of scope of localization area
  - Identify the industrial involvement needed to support the introduction of nuclear power;

- Maximize to utilize experiences of thermal power plants
  - Identify key issues/risks that affect decisions on using local industrial capacity for new nuclear power programmes;

- Familiar with Code and Standard
  - ASME, Ghost, RRC-M/E, JSME

- Prepare Quality assurance programme
  - NQA, ISO -9001

Provide case studies in major nuclear power countries