The Roadmap of First NPP Project in Bangladesh

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Construction of Rooppur Nuclear Power Plant Project, BAEC
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Present Power Situation (1/2)

- Total Installed Capacity* (01 Jan 2017): 13,151 MW
  - Public Sector: 7138 MW (54%)
  - Private Sector: 6013 MW (46%)

- Installed Capacity by Fuel Type*:
  - Natural Gas: 62.78%
  - Furnace Oil: 21.19%
  - Diesel: 7.82%
  - Hydro: 1.75%
  - Coal: 1.90%
  - Import: 4.56%

- Max. Generation*: 9471 MW (27 May 2017)

Per capita electricity consumption: 279 kWh
Per Capita Income: $1466
Present Power Situation (2/2)

- Perspective Plan 2010-2021

  - VISION 2021: Electricity for all by 2021

Targets of Electricity Generation as per PP 2010-21:

- By the year 2013: 8,500 MW
- By the year 2015: 11,500 MW
- By the year 2021: 20,000 MW*

Addition of 2000 MW Nuclear capacity is a part of the ‘Vision 2021’ of the Government of Bangladesh

*Projected Peak Demand for 2021 as per PSMP-2010: 18,838 MW
Demand Forecast, 2010-2030

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Peak Demand (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>6454</td>
</tr>
<tr>
<td>2011</td>
<td>6765</td>
</tr>
<tr>
<td>2012</td>
<td>7518</td>
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<td>2013</td>
<td>8349</td>
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<tr>
<td>2015</td>
<td>10283</td>
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<tr>
<td>2016</td>
<td>11405</td>
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<td>2017</td>
<td>12644</td>
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<td>2018</td>
<td>14014</td>
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<td>15527</td>
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<td>18838</td>
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<td>30134</td>
</tr>
<tr>
<td>2029</td>
<td>31873</td>
</tr>
<tr>
<td>2030</td>
<td>33708</td>
</tr>
</tbody>
</table>

* Source: PSMP2010
Plan for NE Development

- Power System Master Plan – 2010 (PSMP – 2010) proposes long-term fuel-mix as follows:

<table>
<thead>
<tr>
<th>Energy</th>
<th>2010</th>
<th>2021 (20,000 MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>87.50%</td>
<td>30%</td>
</tr>
<tr>
<td>Oil</td>
<td>6.00%</td>
<td>3%</td>
</tr>
<tr>
<td>Coal</td>
<td>3.70%</td>
<td>53%</td>
</tr>
<tr>
<td>Hydro</td>
<td>2.70%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Nuclear</strong></td>
<td><strong>0%</strong></td>
<td><strong>10%</strong></td>
</tr>
<tr>
<td>Renewable</td>
<td>0.50%</td>
<td>3%</td>
</tr>
</tbody>
</table>

- By **2021**, the share of nuclear will be 10% of 20,000 MW = **2000 MW** (2X1000 MW)
- PSMP-2010 also proposes addition of another **2000 MW** from nuclear as follows:
  - **1000 MW by 2025** (Share of Nuclear: ≈12% of Peak Demand of 25,199 MW)
  - **1000 MW by 2030** (Share of Nuclear: ≈12% of Peak Demand of 33,708 MW)
Primary Fuel Supply Scenario

- **Gas:** No significant gas discovery in recent years; 14.16 TCF (remaining reserve as of June 2015); off-shore and on-shore gas exploration initiatives & increased reserves in present fields may change the present scenario.

- **Coal:** Near term option; Indigenous (Reserve: 3.2 billion tonnes) or Imported; Base Load;

- **Oil:** Volatile market; High price; For peaking duty

- **Nuclear:** Expected to be future Base Load option
Monitoring and Coordination System for Nuclear Power Program

- To oversee and coordinate the planning for nuclear power at the national level, a National Committee headed by the Hon'ble PM was established in 2010;
- A Technical Committee headed by the Minister, MOST was formed in 2010 to coordinate and monitor the progress of nuclear power program and Rooppur NPP project activities;
- A Working Group and 8 interagency Sub-Groups on key infrastructure issues were formed in 2010, headed by the Secretary, MOST to initiate and perform activities for establishing required infrastructures as outlined in the IAEA Milestone documents;
- Government-level decisions about the nuclear power programme are reviewed through this committee structure
To review the progress of nuclear infrastructure development in Bangladesh two INIR missions were conducted by the IAEA:

**INIR Mission 2011**

The mission reviewed the 19 issues of Phase 1 and Phase 2.

**INIR Follow-up Mission 2016**
The INIR Mission (Phase I & II)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Suggestions</th>
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<tr>
<td>INIR Mission 2011:</td>
<td>50</td>
</tr>
<tr>
<td>INIR Follow up Mission 2016:</td>
<td>24</td>
</tr>
</tbody>
</table>

Observations of the 2016 INIR Team:

- Noticeable progress
- Actions initiated to address all the recommendations and suggestions
- Completed implementation of 26 recommendations and 14 suggestions out of those (50 and 20 respectively) formulated during the 2011 INIR Mission
Main Findings of the INIR Mission 2011 (1/2)

The INIR mission concluded that

- Bangladesh reached Milestone 1, having “made a knowledgeable decision”; however, two open issues that still require attention from Phase 1—management (implementation approach – State Owned Turnkey or BOOT) and funding/financing;

- Bangladesh nuclear power program in general has progressed into Phase 2, being in the stage of preparation to negotiate agreement(s)/contract(s) with selected Vendor for construction of Rooppur NPP.
Main Messages of the INIR Mission for achieving Milestone 2:

- Establishing an effective regulatory body with adequate legislative and policy documents;
- Preparations for contract negotiations;
- Developing Integrated Management System and strengthening Project Management system;
- Completion of ongoing activities- site evaluation
The major issues yet to be addressed:

- Develop a leadership development program
- Revision of BANPAP 2000
- Develop a specific management system
- To join the joint convention, the Amendment to the CPPNM and the international legal instruments on civil liabilities for nuclear damage
- Further studies of the improved grid system
- Plans for protocols and training for grid operation staff
The major issues yet to be addressed:

- Develop an Integrated National HRD Plan
- Develop stakeholder management program
- Finalize and approve EIA
- Develop Fuel Cycle Policy and Strategy
- Develop Radioactive Waste Management Policy and Strategy
- Develop a specific plan for the development of procurement capabilities
Nuclear Regulatory Infrastructure

- Bangladesh Atomic Energy Regulatory (BAER) Act was promulgated in 2012
- An Inter-Agency Agreement (IAA) was signed in 2012 on developing nuclear infrastructure between MOST & Russian nuclear regulatory authority Rostechnadzor
- An independent regulatory body “Bangladesh Atomic Energy Regulatory Authority (BAERA)” has been established in 2013 under the provision of BAERA Act
- Site License was issued by BAERA on 21 June 2016 with the assistance of Rostechnadzor
- Design & construction license, operation license are yet to be issued by BAERA
Present Status of Nuclear Power Program

- IGA signed with Russian Federation in 2011
- ASE is selected as the Vendor
- AES-2006 (VVER-1200) has been selected
- Novovoronezh NPP-2 has been taken as the reference plant
- Total 2400 MW of 2 units (each 1200 MW) will be constructed
- General Contract was signed with ASE on 25 December 2015
- Site license by BAERA 21 June 2016
- State export credit signed on 26 July 2016
Schedule of Construction & Operation

- **License Approval**
  - Site
  - Construction
  - Operation

- **2013** → **2016** → **2017**
- Commissioning: 2022-23
- Operation: Up to 60 years

- Construction
  - Project Management Unit

- Operation
  - Operating Organization
Contracts Signed for the Preparatory Works

- Four contracts have been signed for preparatory works:
  - **1st contract**: FE, EIA, Performance of the necessary Engineering Survey & Environmental Studies
  - **2nd contract**: Development of design documentation, first-priority working documentation and engineering survey for design stage
  - **3rd contract**: Performance of first-priority construction and erection works of preparatory stage prior to the “First Concrete” on 01 August 2017
  - **4th contract**: Completion of all the preparatory works by May 2017
Directorate for NPP Construction

- A Project Management Unit (PMU) has been established to supervise and control the preparatory construction activities.
- This PMU is working as the Directorate for NPP construction.
- PMU of “Rooppur NPP” is headed by the Project Director with 80 full-time personnel;
- Nuclear Power Company of Bangladesh (NPCBL) has been formed which will be the future operating organization according to the NPP Act, 2015.
The Construction of Rooppur NPP (First Phase) Project was approved in April 2013 for preparatory stage construction activities;

Project Document developed based on the Guidelines of Annual Development Programme of the Government;

The PMU is responsible for implementation of the project;
The Project Implementation Committee (PIC) comprises of expert members from different agencies/ministries; The PIC oversees the activities of PMU, identifies problems/barriers and resolves; The implementing ministry, MOST monitors the project activities through inter-ministerial Project Steering Committee (PSC). The PSC comprises members of decision making level from different ministries; PSC monitors the progress of implementation of the project; PSC solves the problems identified by the PIC; Recommends for resolving issues that warrant decision from the national level;
Monitoring and Review of Progress of the Project (National Level)

Fast Track Project Monitoring Committee Headed by the Prime Minister (every two month)
- Reviews implementation status of the project;
- Makes instant decisions on the project with MOST;

Fast Track Monitoring Taskforce Headed by Principal Secretary to the Prime Minister (every month)
- Monitors implementation of the decisions taken by the Fast Track Monitoring Committee;
- Takes prompt measures to resolve whenever there is any problem;
Funding & Financing

- State Export Credit Agreement was signed between Bangladesh & Russian Federation for financing 90% of the preparatory stage works of RNPP in 2013.
- State Export Credit agreement was signed between Bangladesh & Russian Federation on 26 July 2016 for financing 90% of the construction of main phase works of RNPP.
- In both preparatory & main stage works, 10% of the financing will be provided by Government of Bangladesh.
Human Resources Development

- Government issued directives on 4 June 2012 to develop infrastructure for higher education & training in Nuclear Technology;
- Nuclear engineering program was introduced in undergraduate & graduate level in major universities;
- Nuclear Energy was introduced in Secondary & Higher Secondary curriculum;
- 1424 key personnel will be trained under GC where 91 will obtain license in compliance with Russian Regulatory body;
- 88 BAEC personnel were trained in India for RNPP project & national nuclear program;
- 47 students are taking undergraduate & graduate level nuclear education in Russian Federation.
Concluding Remarks

- IAEA’s assistances in identifying the gaps through the INIR Missions and the joint efforts to bridge the gaps through the implementation of Integrated Work Plan has been found to be quite useful;

- Bangladesh needs comprehensive, integrated and tailor-made support from the vendor and experienced countries like Japan to fill up the remaining gaps that have been identified by the follow-up INIR Mission of 2016 in order to comply with the NI related requirements as delineated in the IAEA Milestone document;

- Continual and more focused cooperation and coordination, both internal and external, are needed to achieve the sustainable NI development goals.
Thank you for your attention!!