An Overview of Power Sector of Bangladesh

November, 2011
Bangladesh Power Development Board
Present Structure of Power Sector

- **Apex Institution**
  Power Division, Ministry of Power, Energy & Mineral Resources (MPEMR)

- **Regulator**
  Bangladesh Energy Regulatory Commission (BERC)

- **Generation**
  - Bangladesh Power Development Board (BPDB)
  - Ashuganj Power Station Company Ltd. (APSCL)
  - Electricity Generation Company of Bangladesh (EGCB)
  - North West Power Generation Company Ltd. (NWPGCL)
  - Independent Power Producers (IPPs)

- **Transmission**
  - Power Grid Company of Bangladesh Ltd (PGCB)

- **Distribution**
  - Bangladesh Power Development Board (BPDB)
  - Dhaka Power Distribution Company (DPDC)
  - Dhaka Electric Supply Company Ltd (DESCO)
  - West Zone Power Distribution Company (WZPDC)
  - Rural Electrification Board (REB) through Rural Co-operatives
Present Structure of Power Sector
BPDB Management

Chairman

Secretary

Member, Administration
- GM, Training

Member, Finance
- Controller, Accounts & Finance
- Director, Purchase

Member, Generation
- Chief Engineer, Generation
- Chief Engineer, Ghorashal P/S
- Chief Engineer, Siddhirganj P/S
- Chief Engineer, Barapukuria P/S
- Chief Engineer, Khulna P/S
- Chief Engineer, Chittagong P/S

Member, Planning & Development
- Chief Engineer, Planning & Design
- Chief Engineer, Services
- Chief Engineer, Civil Works
- Chief Engineer, Coal Project

Member, Distribution
- Chief Engineer, Southern Zone, Ctg.
- Chief Engineer, North Zone, Rajshahi
- Chief Engineer, Central Zone, Mymen.
- Chief Engineer, Project
- General Manager, Comm. Opn.
- Chief Engineer, Comilla
- Chief Engineer, Rangpur
- Chief Engineer, Sylhet

Member, Company Affairs
- Chief Engineer, Company Affairs
Functions of BPDB

- Partially integrated public utility
- Generates power
- Purchaser & seller of power as a “Single Buyer”
  - Prepare least cost generation expansion plan
  - Construct most of public sector power plants according to least cost plan
  - Conduct procurement process for Private Power (IPPs)
  - Purchase electricity from generators (public and private)
  - Sell to distributors
- Distribution business in nation-wide urban areas, except Dhaka and West Zone
Existing Major Generating Stations

- Barapukuria - 250 MW
- Mymensingh - 210 MW
- Shahjibazar & Fenchuganj - 300 MW
- Baghabari - 261 MW
- Ashuganj - 724 MW
- Bheramara - 60 MW
- Ghorasal - 950 MW
- Tongi - 105 MW
- Meghna, Haripur & Siddirganj - 1300 MW
- Khulna - 270 MW
- Barisal - 40 MW
- Raujan & Sikolbaha - 600 MW
- Kaptai - 230 MW
Generation Capacity: By Plant Type

Generation Capacity as on October, 2011 (By Plant Type)

Receprocating Engine (RE) 34.78%
Gas Turbine (CT) 13.09%
Combined Cycle (CC) 17.84%
Stem Turbine (ST) 31.06%
Hydro 3.23%

Total Installed Capacity: 7119 MW
Present Power Scenario
Bangladesh’s Power Sector: At a Glance (FY 2011)

- **Electricity Growth**: 7.20% in FY-2011 (Av. 7% since 1990)
- **Generation Capacity**: 7119 MW (Oct., 2011)
- **Total Consumers**: 12.5 Million
- **Transmission Lines**: 8,600 km
- **Distribution Lines**: 2,78,000 km
- **Per Capita Generation**: 252 kWh (incl. Captive)
- **Access to Electricity**: 50%
### Present Generation Capacity (Oct., 2011)

<table>
<thead>
<tr>
<th>SL.</th>
<th>Public Sector</th>
<th>Generation Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BPDB</td>
<td>2868</td>
</tr>
<tr>
<td>2.</td>
<td>APSCL</td>
<td>659</td>
</tr>
<tr>
<td>3.</td>
<td>EGCB</td>
<td>255</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>3782 (53 %)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Private Sector</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>IPPs</td>
<td>1231</td>
</tr>
<tr>
<td>2.</td>
<td>SIPPs (BPDB)</td>
<td>99</td>
</tr>
<tr>
<td>3.</td>
<td>SIPPs (REB)</td>
<td>226</td>
</tr>
<tr>
<td>4.</td>
<td>15 YR. Rental</td>
<td>168</td>
</tr>
<tr>
<td>5.</td>
<td>3/5 YR. Rental</td>
<td>1613</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>3337 (47 %)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>7119</strong></td>
</tr>
</tbody>
</table>

- Considering 15-20 % Maintenance and Forced Outage, Available Generation Capacity is in the range of 5600 – 5800 MW without fuel constraint
Demand Supply Situation

- **Generation:** 5000 – 5300 MW (Capacity- 7119 MW)
- **Highest so far:** 5244 MW (August 29, 2011)
- **Gas shortage causes 400 - 600 MW less Power Generation**
- **Peak Demand:** 6000 MW (with DSM)
- **Load shedding up to 800 MW during hot summer days** (with DSM)
- **Shortage and unreliable power supply has constrained economic growth**
### Age of Power Plants

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Generation Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 +</td>
<td>208</td>
</tr>
<tr>
<td>31 – 40</td>
<td>156</td>
</tr>
<tr>
<td>21 – 30</td>
<td>1268</td>
</tr>
<tr>
<td>11 – 20</td>
<td>1412</td>
</tr>
<tr>
<td>01 – 10</td>
<td>4075</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7119</strong></td>
</tr>
</tbody>
</table>

- 23% of Capacity have more than 20 Years life
**Average Peak Power Generation**

**Comparison of Monthly Average Peak Power Generation**

- **Av. Peak Power Generation in August’ 2011**: 4956 MW
- **Av. Peak Power Generation in October’ 2011**: 4804 MW
Load Curve on August 29, 2011 (so far Maximum Peak)

Holiday

5102 MW (4:00 AM)

5243.5 MW (22:00 )
Energy Generation by Fuel Type in FY 2010 and FY 2011

- Energy Growth in FY11 is about 7.20%
- High Dependence on Gas

Energy Generation (FY10): 29,247 M kWh
- Diesel 1.76%
- Hydro 2.50%
- Coal 3.53%
- Gas 89.21%

Energy Generation (FY 11): 31,355 M kWh
- Diesel 6.93%
- Coal 2.49%
- Hydro 2.78%
- Natural Gas 82.12%

Energy Generation (July-11 To Sept. 11): 9,293 M kWh
- Diesel 8.20%
- Furnace Oil 11.51%
- Coal 2.03%
- Hydro 2.99%
- Natural Gas 75.27%
Planning Perspective
Primary Fuel Supply Scenario

- **Gas**: No significant gas discovery in recent years; off-shore and on-shore gas exploration initiatives & increased reserves in present fields may change the present scenario

- **Coal**: Near term option; Indigenous or Imported; Base Load;

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

- **LNG**: Necessary to ensure secure and reliable gas supply

- **Nuclear**: Safe technology; No pollution; Expected to be future Base Load option
### Power Generation Projects up to 2016

Calendar Year Wise Projects Completion (From 2010 to 2016)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2010 (MW) Commissioned</th>
<th>2011 (MW)</th>
<th>2012 (MW)</th>
<th>2013 (MW)</th>
<th>2014 (MW)</th>
<th>2015 (MW)</th>
<th>2016 (MW)</th>
<th>TOTAL (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>255</td>
<td>851</td>
<td>838</td>
<td>1190</td>
<td>1270</td>
<td>450</td>
<td>1500</td>
<td>6204</td>
</tr>
<tr>
<td>Private</td>
<td>520</td>
<td>1343</td>
<td>1319</td>
<td>1034</td>
<td>1003</td>
<td>1900</td>
<td>1300</td>
<td>8569</td>
</tr>
<tr>
<td>Total</td>
<td>775</td>
<td>2194</td>
<td>2157</td>
<td>2224</td>
<td>2273</td>
<td>2350</td>
<td>2800</td>
<td>14,773</td>
</tr>
</tbody>
</table>

- Public Sector: 6204 MW (comm: 587 MW, u/c: 1731 MW, Tender: 1275 MW); (42%)
- Private Sector: 8569 MW (comm: 1463 MW, u/c: 1667 MW, Tender: 2639 MW); (58%)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Demand with DSM</td>
<td>6454</td>
<td>6765</td>
<td>7518</td>
<td>8349</td>
<td>9268</td>
<td>10283</td>
<td>11405</td>
</tr>
<tr>
<td>Gen addition - Public Sector</td>
<td>308</td>
<td>1211</td>
<td>865</td>
<td>1510</td>
<td>810</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Gen. addition - Private Sector</td>
<td>1348</td>
<td>477</td>
<td>2811</td>
<td>823</td>
<td>1600</td>
<td>1900</td>
<td></td>
</tr>
<tr>
<td>Capacity Retired</td>
<td>40</td>
<td>98</td>
<td>33</td>
<td>1058</td>
<td>426</td>
<td>1033</td>
<td></td>
</tr>
<tr>
<td>Generation Capacity</td>
<td>5271</td>
<td>6887</td>
<td>8477</td>
<td>12120</td>
<td>13395</td>
<td>15379</td>
<td>17746</td>
</tr>
<tr>
<td>NET</td>
<td>5060</td>
<td>6612</td>
<td>8138</td>
<td>11635</td>
<td>12859</td>
<td>14764</td>
<td>17036</td>
</tr>
<tr>
<td>Dependable Capacity</td>
<td>3846</td>
<td>5091</td>
<td>6348</td>
<td>9192</td>
<td>10287</td>
<td>11811</td>
<td>13629</td>
</tr>
<tr>
<td>Shortfall</td>
<td>-2608</td>
<td>-1674</td>
<td>-1170</td>
<td>843</td>
<td>1019</td>
<td>1528</td>
<td>2224</td>
</tr>
<tr>
<td></td>
<td>-40%</td>
<td>-25%</td>
<td>-16%</td>
<td>10%</td>
<td>11%</td>
<td>15%</td>
<td>19%</td>
</tr>
</tbody>
</table>
Project Implementation
Successful Contract Signed since Jan 2009

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>No. of Contract</th>
<th>No. of Plant</th>
<th>Capacity (MW)</th>
<th>Commis. (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Private Sector</td>
<td>27</td>
<td>29</td>
<td>3236</td>
<td>1353</td>
</tr>
<tr>
<td>02.</td>
<td>Public Sector</td>
<td>18</td>
<td>18</td>
<td>2011</td>
<td>228</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
<td><strong>47</strong></td>
<td><strong>5,247</strong></td>
<td><strong>1581</strong></td>
</tr>
</tbody>
</table>

- Out of 5247 MW, **1581 MW** (20 Plants) already commissioned.
- **27 Projects** with capacity **3666 MW** under construction.
Projects Under Tendering Process: Contract within Next 6 Months

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>No. of Projects</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Public Sector</td>
<td>6</td>
<td>1600</td>
</tr>
<tr>
<td>02.</td>
<td>Private Sector (IPP’s)</td>
<td>22</td>
<td>2977</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td><strong>4,577</strong></td>
</tr>
</tbody>
</table>
Bangladesh Transmission Network
Average Supply Cost and Bulk Tariff Requirement

Av. Bulk Supply Cost

If increase by 15%

FY 2011 (July-Dec)
FY 2011 (Jan-June)
FY 2012 (July-Dec)
FY 2012 (Jan-June)
FY 2013 (July-Dec)
FY 2013 (Jan-June)
FY 2014 (July-Dec)
FY 2014 (Jan-June)
FY 2015 (July-Dec)
FY 2015 (Jan-June)

2.37 Taka/kWh
2.80 Taka/kWh
4.90 Taka/kWh
Power System Master Plan up to 2030
Power System Master Plan (up to 2030)

- **Updates of PSMP 2006**: Due to change of planning perspective
- **PSMP 2010**: Long term planning up to 2030
- **Study completion**: February 2011
- **Findings**:
  - Generation capacity requirement by 2021: 24,000 MW
  - Generation capacity requirement by 2030: 39,000 MW
  - Coal based generation capacity by 2030: 20,000 MW
  - Coal and Nuclear for base load power requirement
  - Cross Boarder Trade with neighboring countries
### Probable Power Generation: Primary Fuel Sources by 2030

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Capacity (MW)</th>
<th>Probable Location(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Domestic Coal</td>
<td>11,250</td>
<td>North West Region at Mine Mouth</td>
</tr>
<tr>
<td>2</td>
<td>Imported Coal</td>
<td>8,400</td>
<td>Chittagong and Khulna</td>
</tr>
<tr>
<td>3</td>
<td>Domestic Gas/LNG</td>
<td>8,850</td>
<td>Near Load Centers</td>
</tr>
<tr>
<td>4</td>
<td>Nuclear</td>
<td>4,000</td>
<td>Ruppur</td>
</tr>
<tr>
<td>5</td>
<td>Regional Grid</td>
<td>3,500</td>
<td>Bahrampur - Bheramara, Agartola - Comilla, Silchar - Fenchuganj, Purnia-Bogra, Myanmar - Chittagong</td>
</tr>
<tr>
<td>6</td>
<td>Others (Oil, Hydro and Renewable)</td>
<td>2,700</td>
<td>Near Load Centers</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>38,700</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
Road Map for Coal Power Development (as of 2030)

**Domestic Coal**
- K-D-P 6x1000 MW USC
- K-D-P 8x 600 MW USC

**Import Coal**
- Meghnaghat 2x600MW
- Zajira/New Meg 3x600MW
- Chittagong 3x660MW
- Moheshkhali/Matarbari 4x600MW
- Khulna 2x660MW (Dom Future)

**Total 19,200MW (New)**

**Coal Center**
- Chittagong
- Matarbari
- Sonadia Island
Regional Power Exchange: Possibilities

- Purnia → Barapukuria
- 1000MW
- 750MW
- Silchar → Fenchuganj
- 500MW [2013-]
- 500MW [2018-]
- Bheramara
- 250MW
- Pallatana → Comilla (N)
- 500MW
- Myanmar → Chittagong

Map showing connections and capacities of power exchanges.
Challenges

Primary Fuel Supply
- Enhanced Gas Exploration, Production
- Domestic coal development
- Coal Import (long term contract) and deep sea port for coal handling
- LNG import
- Safe Nuclear Technology

Project Financing
- Ensuring financing for Public and Private sector projects
- Availability of foreign currency

Transportation of fuel and equipment
- Infrastructure development by Railway and R&H
- Dredging of river routes by BIWTA
- Capacity build up of BPC, Railway, R&H and BIWTA etc.

Human Resources Development
- Development of skilled manpower: adopt and operate new technology
Thank You
Siddhirganj 210 MW Thermal Power Plant (Unit-2)
Kaptai 230 MW Hydro Power Plant
Kutubdia 1MW Wind Park
East West Inter-Connector