Gas Infrastructure in Bangladesh

Md Mahbub Sarwar
General Manager, Petrobangla
www.petrobangla.org.bd

SARI/Energy-Global Energy Markets Trade Program
Delhi, 27th February 2008
FUNCTIONS

- To undertake research in the field of oil, gas & minerals;
- To prepare & implement programs for the exploration & development of oil, gas & mineral resources;
- To produce & sell oil, gas & mineral resources;
- To undertake research for alternative use of natural gas;
- To perform such other functions as the govt. may, from time to time assign to the corporation.
Companies at a Glance

BAPEX : Exploration & Production
- Formed in 1989 by separating Exploration Directorate of Petrobangla to conduct exploration.
- In 1998 BAPEX converted to exploration & production company.
- Owned fields- Saldanadi, Fenchuganj, Shabajpur, Begumganj
- Production-28 mmmscfd gas & 12 bbls condensate from 3 wells of 2 gas fields.

BGFCL : Production
- Successor of Pakistan Shell Oil Company
- Operating 5 fields- Titas, Habiganj, Bakhrabad, Meghna & Narshingdi
- Producing gas-720 mmmscfd & condensate-560 bbls from 30 wells.
Companies at a Glance

SGFL : Production
- Successor of Burma Oil Company
- Operating 4 fields- Sylhet, Kailastila, Rashidpur & Beanibazar
- Producing gas-175 mmscfd & condensate-1325 bbls from 15 wells.

GTCL : Transmission
- Formed in 1993 to construct & operate all high pressure transmission pipelines.
- Operates 930 Km gas transmission pipeline
Companies at a Glance

**TGT DCL : Distribution**
- Oldest & largest gas distribution company. Established in 1968 to serve the customers under greater Dhaka, greater Mymensingh, & Partly B-baria.
- Catering 1,270 mmmscf/d (74% of total consumption) gas to 1.2 million customers including Power-26 & Fertilizer-4.

**BGSL : Distribution**
- Established as a prod. & T&D co. with Bakhrabad gas field in 1985. At a later stage transformed into a gas distribution co. to operate in Chittagong Division excluding B-baria.
- Distributing 280 mmmscf/d (16% of total consumption) gas to 411 thousand customers including Power-5 & Fertilizer-3.
JGTDSL : Distribution
- Established in 1986 to supply gas to greater Sylhet district
- Supplying 100 mmscfd (6% of total consumption) gas to 111 thousand customers including 3 power stations & 1 fertilizer factory.

PGCL : Distribution
- Established in 1999 in the western side of the Jamuna river
- Presently selling 70 mmscfd (4% of total consumption) gas to 32 thousand customers including 3 power stations.
RPGCL : CNG Conversion & LPG

- Formed to promote CNG & fractionate NGL to produce LPG
- Currently operating 1 conversion workshop & 5 CNG filing stations in Dhaka
- Produces about 175 (65+110) tons LPG per day at Kailashtila LPG plant
Primary Commercial Energy Mix

FY 2005 - 06

- Natural Gas: 75.14%
- Petroleum Products: 20.9%
- Coal: 3.62%
- Hydro: 0.29%

(18 MTOE)
Milestones of Gas Industry

- First gas discovery – Sylhet gas field, 1955
- First oil discovery – Haripur, Sylhet, 1986
- First offshore gas discovery – Kutubdia, 1977
- First offshore gas production – Sangu, 1998
- First gas supply – Chatak Cement Factory, 1961
- First gas supply to fertilizer – NGFF, Sylhet, 1961
- First gas supply to Power – Siddirganj Power Station, 1968
- First gas supply to domestic customer – 1968
- Introduction of CNG as a Vehicular Fuel – 1982
GAS FLOW MANAGEMENT

BGFL
SGFL
BAPEX
NIKO
CHEVRON
TULLOW
CAIRN

GTCL

JGTDSL
TGTDCL
PGCL
BGSL

CONSUMER
CONSUMER
CONSUMER
CONSUMER
## Customer Base

**November 2007**

<table>
<thead>
<tr>
<th>Customer</th>
<th>TGTDCL</th>
<th>BGSL</th>
<th>JGTDSL</th>
<th>PGCL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Power</td>
<td>26</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>2. Fertilizer</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>3. Industrial</td>
<td>3987</td>
<td>997</td>
<td>45</td>
<td>48</td>
<td>5077</td>
</tr>
<tr>
<td>4. Commercial</td>
<td>9453</td>
<td>4052</td>
<td>914</td>
<td>191</td>
<td>14610</td>
</tr>
<tr>
<td>5. Capt. Power</td>
<td>554</td>
<td>116</td>
<td>34</td>
<td>12</td>
<td>716</td>
</tr>
<tr>
<td>6. Tea-Estate</td>
<td>-</td>
<td>1</td>
<td>89</td>
<td>-</td>
<td>90</td>
</tr>
<tr>
<td>7. Seasonal</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>8. CNG</td>
<td>135</td>
<td>38</td>
<td>13</td>
<td>5</td>
<td>191</td>
</tr>
<tr>
<td>9. Domestic</td>
<td>1262</td>
<td>4066</td>
<td>1102</td>
<td>322</td>
<td>1811233</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1276</td>
<td>4118</td>
<td>111384</td>
<td>32471</td>
<td>1831974</td>
</tr>
</tbody>
</table>
## Present Production Capacity

<table>
<thead>
<tr>
<th>Gas Fields</th>
<th>Producing Wells</th>
<th>Capacity (MMSCFD)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titas</td>
<td>14</td>
<td>405</td>
<td></td>
</tr>
<tr>
<td>Bakhrabad</td>
<td>4</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Habiganj</td>
<td>9</td>
<td>246</td>
<td></td>
</tr>
<tr>
<td>Narsingdi</td>
<td>2</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Meghna</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sylhet</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Kailastila</td>
<td>6</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Rashidpur</td>
<td>5</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Beanibazar</td>
<td>2</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Saldanadi</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Fenchuganj</td>
<td>1</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Sangu</td>
<td>6</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Jalalabad</td>
<td>4</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Moulavibazar</td>
<td>4</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Bibiyana</td>
<td>12</td>
<td>450*</td>
<td></td>
</tr>
<tr>
<td>Feni</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Bangura</td>
<td>2</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>79</strong></td>
<td><strong>1838</strong></td>
<td></td>
</tr>
</tbody>
</table>

Petrobangla Companies: 923 MMSCFD (50.22%)

IOCs: 915 MMSCFD (49.78%)

* Bibiyana is capable of producing @ 600 MMSCFD
Major Role Players in Future Demand

- Large scale Power Plant under Public Sector
- Large scale IPP
- 3 years rental PP
- 15 years rental PP
- Small IPP
- Two new fertilizer plants, one by 2011 and another by 2013
- Usual growth commensurate with GDP growth
Overall Daily Gas Demand Forecast for Bangladesh – GSMP 2006

- 2004-05: 1,000 mmcf
- 2007-08: 2,000 mmcf
- 2010-11: 3,000 mmcf
- 2013-14: 4,000 mmcf
- 2016-17: 5,000 mmcf
- 2019-20: 6,000 mmcf
- 2022-23: Total = 5,606 mmcf

Pie chart showing:
- Power: 57%
- Fertiliser: 5%
- Non-Bulk: 38%

Total Gas Demand 2024-25: 5,606 mmcf
Gas Reserve Vs Production
(As of December 2007)

<table>
<thead>
<tr>
<th>Category</th>
<th>Gas in TCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven (GIIP)</td>
<td>21.265</td>
</tr>
<tr>
<td>Proven Recoverable</td>
<td>15.4035</td>
</tr>
<tr>
<td>Production</td>
<td>7.42</td>
</tr>
<tr>
<td>Proven Remaining</td>
<td>7.98</td>
</tr>
<tr>
<td>Probable Recoverable</td>
<td>5.4711</td>
</tr>
<tr>
<td>Possible Recoverable</td>
<td>7.6918</td>
</tr>
</tbody>
</table>

Gas in TCF
Current Reserve Categories - Supply Demand Balance

Shortfall commences as early as 2011 for Proved reserves
## Production Augmentation Activities

<table>
<thead>
<tr>
<th>Programs</th>
<th>Period</th>
<th>Production MMSCFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-D Seismic survey of existing potential fields</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work over of 8 wells &amp; Drilling of 6 wells of existing producing fields</td>
<td>2007-08 to 2008-09</td>
<td>255</td>
</tr>
<tr>
<td>Drilling of 5 Development wells &amp; 5 Appraisal wells of 9 different fields</td>
<td>2009-10 to 2010-11</td>
<td>240</td>
</tr>
<tr>
<td>Exploration in Block # 5,7,10</td>
<td>June-11</td>
<td>200</td>
</tr>
<tr>
<td>Exploration in Block # 17 &amp; 18 (3-D Seismic followed by exploration drilling)</td>
<td>June-12</td>
<td>50 - 100</td>
</tr>
<tr>
<td>Exploration Drilling of Hatiya Structure</td>
<td>June-12</td>
<td>100</td>
</tr>
<tr>
<td>Bangladesh Offshore Bidding 2008</td>
<td>2015</td>
<td>300 - 500</td>
</tr>
</tbody>
</table>
Load Centers on Transmission System

**Khulna**
- Bheramara
- Ishwardi
- Bonpara
- Hatikumrul
- JMB
- Nalka
- Baghabari
- Westmont
- Barge Mounted

**Greater Dhaka**
- Elenga
- Dhanua
- Monohordi
- Bangura
- Narshingdi
- Srisail
- Salda

**Bibiyan**
- Rashidpur
- HGF

**Ashuganj**
- ZFCL
- APS
- TGDCL VS-3

**Muchai**
- This line operated by TGDCL

**Jalalabad**
- KTL
- Beani Bazar

**Maulavibazar**

**Non-GTCL Loopline**
- 24in O.D.
- 30in O.D.
- 20in OD
- 12in O.D.

**Non-GTCL Pipeline**

**Small O.D. pipeline**

**Proposed/Under construction**

**BGSL Franchise Area (BFA)**

**Future Gas Field**

**Node**

**Future Load Center**

**Load Center**

**Future Load Center**

**Future Gas Field**

**Gas Field**

**Node**

**Hub**

**Future Gas Field**

**Load Center**

**Future Load Center**

**Future Gas Field**

**Load Center**

**Future Load Center**

**Future Gas Field**

**Load Center**

**Future Load Center**

**Future Gas Field**

**Load Center**

**Future Load Center**
<table>
<thead>
<tr>
<th>Pipelines</th>
<th>Length (Km)</th>
<th>Nominal Diameter (Inches)</th>
<th>Maximum Allowable Operating Pressure</th>
<th>Capacity (mmcf)</th>
<th>Commissioned In the year</th>
</tr>
</thead>
<tbody>
<tr>
<td>North-South</td>
<td>175</td>
<td>24</td>
<td>1135</td>
<td>350</td>
<td>1993</td>
</tr>
<tr>
<td>Bibiyana - Muchai</td>
<td>42 Km</td>
<td>30</td>
<td></td>
<td>600</td>
<td>March 2007</td>
</tr>
<tr>
<td>Ashuganj-Bakhrabad</td>
<td>58</td>
<td>30</td>
<td>1000</td>
<td>500</td>
<td>1998</td>
</tr>
<tr>
<td>Beanibazar-Kailashtila</td>
<td>18</td>
<td>20</td>
<td>1135</td>
<td>200</td>
<td>2001</td>
</tr>
<tr>
<td>Ashuganj-Elenga</td>
<td>124</td>
<td>24</td>
<td>1000</td>
<td>270</td>
<td>1992</td>
</tr>
<tr>
<td>Bakhrabad-Demra</td>
<td>68</td>
<td>20</td>
<td>1000</td>
<td>250</td>
<td>1985</td>
</tr>
<tr>
<td>Bakhrabad-Chittagong</td>
<td>175</td>
<td>24</td>
<td>960</td>
<td>350</td>
<td>1982</td>
</tr>
<tr>
<td>Ashuganj-Monohordi</td>
<td>37</td>
<td>30</td>
<td>1000</td>
<td>425</td>
<td>2006</td>
</tr>
<tr>
<td>Dhanua-Aminbazar</td>
<td>60</td>
<td>20</td>
<td>1000</td>
<td></td>
<td>2006/2007</td>
</tr>
</tbody>
</table>
## Transmission Projects under Implementation

<table>
<thead>
<tr>
<th>Projects</th>
<th>Completion Time</th>
<th>Funded By</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North-South System Expansion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Muchai Compressor Station</td>
<td>June 2011</td>
<td>ADB</td>
<td>12000 hp</td>
</tr>
<tr>
<td>• Ashuganj Compressor Station</td>
<td>June 2011</td>
<td>ADB</td>
<td>18000 hp</td>
</tr>
<tr>
<td><strong>BB Corridor Expansion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monohordi-JMB East Loopline</td>
<td>June 2009</td>
<td>ADB</td>
<td>30”x51km</td>
</tr>
<tr>
<td><strong>Expansion to West Zone</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Elenga Compressor</td>
<td>June 2011</td>
<td>ADB</td>
<td>10000 hp</td>
</tr>
<tr>
<td>➢ Hatikamrul-Ishwardi-Bheramara Pipeline</td>
<td>June 2010</td>
<td>ADB</td>
<td>30”x87km</td>
</tr>
<tr>
<td>➢ Bonpara-Rajshahi Pipeline</td>
<td>June 2009</td>
<td>ADB</td>
<td>12”x51km</td>
</tr>
<tr>
<td>➢ Bheramara-Khulna Pipeline</td>
<td>June 2010</td>
<td>ADB</td>
<td>20”x165km</td>
</tr>
<tr>
<td><strong>Pipeline from Titas field to A-B pipeline</strong></td>
<td>June 2010</td>
<td>ADB/GOB</td>
<td>24”x14km</td>
</tr>
<tr>
<td><strong>Bakhrabad – Siddirganj (being considered by ADB)</strong></td>
<td>June 2010</td>
<td>WB</td>
<td>30”x60km</td>
</tr>
<tr>
<td><strong>Ashuganj-BKB-CTG Trans. Pipeline (under active consideration of ADB)</strong></td>
<td>Dec 2011</td>
<td>ADB</td>
<td>30”x235km</td>
</tr>
</tbody>
</table>
**Planning:** Planning of a gas transmission pipeline system is based on transmission system simulations, which essentially requires point-to-point gas production/supply and withdrawal requirements for which following shall be considered:

- Locations and quantity of gas to be produced with delivery pressure
- Requirement of gas quantity and pressure at all withdrawal locations
- Pipeline route and impediments along the route
- Least disturbance to the environment and damage to properties
Design: Pipeline and associated facilities are planned and designed as per requirements of the Bangladesh Mineral Gas Safety Rules 1991 (amended in 2003) and selection of materials & all engineering calculations are performed using the following International Codes & Standards:

- API (American Petroleum Institute)
- ASTM (American Society for Testing Material)
- ASME (American Society of Mechanical Engineers)
- ANSI (American National Standard Institute)
- DIN (Deutsche Norm)
- EN (European Standard)
- MSS (Manufacturers Standardization Society)
- AWS (American Welding Society)
- BGC (British Gas Plc Engineering specifications)
Existing PSC Activities

- During 1989 Bangladesh was divided into 23 acreage Blocks (6 offshore + 17 onshore blocks)

- 8 PSCs active in 10 Blocks
  
<table>
<thead>
<tr>
<th>IOC</th>
<th>Block(s)</th>
<th>Nos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cairn, UK</td>
<td>16, 5 &amp; 10</td>
<td>3</td>
</tr>
<tr>
<td>Chevron, USA</td>
<td>12, 13 &amp; 14, 7</td>
<td>3</td>
</tr>
<tr>
<td>Tullow, Ireland</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Tullow, Ireland</td>
<td>17 &amp; 18</td>
<td>1</td>
</tr>
</tbody>
</table>

- BAPEX working in 2 Blocks (Blocks 8 and 11)

- 11 Blocks are open
Bangladesh Oil, Gas & Mineral Corporation (Petrobangla) has taken initiative to explore offshore area of Bay of Bengal to meet upcoming demand. In this regard tender has already been floated for the potential contractors. A model Production Sharing Contract -2008 has been formulated.

- Offshore Bidding 2008 offers about 100,000 sq. km of offshore acreage under the terms of Model PSC-2008.
- 28 offshore blocks up to 18 N latitude have been delineated to offer.
- Most of the blocks are about 3300 sq. km in size.

- Tender invited: February 16, 2008
- Closing date of tender: May 7, 2008

Details of tender notice, model PSC, bid document, block map etc. are available in the official website of Petrobangla: www.Petrobangla.org.bd
Salient Features of Model PSC 2008

**Contract Period:**

**Exploration:** 8 years for shallow area (4+2+2: initial period of four years plus two extensions of two years each), in case of deep sea initial period will be 5 years

**Appraisal:** Up to a maximum of three years if needed

**Production:** For each production area 20 years from the approval date of Development Plan for an Oil Field and 25 years for a Gas Field, subject to an extension of 5 years on mutually agreed terms

**Gas Pricing:**

The price of onshore gas will be 75% of the international price of high sulfur fuel oil (HSFO). Shallow water offshore gas will be priced at 25% higher than those from onshore gas. For deep sea gas the price will be 100% of HSFO.

The price will have a floor of $70/MT and a ceiling of $180/MT of HSFO
**Oil Price:** The price of oil, condensate & NGL will be determined on the basis of Asian Petroleum Price Index (APPI) or Platt’s Oilgram

**Cost Recovery:** The cost recovery will not exceed 55% of sales proceed

**Profit Split:** Contractor has to mention his share of profit deducting cost recovery in the bid

**Compensation:** The contractor will liable to pay compensation for any loss arising out of accidents due to inefficient or careless operation

**Management of Operations:** A Joint Review Committee comprising of representative from Petrobangla & Government and representatives from the Contractor shall coordinate Work Program. A Joint Management Committee will replace joint Review Committee after declaration of Commercial Discovery
Conclusion

1. Recent study conducted for Gas Master Plan (GSMP) estimated that deficit of gas supply will commence by 2015 if 2P reserves are taken into consideration.

2. An additional 24 Tcf of gas reserve need to be discovered by 2010 assuming 7.5% depletion per annum which will require about US$7.7 billion as finding and development cost.

3. Expansion of the transmission network would require about US$1.5 billion over the next twenty years.

4. To remove sole dependency on NG, initiative has taken to produce more coal as alternative energy by introducing Coal Policy which is at the final stage.

5. Bangladesh has decided to launch offshore bidding for exploration and development of oil and gas in the offshore, particularly deep sea.

6. Regional cooperation on energy for security of supply may supplement the indigenous resources.
Thank You for
Your Kind Attention