Development of the Indian Coalbed methane resources
– Challenges and issues


N. K. Punjrath,
GM - Block Manager
CBM Development Project, ONGC
Bokaro Steel City
<table>
<thead>
<tr>
<th></th>
<th>Overview of Indian CBM scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Challenges and Issues</td>
</tr>
<tr>
<td>3</td>
<td>Technical Challenges</td>
</tr>
<tr>
<td>4</td>
<td>Socio economic Challenges</td>
</tr>
<tr>
<td>5</td>
<td>Government/ Policy Issues</td>
</tr>
<tr>
<td>6</td>
<td>Take home</td>
</tr>
</tbody>
</table>

Presentation Overview

#2 E&P Company in the world
CBM – Indian scenario

• 3rd largest proven coal reserves and 4th largest coal producer in the world
• Total coal resource of India is almost 300 BT and the mining industry over 2 centuries old
• Prognosticated CBM resource is around 4.6 TCM.
• India is a relatively newcomer to the CBM E&P industry
• CBM ‘R&D’ commenced in the early nineties and companies like ONGC, ESSAR, RIL and GEECL, initiated quest for CBM in India – early ‘90’s
• CBM Policy of GoI formulated in 1997 and first award of CBM Blocks in 2001
A FORTUNE Global 500 Company

- 33 CBM Blocks thru’ 4 bidding rounds including 3 by nomination.
- Total CBM Resource awarded ~ 1.5 TCM
- 8 major PSU and Pvt O&G Operators
- 20 Blocks Active

<table>
<thead>
<tr>
<th>Operator</th>
<th>Blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONGC</td>
<td>4</td>
</tr>
<tr>
<td>ONGC-IOC</td>
<td>2</td>
</tr>
<tr>
<td>ONGC-GSPCL</td>
<td>1</td>
</tr>
<tr>
<td>RIL</td>
<td>5</td>
</tr>
<tr>
<td>ESSAR OIL</td>
<td>5</td>
</tr>
<tr>
<td>GEECL</td>
<td>2</td>
</tr>
<tr>
<td>Arrow</td>
<td>5</td>
</tr>
<tr>
<td>B P</td>
<td>1</td>
</tr>
<tr>
<td>REL – RNRL</td>
<td>4</td>
</tr>
<tr>
<td>Coal Gas Mart -</td>
<td>2</td>
</tr>
<tr>
<td>Deep Inds</td>
<td></td>
</tr>
</tbody>
</table>
Almost two decades of CBM Exploration

Total CBM production is just 0.35 MMSCMD

Realized from 2 nomination Blocks and 1 of CBM Round I

Major contribution from GEECL’s Raniganj Block (~0.25 MM)

Blocks awarded post 2001, still not on Commercial production

Even the 3 ‘producing’ Blocks are under ‘incidental production’

Ideally CBM round I – III Blocks should have been under Production
Methane for thought ..... 

- Contracted Phase I & II of most Blocks < 7 years
- Total 3 years extensions can be availed on various accounts in addition to dispensations (Statutory clearances, Force Majure etc.)
- Most Operators completed exploration work with extensions/dispensations
- Monetization of national CBM resources delayed as Operators face diverse Challenges and Issues
- Do we have a solution ?? Lets attempt to diagnose ......
Challenges and Issues

- USA - Mother of CBM Industry
- Taking cue from the US success ambitious CBM programme launched in India
- Wide spectrum of challenges confront the Indian CBM sector, which can be grouped as
  - Technical,
  - Socio economic and
  - Government/ Policy issues.
Challenges – TECHNICAL

- Geological complexity of our Gondwana basins, multiple seam set-up
Challenges – TECHNICAL

- Geological heterogeneity and complexity
- Long stratigraphic column
- Depth
- Abrasive formations
- Multi seam drilling and completions is a compulsion on account of:
  - High resource concentration
  - LAQ issues – inclined wells/ HMMWs
- Reservoir modeling
- Production testing
- Lift (Pump) selection – wide range of dewatering
Challenges – TECHNICAL

- Lack of infrastructure and CBM specific technology
  - CBM E&P requires completing scores of wells in a short time frame for viability
  - Drilling rigs, HF units and completion equipment availability and deployment

- Most of above can be addressed by the Operators through experience, learning and global service providers.
- ONGC itself in the process of farming out to mitigate Technical, Technological and infrastructure issues.
Most CBM acreages in Frontier and economically backward areas

CBM Projects initially require large scale activity
- Large number of land pieces within a small area,
- large volumes of water for drilling and hydrofracturing,
- large scale vehicular movement,
- effluent disposal

..... and thus *Local factors/ forces* come into play.

Socio economic challenges although not so apparent, can *make or mar* a CBM Project. Some of these are:
Challenges - SOCIO ECONOMIC

- **Land Acquisition**
  - Deficient land records and fragmented ownership.
  - Encroached GM land - Gair Majarua lands, encroached by villagers for cultivation. Even after obtaining possession from Govt. Operators face local unrest for want of compensation.
  - Tribal land - Tribal land falling in operational areas. Acquisition possible only through State Govt.
  - Encroached Forest Land - Clearance from MoEF & possession through State Govt.
  - Commercial rates for land - Irrespective of type / category of land, including waste land, impacts project economics.
  - Implementation of CNT Act - Acquisition through direct negotiation not possible. All acquisitions through Govt. only.
Most CBM acreages fall in inhabited areas
This scale of activity is unprecedented in the area
Lack of awareness in the local populace
Local non-cooperative/ hostile environment
Compensation and employment issues
CSR and local awareness programmes
Intense support of Local Authorities and Government required
Overlapping – an area of major concern

• CBM blocks were carved out jointly by MOC & MOP&NG wherein the coal mining was not considered to take place for a considerable time. Three categories of areas were identified

• “Yes Areas” were identified for CBM where for a ‘foreseeable future’ there was no possibility of mining; i.e. up to 2035.

• “No Areas” were areas where no CBM is possible due to the fact that these areas are either under active mining or may be mined in future.

• Most CBM blocks offered were from ‘Yes Areas’
- Subsequently, GoI decided to allocate captive coal mining blocks to tide over the energy crisis
- Such allocated blocks in many cases overlapped with the already allotted CBM Blocks
- Even overlapping of infrastructural project with CBM block exists
- All ONGC CBM blocks have overlapping issues
Issues – Government and Policy – Overlap

A FORTUNE Global 500 Company
Issues – Government and Policy – Overlap

Overlapping in Raniganj CBM Block

<table>
<thead>
<tr>
<th>Overlapping area awarded to</th>
<th>Block Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBMDTC</td>
<td>1. Kulti Coal Block</td>
</tr>
<tr>
<td></td>
<td>2. Icchapur Coal Block</td>
</tr>
<tr>
<td></td>
<td>3. Sitarampur Coal Block</td>
</tr>
<tr>
<td>Consortium of 5-6 pvt. companies</td>
<td>4. Moira-Madhujore Coal Block</td>
</tr>
<tr>
<td>Bengal Aerotropolis Project Ltd. (BAPL)</td>
<td>5. Airport city</td>
</tr>
</tbody>
</table>
Issues – Government and Policy – Overlap

- Overlapping of coal mining blocks is common to all ONGC’s CBM Blocks.
- Invariably coal-mining blocks were awarded much later than award of CBM Blocks.
- Coal blocks generally overlap with the prime prospective areas of CBM.
- Feasibility of simultaneous coal mining and CBM activity in the same areas has been examined and the same is not practical.
- Coal Block operators working in the CBM acreages lead to LAQ constraints in addition to legal, technical and logistic issues.
- CBM Development Plans may not be viable with overlapping.
- Statutes of India do not permit multiple leasing for different minerals in the same area as all mining rights in a vertical column belong to party having the surface lease.
- Under the circumstances concurrent exploitation of coal and CBM not possible without change of the statute.
- Internationally CBM recovery is ahead of mining.
• Government of India (GoI) formulated the CBM Policy encompassing the lucrative terms and fiscal packages of other global CBM Policies.

• Subsequent to award of the acreages the Operator has to seek licenses and statuary clearances from other departments of the Government and from the State Govts., Forest and Environment Clearances from GoI and State of operation.

• PEL/ PML grant normally done at State level in most States. In Jharkhand it is at District level. All Blocks fall in more than one District.

• No single-window for redressal or pre-approvals are available, operations are often delayed or stalled as the Operator runs from pillar to post.
Issues – Government and Policy

- Need for CBM specific safety regulation (DGMS)
- Progressively stiffer fiscal and regulatory norms in successive Bidding Process
- Upcoming unified NELP

Take Home:

- CBM is a front loaded, marginal economics play and Government also needs to hold hands of the Operator in this journey to achieve the ultimate goal of monetising the Indian CBM resources
MAP OF PARBATPUR AREA SHOWING HABITATION, FOREST, VACANT LAND, OVERLAPPING AREA AND DEVELOPMENT WELLS
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Block Name</th>
<th>State</th>
<th>Area(Sqkm)</th>
<th>Resource (BCM)</th>
<th>Awardee</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RANIGANJ (NORTH)</td>
<td>West Bengal</td>
<td>350</td>
<td>43</td>
<td>ONGC-CIL</td>
<td>FDP submitted (05/10/2012)</td>
</tr>
<tr>
<td>2</td>
<td>JHARIA</td>
<td>Jharkhand</td>
<td>85</td>
<td>85</td>
<td>ONGC-CIL</td>
<td>FDP submitted (24/08/2012)</td>
</tr>
<tr>
<td>5</td>
<td>SK-CBM-2003/II</td>
<td>Jharkhand</td>
<td>70</td>
<td>30.5</td>
<td>ONGC</td>
<td>Relinquished</td>
</tr>
<tr>
<td>6</td>
<td>NK(W)-CBM-2003/II</td>
<td>Jharkhand</td>
<td>267</td>
<td>43.6</td>
<td>ONGC</td>
<td>Relinquished</td>
</tr>
<tr>
<td>7</td>
<td>BS(3)-CBM-2003/II</td>
<td>Gujarat</td>
<td>790</td>
<td>87.2</td>
<td>ONGC-GSPCL</td>
<td>Relinquished</td>
</tr>
<tr>
<td>8</td>
<td>ST-CBM-2003/II</td>
<td>Madhya Pradesh</td>
<td>714</td>
<td>29.3</td>
<td>ONGC</td>
<td>Relinquished</td>
</tr>
<tr>
<td>9</td>
<td>WD-CBM-2003/II</td>
<td>Maharashtra</td>
<td>503</td>
<td>19.9</td>
<td>ONGC</td>
<td>Relinquished</td>
</tr>
</tbody>
</table>
#2 E&P Company in the world

CBM BLOCKS OF ONGC

INDEX
1. Raniganj Coal Field
2. Jharia Coal Field
3. Bokaro Coal Field
4. Ramgarh Coal Field
5. Karanpura Coal Fields
6. Auranga Coal Field
7. Hutar Coal Field
8. Daltonganj Coal Field
9. Hazaribagh Coal Field
10. Giridih Coal Field
11. Rajmahal Coal Field

LEGEND
CBM Blocks
Jharia
BK-CBM-2001/I
NK-CBM-2001/I
Raniganj
NK(West)-CBM-2003/I (Relinquished)
SK-CBM-2003/I (Relinquished)

RANCHI
GAYA
KODARMA

50 KM
Overlapping & Horizontal Drilling

- Horizontal drilling in the deeper seams from outside the mining area may emerge as a method for simultaneous exploitation of both the resources.
- However, this technique is yet to be proven, though horizontal drilling for enhancement of CBM recovery is established.
- Proprietary technology with slight variation by different Companies used in United States, Australia, Canada and China for its superiority over drilling of large number of vertical wells.
Vertical wells – the standard technique for CBM

- 8 wells per section on 80 acre spacing
- 5 to 50 meters of coal exposure per well (thickness of each coal seam)
- Complex gathering system
- Larger environmental impact
- Many pumps
- Logistics: rig moves, etc.
The alternative – horizontal, multilateral wells

- 1 to 2 wells per section
- Simpler gathering system
- Low environmental impact
- Fewer pumps
- No hydraulic fracturing
- Up to 5,000 meters of coal exposure per well
- Higher productivity well: up to 10x to 20x vertical well rates