Methane gas from Coalbeds

- **Coalbed Methane (CBM)**
  - Methane contained in coal seams. Often referred to as virgin coalbed methane, or coal seam gas.

- **Coalmine Methane (CMM)**
  - CBM that is released from the coal seams during coal mining.

- **Abandoned Mine Methane (AMM)**
  - Methane that continues to be released from closed and sealed mines. May also be referred to as coal mine methane because the liberated methane is associated with past coal mining activity.
Coalbed Methane Terminology

Coalbed Methane (CBM)
- Coal Seam Methane
- Coal Seam Gas
- Virgin Coalbed Methane

Pre-Mine Drainage is CBM Until Coal Mined Through

Coal Mine Methane (CMM)
- Ventilation Air Methane
- Abandoned Mine Methane
- Gob/Goaf Gas
- In-Mine
- Pre-Mine Drainage
CMM/CBM: Production And Utilization

**METHANE EXTRACTION AND RECOVERY**
- Vertical Degasification Wells
- In Mine Well
- Gob Wells

**GATHERING, COMPRESSION, AND PROCESSING**
- Compression
- Gas Processing
- Power/Heat Generation
- Cottage Industries
- Low/Medium Quality Methane (30 to 70%)
- High Quality Methane (90%+ CH₄)
- High Quality Methane (95+% CH₄)

**METHANE TO MARKETS**
- Export Gas Sales
- Power Generation
- Chemical Feedstock
- Transportation Fuel
- CNG Refueling Station
- Sales Metering
Developments of CBM/CMM/AMM in India

- Ranks 3rd in global coal production
- About 15% of coal production is from underground mines
  - ~24 underground mines classified as “Degree III” gassy mines
- Estimated CBM resource base: 1.5 to 2 trillion cubic meters
  - 26 CBM blocks awarded. Many under active exploration and some moved into development
- India CMM emissions:
  - Substantial methane emissions occur due to mining activity and get added to the atmosphere
Developments of CBM/CMM/AMM in India

• National coal company, CIL actively pursuing CMM development through resource assessment and implementing demonstration projects

• CMM Demonstration Project already in action at Moonidih & Sudamdih in Jharia Coalfields

• CMPDI has invited EOI for five blocks identified by CCL & BCCL for Coal Mine Methane in East Bokaro & Jharia Coal fields respectively

• Global Environment Fund project: Demonstrate commercial feasibility of utilizing methane gas recovered before, during, and after coal extraction

• CMM being used for power generation
Moonidih CMM Project

- Demonstration Project implemented in Jharia CF
  - Occurrence of High Rank Bituminous coal
  - High vertical density of coal seams
  - Long history of coal mining
  - Large number of operating D-III mines
  - Methane emission > 10 m³ per Ton of coal produced

- Utilization of CBM/CMM at Moonidih
  - As fuel in electrical generator sets

Gas based generator at Moonidih
Target Coalfields for CMM Development

East Bokaro Coal Fields

Jharīa Coal Fields

Raniganj Coal Fields

West Bokaro Coal Fields

South Karanpura Coal Fields
Challenges for CMM /AMM Development in India

- Lack of clarity about legal and regulatory issues
  - Especially ownership of the gas
- Lack of technology and technical knowledge
  - Resource assessment, technology selection, formulating feasibility studies
- Lack of pilot projects to demonstrate site-specific economic recovery & utilization
- Lack of infrastructure to utilize gas
- Lack of financing or capacity to obtain financing
CBM Blocks in India - An Overview

CBM Blocks of India

<table>
<thead>
<tr>
<th>State</th>
<th>No. of Blocks</th>
<th>Area (Sq. Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Bengal</td>
<td>4</td>
<td>1308</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>6</td>
<td>1326</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>5</td>
<td>2648</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>4</td>
<td>3972</td>
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<tr>
<td>Chattisgarh</td>
<td>3</td>
<td>1917</td>
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<tr>
<td>Andhra Pradesh</td>
<td>2</td>
<td>1136</td>
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<tr>
<td>Maharashtra</td>
<td>1</td>
<td>503</td>
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<tr>
<td>Gujarat</td>
<td>1</td>
<td>790</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>13600</strong></td>
</tr>
</tbody>
</table>

Source: DGH, IVth round Biding not included

Eastern region presently deprived of natural gas
Essar’s Raniganj CBM Block Development

- 15 CBM production test wells drilled; gas flow started
- Project scope: 500 wells
- OGIP estimated to be 4.6 TCF (best case) with recoverable reserve of about 1 TCF as realistic estimate as per reserves certification by Netherland, Sewell & Associates, Inc. (NSAI), Houston, USA
- CBM sales as trial production planned by the Q2’10 & significant production is expected by Dec’10
Pictorial progress...Raniganj

- **Air Drilling Rig For CBM**
- **PC Pumps running at test wells**
- **Plantation at test well site**
- **Gas flare**
- **Separators installed at test wells**
Developments in Other CBM Blocks

- Sohagpur West & East CBM Block owned by Reliance Industries Limited are in development phase.

- GEECL operated Raniganj South block moved to development phase after completing CBM exploration in the block.

- Majority of ONGC operated CBM blocks are in the exploration stage. Few at the verge of moving into development.

- Other operators such as BP, Arrow, Geopetrol, Deep, etc are at various stages of CBM exploration.
PATH FORWARD

- Development of coal-field specific databases & carrying out assessment of potential
- Delineation of CMM/AMM blocks. Coal producing companies in public and private sector should carve out areas for methane drainage
- The blocks so formed may be allocated to experienced operators by forming joint ventures through:
  - International competitive bidding
  - Selection from pre-qualified operators
- Fiscal terms & conditions could be similar to CBM Exploration & Production Policy
Thank You!