

Coal Mine Methane 'Project Development Status and Trends for the Methane to Markets' EXPO



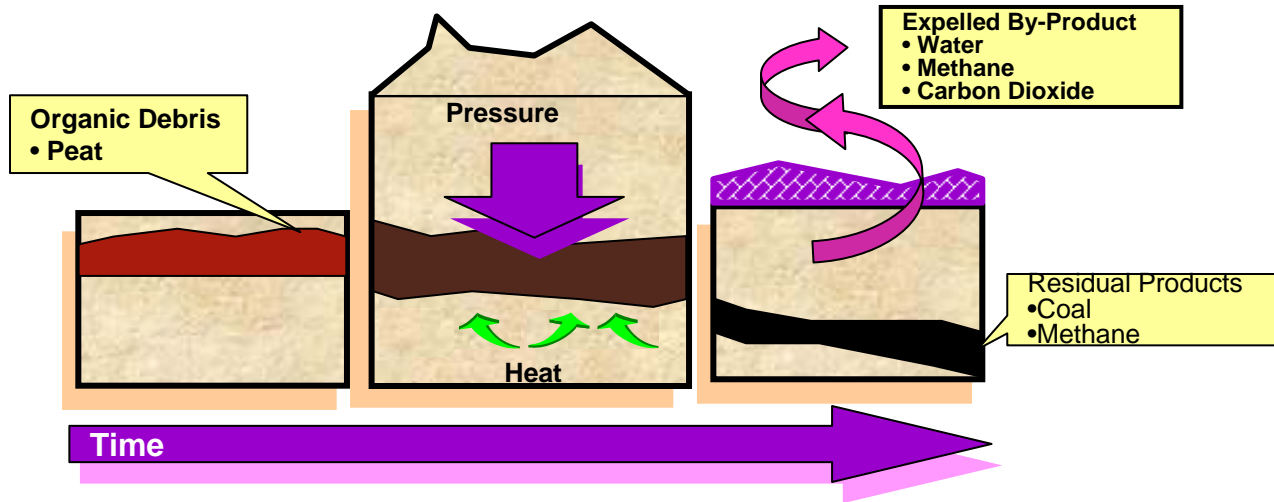
Developments in India - CMM/CBM

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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

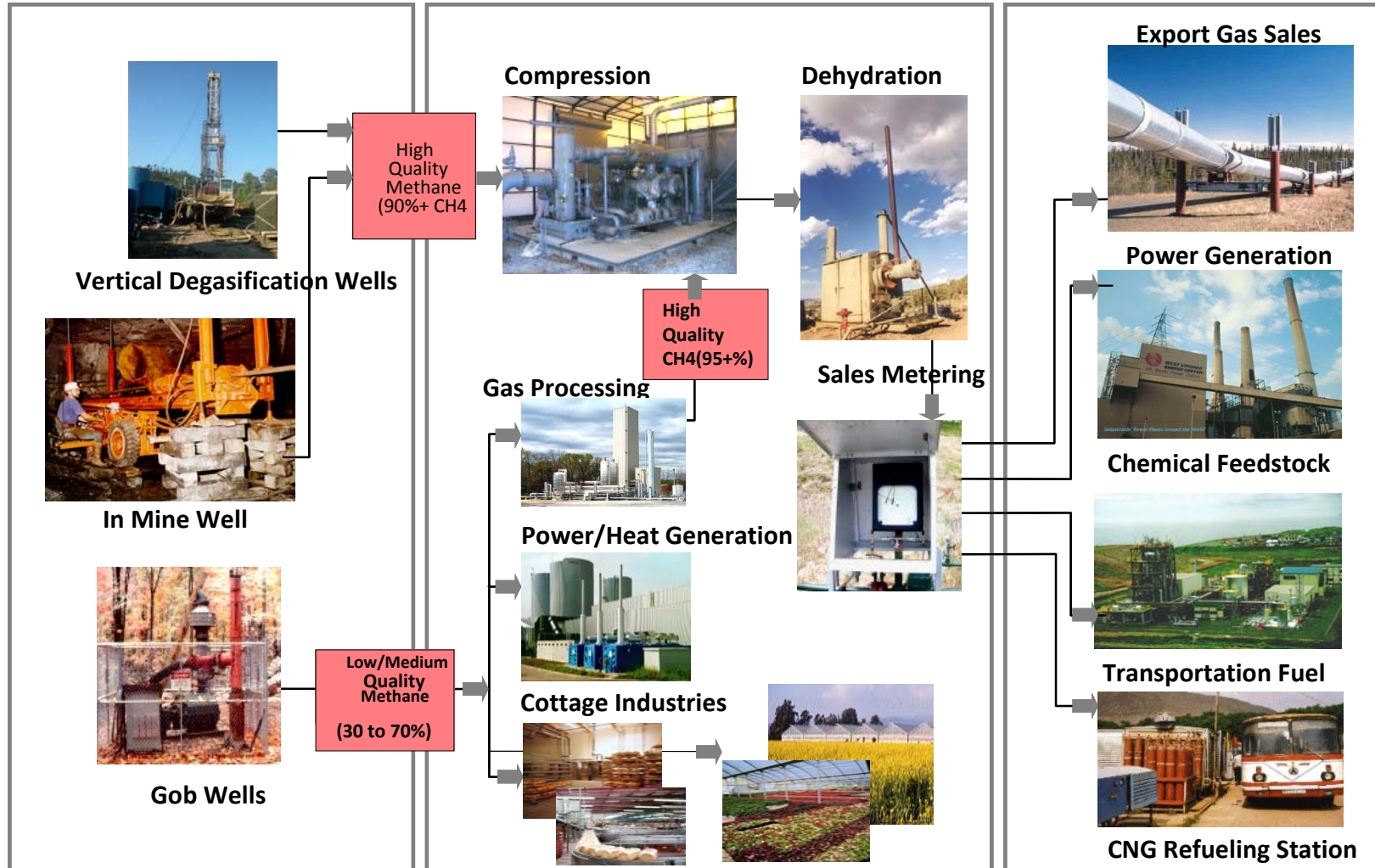


CMM/CBM: Production And Utilization

METHANE EXTRACTION AND RECOVERY

GATHERING, COMPRESSION, AND PROCESSING

METHANE TO MARKETS





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

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- **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**
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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

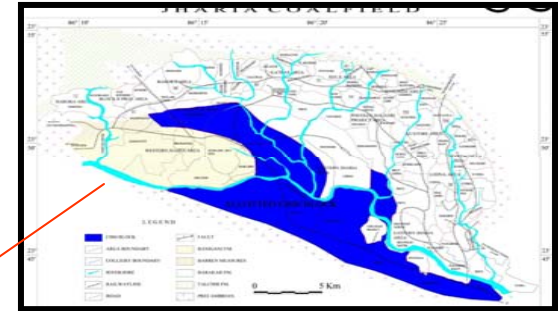


Gas based generator at Moonidih

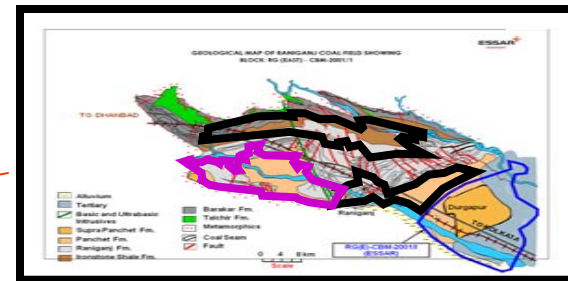
Target Coalfields for CMM Development



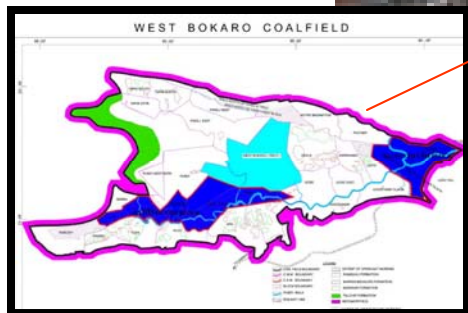
East Bokaro Coal Fields



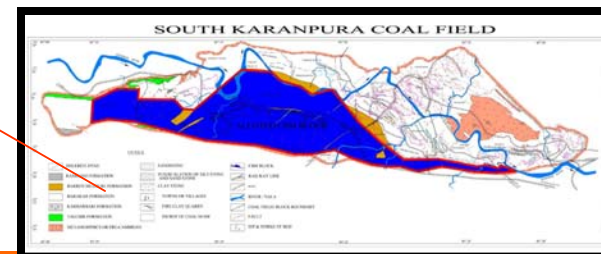
Jharia Coal Fields



Raniganj Coal Fields



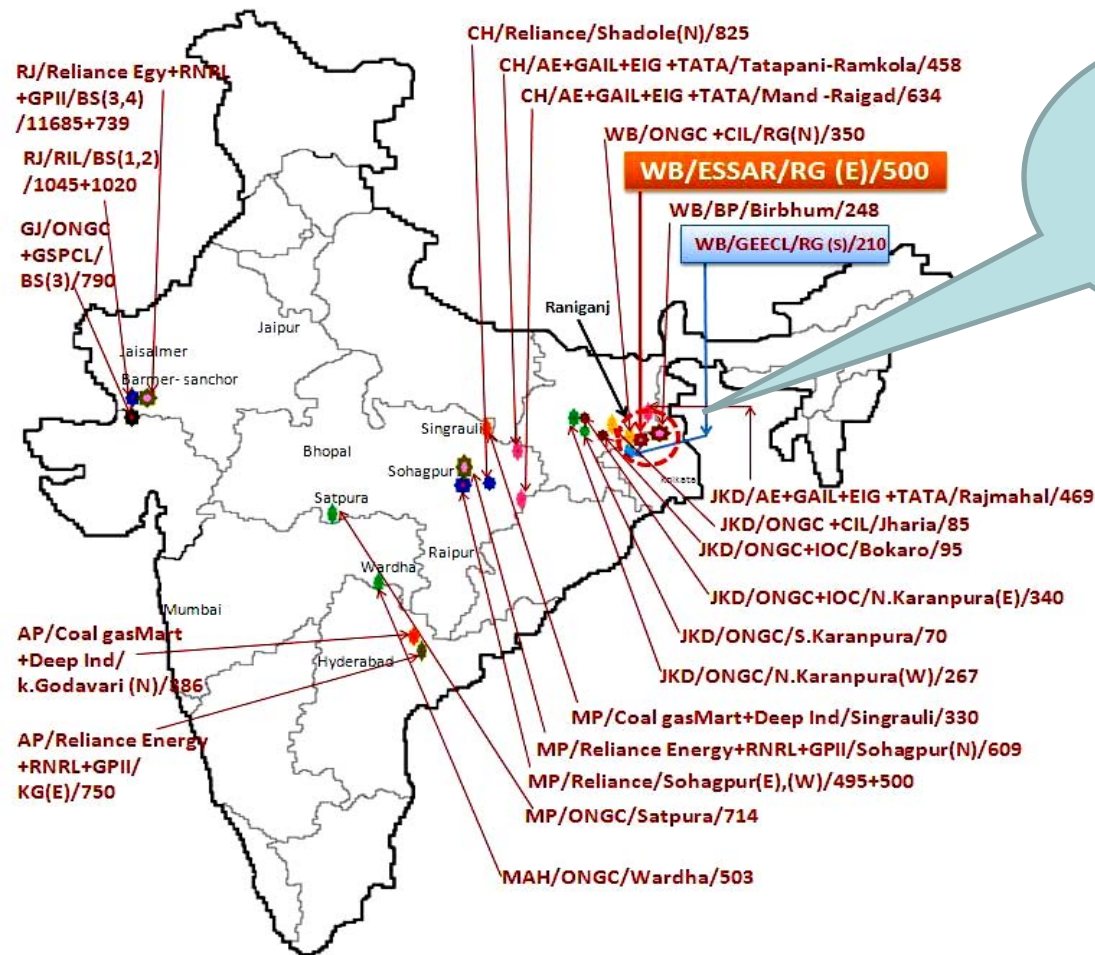
West Bokaro Coal Fields



South Karanpura Coal Fields

- **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**
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CBM Blocks in India - An Overview



Eastern region presently deprived of natural gas

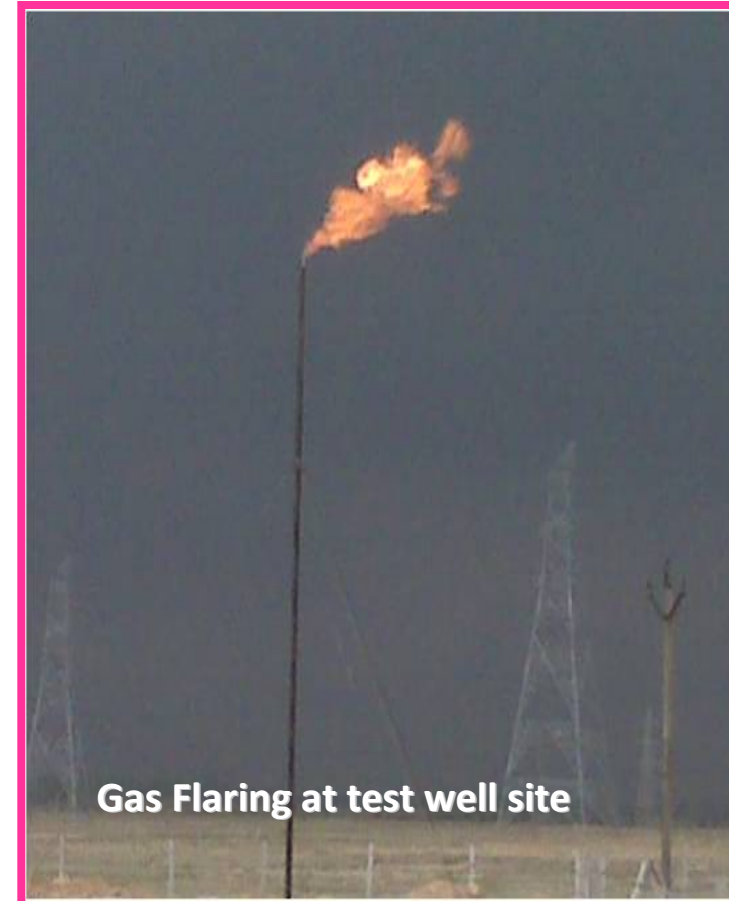
CBM Blocks of India		
State	No. of Blocks	Area (Sq. Km)
West Bengal	4	1308
Jharkhand	6	1326
Madhya Pradesh	5	2648
Rajasthan	4	3972
Chattisgarh	3	1917
Andhra Pradesh	2	1136
Maharashtra	1	503
Gujarat	1	790
Total	26	13600

Total estimated CBM potential 70 TCF

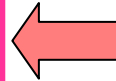
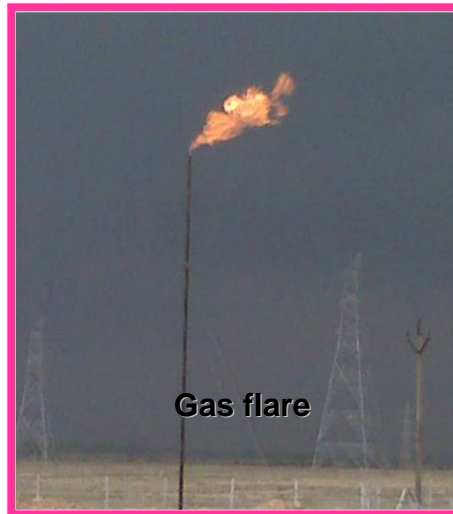
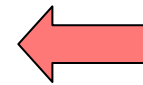
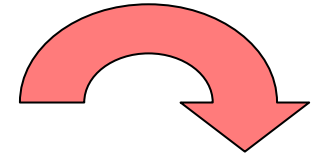
Essar's Raniganj CBM Block Development



- **15 CBM production test wells drilled; gas flow started**
- **Project scope: 500 wells**
- **OGIIP 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



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- **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**
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- **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**
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Thank You !
