



Opportunities and Barriers for CMM Development in China

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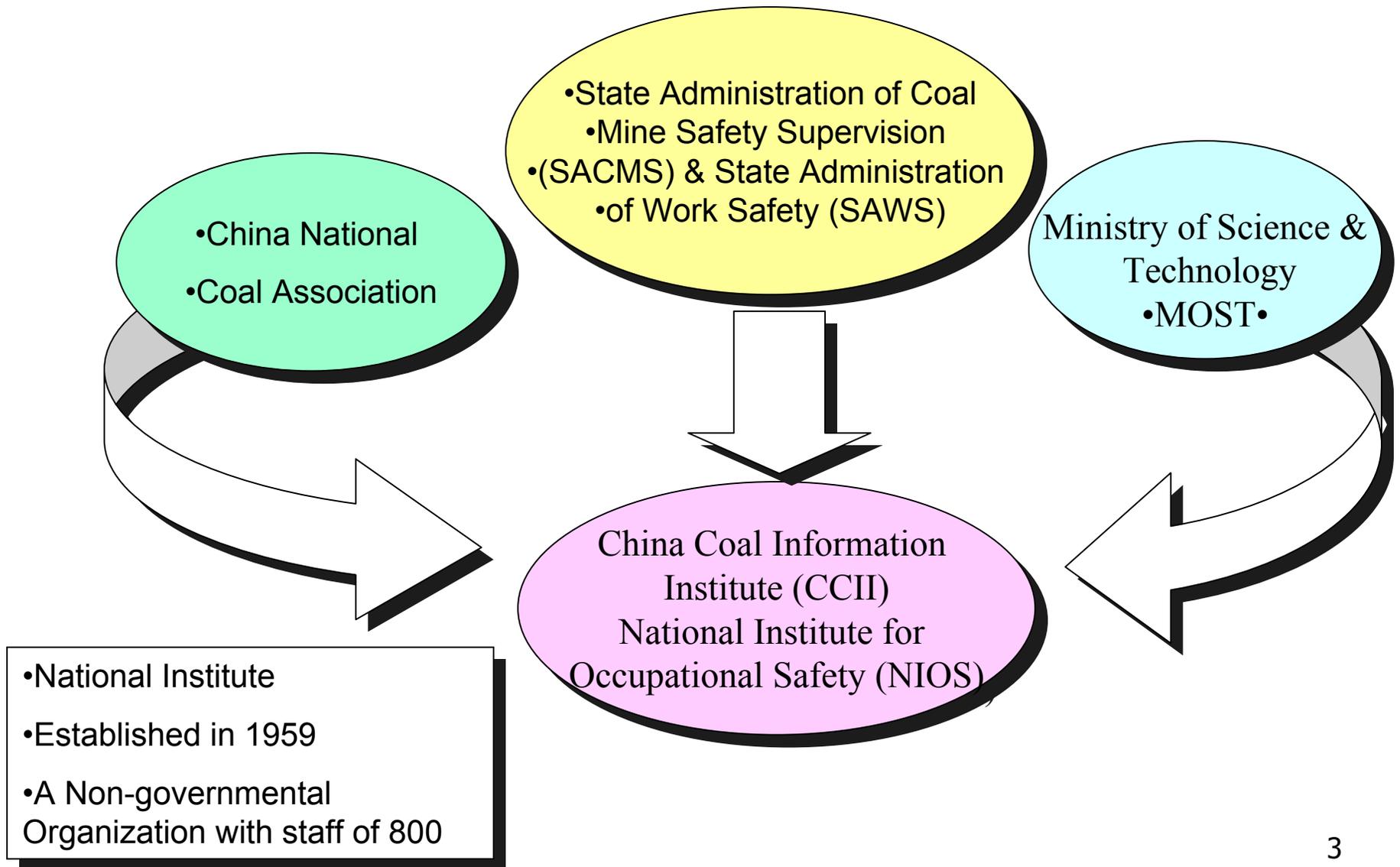
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1. Background

- Largest coal producer and largest emitter of coal mine methane (CMM) in the world
- Increasing demands for energy
- Coal mine safety
- Growing CBM/CMM industry

2. Review of CMM Projects-with support of USEPA



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The 3rd International Methane & Nitrous Oxide Mitigation Conference, November, 2003, Beijing
#Coal mining #Landfill #Natural gas #Agriculture



2. Review of CMM Projects-with support of USEPA

- The Coalbed Methane Clearinghouse was established at the CCII in 1994, funded by USEPA.



2. Review of CMM Projects-with support of USEPA

- **follow-up projects**

- *From October 1, 1999 to December 31, 2001*

- Coal Mine Methane Market Development**

- *From January 1, 2002 to December 31, 2003*

- Commercializing Coal Mine Methane Projects**

- *From April 2004 to April, 2006*

- Ventilation Air Methane/Coal Mine Methane Recovery and Utilization in China**

2. Review of CMM Projects-with support of USEPA

- Preparation of data packages of potencial CMM projects in 8 key mining areas
 - Jingcheng, Huainan, Fushun, Jiaozuo
 - Huaibei, Yangquan, Panjiang, Pingdingshan

2. Review of CMM Projects-with support of USEPA

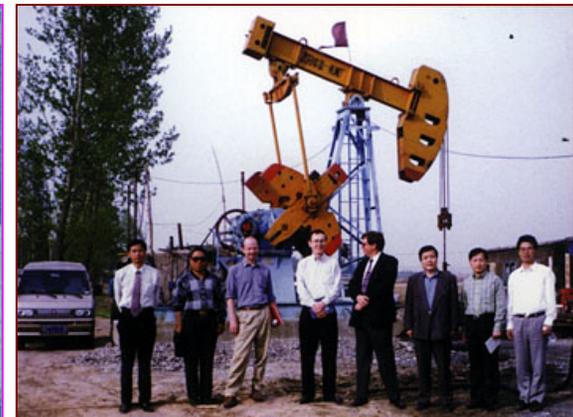
- Country Study with USDOE and EPA
 - GHG Mitigation Technology Assessment and Development Strategies—CBM/CMM

2. Review of Projects- with other partners

- Asian Development Bank Projects
 - Improvement of Environment in Liaoning with total investment of US\$250 million including three components
 - Central heating
 - CBM/CMM development
 - Gas pipeline network

2. Review of Projects- with other partners

- The Feasibility Study of Coal Mine Methane Demonstration Project in Yangquan
- Feasibility study on CMM power plant with total capacity of 120MW at Jincheng Coal Mines



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2. Review of Projects- with other partners

- **UNDP Project— Coalbed Methane Resources Development in China**
 - With the grant of US\$10,000,000
 - Four sub-projects
 - Evaluation of Coalbed methane Resources
 - demonstration projects in Songzao, Kailuan and Tiefa

2. Review of Projects- with other partners

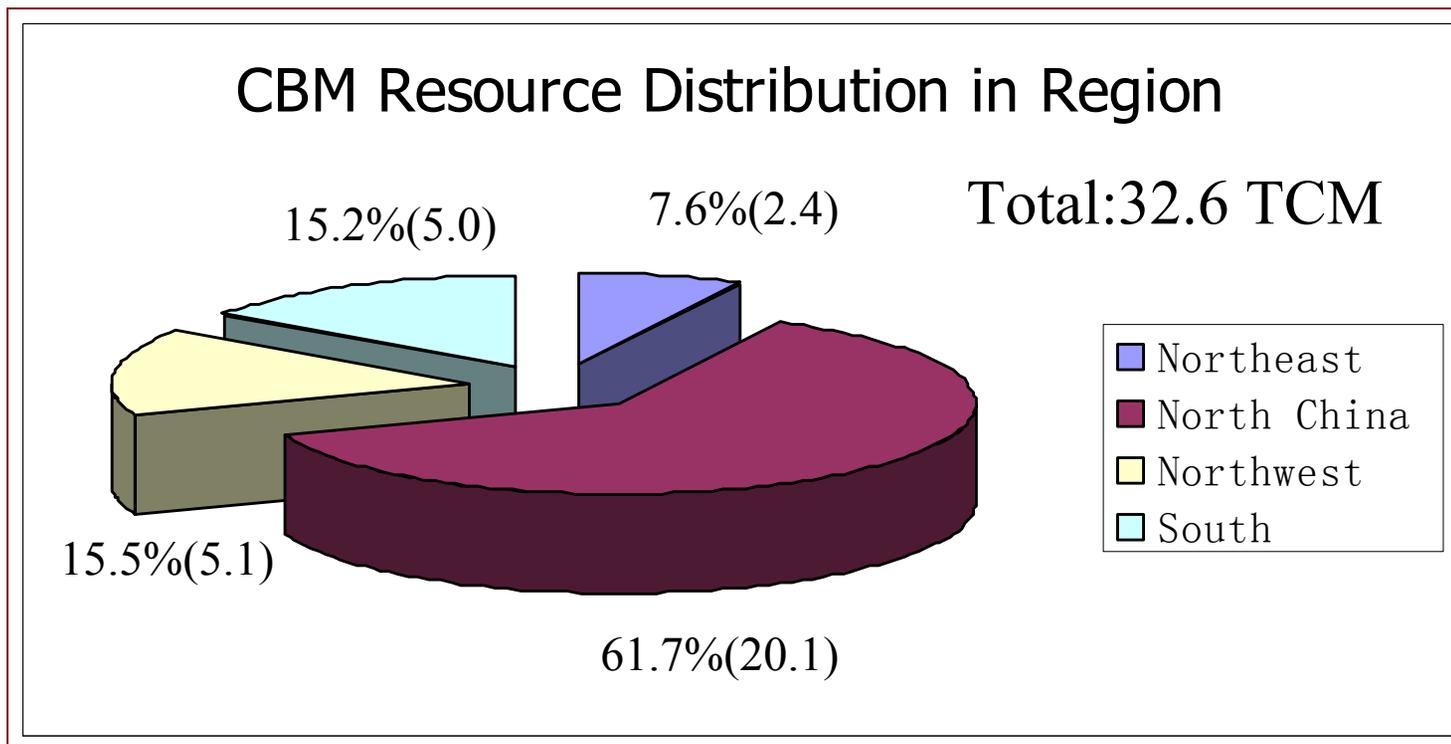
- UNDP Projects for 2004-2005:
Building Capability of CDM implementation in China
 - **Coal Mine Methane**
 - **Renewable Energy**
 - **Energy Efficiency**

3. Opportunities for CMM Development in China

3.1 Coalbed Methane Resources and Emissions

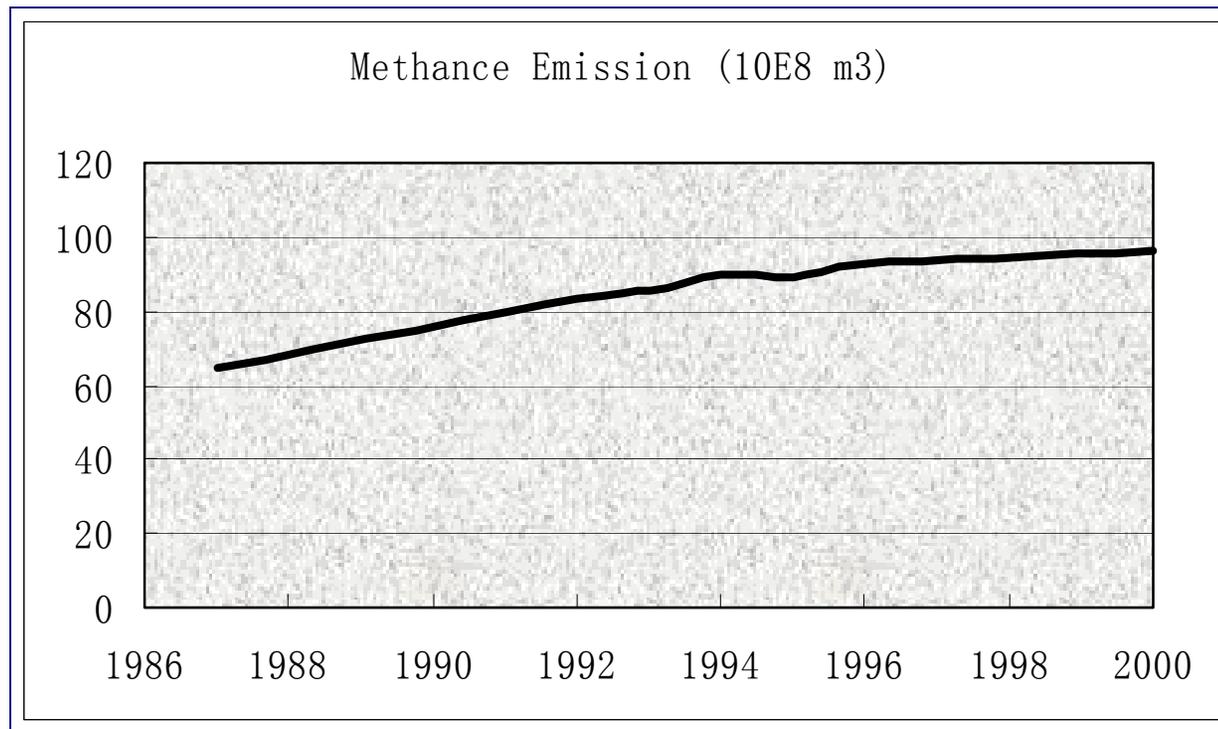
- The coalbed methane resources reach 3.0-3.5 trillion m³.

3. Opportunities for CMM Development in China



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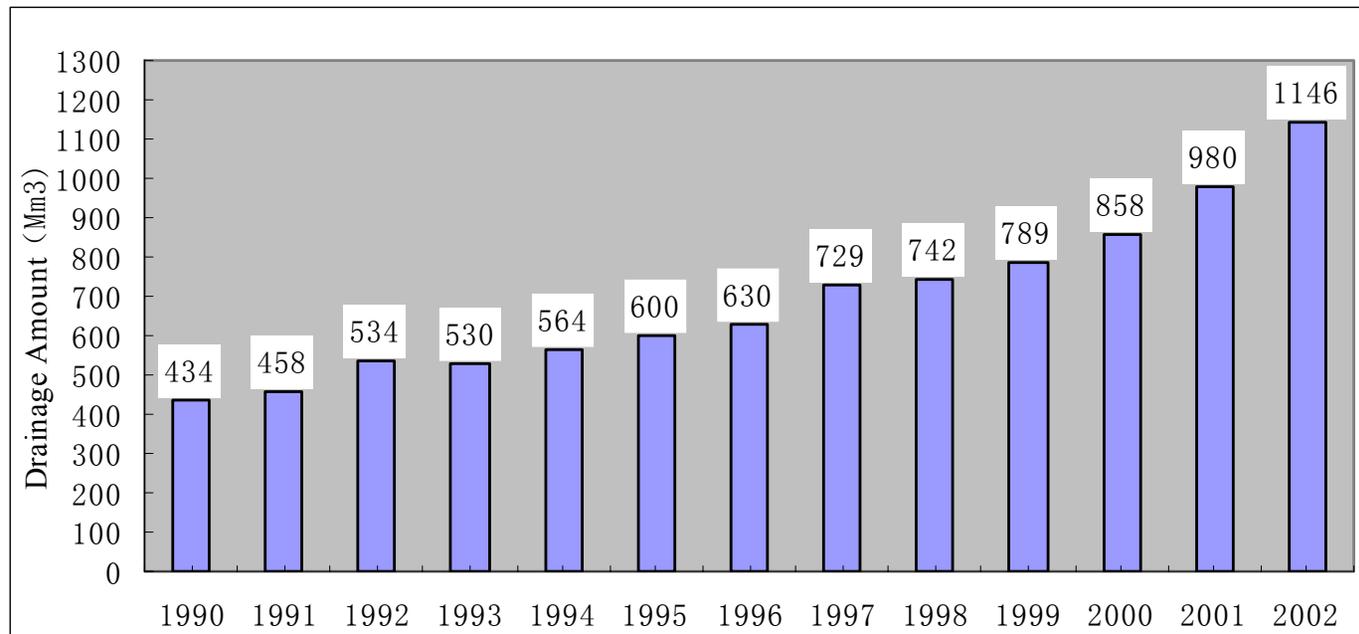
- CMM emissions increased from 6.35 billion m³ in 1987 to about 10 billion m³ in 2000, accounting for 1/3 of global emissions (EPA-19.1 billion m³)



3. Opportunities for CMM Development in China

3.2 Status of Coalbed Methane Recovery and Utilization

- **Underground Drainage**
 - CMM Recovery Over the Last 10 Years
 - 1.5 billion m³ estimated in 2004

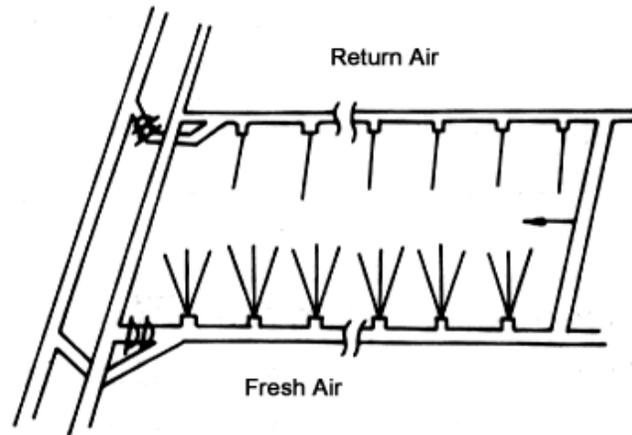


3. Opportunities for CMM Development in China

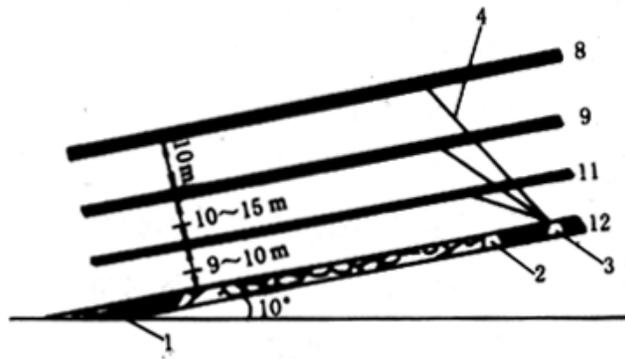
The top ten coal mining areas with methane drainage (10^6m^3)

Coal Area	1980	1985	1990	1993	1995	1996	1998	2000	2002
阳泉(Yangquan)	85.8	89.5	76.9	90.5	92.7	101.0	115	117	200
抚顺(Fushun)	99.9	102	109	113	122	114	127	129	128
淮南(Huainan)	2.47	4.74	4.06	4.2	5.0	6.6	22.6	49.4	112
松藻(Songzao)	10.7	34.1	59.2	76.3	56.4	65.2	69.5	76.4	92.7
盘江(Panjiang)	-	0	5.64	15	20.6	18.3	36.3	102	71.1
铁法(Tiefa)	25.2	18	10.2	16.3	22.1	23.5	36	44.5	63.5
水城(Shuicheng)	19.3	16.4	53.5	12.8	19.5	20.2	12.1	26.2	59.5
宁煤(Ningxai)	-	-	0.06	11	14.7	21.6	28.4	43.8	-
淮北(Huaibei)	1.69	4.25	31.6	4.66	4.53	5.04	7.9	18.0	42.8
芙蓉(Furong)	0.57	1.24	12.4	14.1	27.0	27.1	28.9	24.7	38.0

3. Opportunities for CMM Development in China

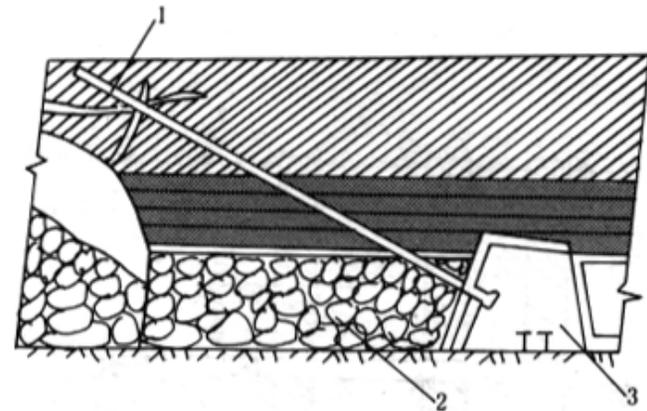


CMM Drainage in Coal Seam



Adjacent seam CMM drainage

1 trans. gateway 2 return air 3 aux. return air 4 bore hole

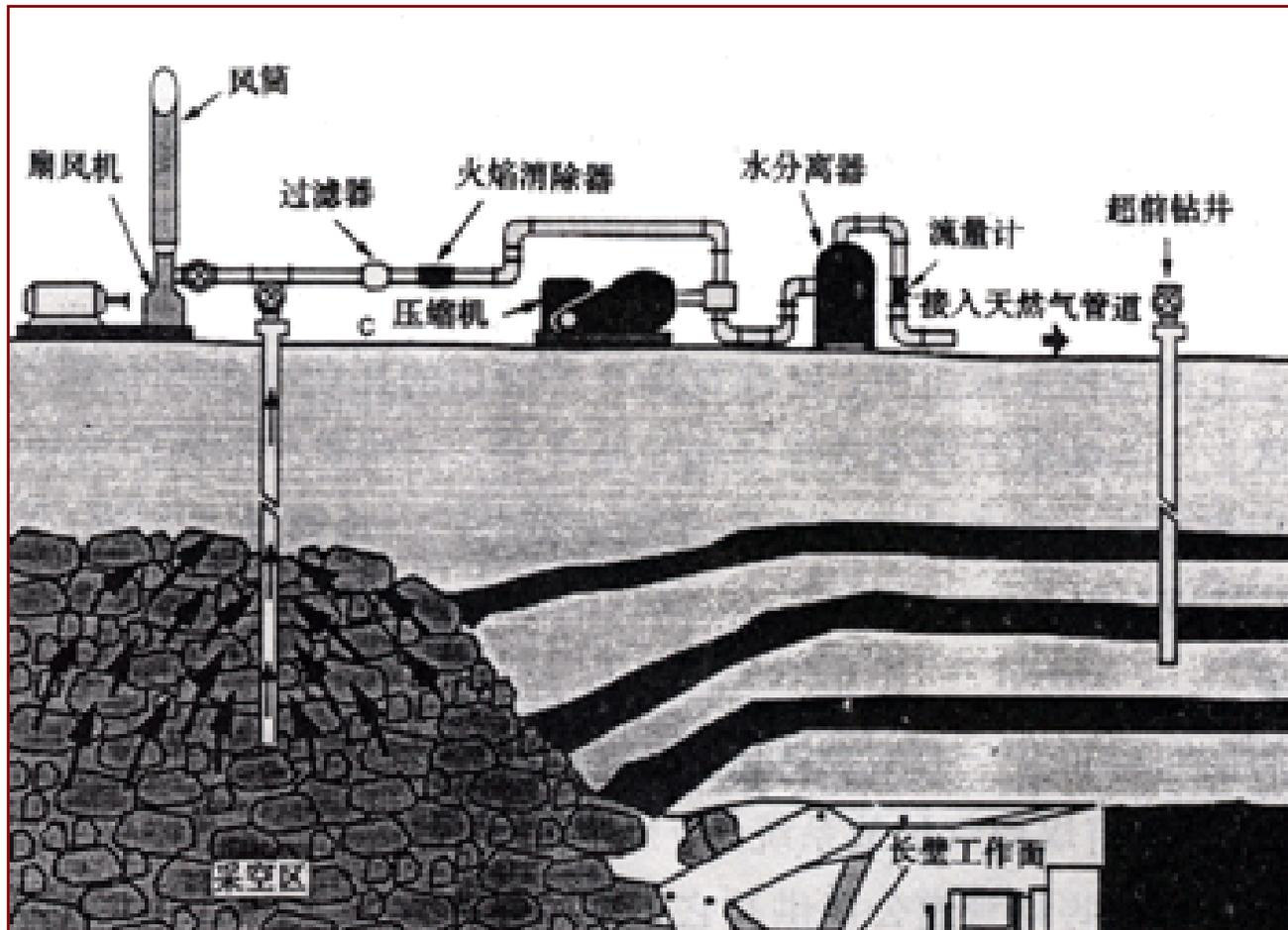


CMM Drainage in Gob Area

1 Borehole 2 Gob 3 Return Air

The Schematic Diagram of Drainage Methods

3. Opportunities for CMM Development in China-application of US technology in China



3. Opportunities for CMM Development in China

Surface development

- surface well drilling technology introduced early 1990s
- Gas flow from a single well-16000 m³ per day
- At stage of exploration development.



3. Opportunities for CMM Development in China

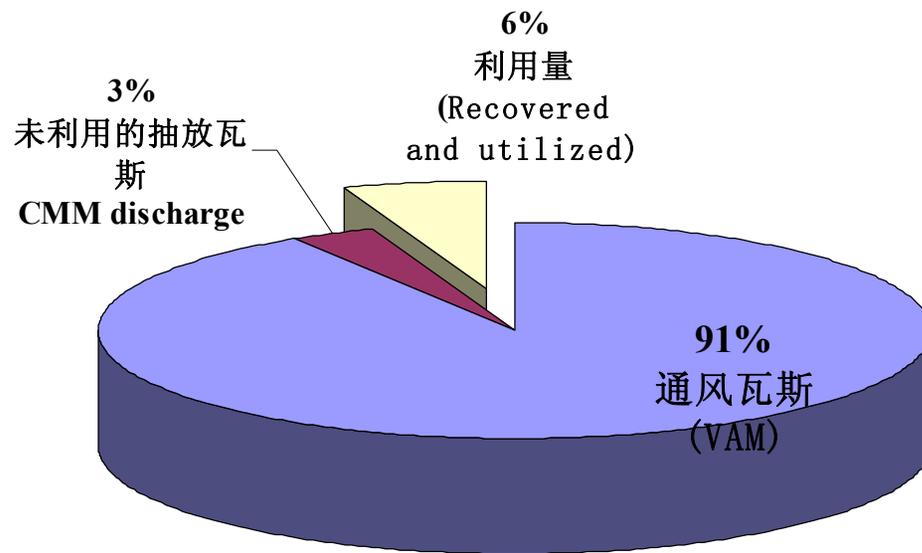
CBM Projects with foreign investors in China

No.	Project Name	Location	Area (km ²)	Contractor	Term	Signing Date	The Number of Drilled Wells
1	HuaiBei	Anhui	2662.6	Texaco	30	98.1.8	9 (one pilot)
2	Sanjiao	Shanxi	448.2	BP	35	98.6.29	20 (two pilots)
3	North Sanjiao	Shanxi	1125.7	BP	35	98.6.29	
4	Shilou	Shanxi	3601.7	BP	35	98.6.29	6
5	Linxing	Shanxi	3324.5	Phillips	30	98.6.29	12 (one pilot)
6	Fengcheng	Shanxi	1540.5	Greka	30	99.8.13	
7	Liulin	Shanxi	198.2	Lowell	30	99.11.12	4
8	Hengshanpu	Ningxia	1708	Virgin	30	01.1.10	
9	Baode	Shanxi	1079	Texaco	35	00.11.8	
10	Shenfu	Shaanxi	3001.1	Texaco	35	00.11.8	
11	Zhungeer	Inner Mongolia	2817.2	Texaco	35	00.11.8	
12	Shouyang	Shanxi	1962.8	Phillips	30	02.4.16	
13	Qinnan	Shanxi	2317.4	Phillips	30	02.4.16	

3. Opportunities for CMM Development in China

Ventilation Air Methane (VAM)

- More than 10 billion m³ Methane (mine gas) released from China coal mines per year
- VAM accounts for 91% .



3. Opportunities for CMM Development in China

3.3 Coalbed Methane Utilization

- Town gas & Fuel
- Power Generation
- Chemical Products
- Gas-fueled Vehicles



3. Opportunities for CMM Development in China

- CMM as Town Gas & Fuel
 - Supplying CMM from Fushun coal mine to Shenyang City in Liaoning Province
 - CMM used as fuel for local alumina plant in Yangquan
 - CMM used as fuel for ceramics plant in Tiefu



3. Opportunities for CMM Development in China

- CMM for Power Generation

- Jincheng 120MW CMM Power Generation
 - Methane abatement : 169 Mm³/a
 - TDA Project: with the grand of US\$500,000
 - ADB's support

3. Opportunities for CMM Development in China

- Small size power plants with domestic equipments.
>70MW totally

Coal Mines	Capacity	Factory
Shanxi	6× 2000kW	Nanhang
Local Mines in Shanxi Province	32× 500kW 3× 400kW	Shengli
Guizhou	25× 500kW	Shengli
Liaoning	14× 500kW 1× 1200kW	Shengli
Anhui	9× 1200kW	Shengli
Chongqing	8× 500kW	Shengli
Gansu	2× 2000kW	Nanhang
Henan	2× 500kW	Shengli
Hebei	1× 2000kW	Nanhang

3. Opportunities for CMM Development in China

Potential projects in selected Coal Mines:

- Fushun
- Yangquan
- Jincheng
- Huainan
- Huaibei
- Panjian
- Jiaozuo
- Pingdingshan



4. Successful Experiences

- Huge emissions and resources available for use
- Existing recovery facilities
- Successful pilot project
- Encouraging policy from the government
 - Preferential tax policy
 - Funding from the government
- Great Potential Market
- Recognition, and
- organizations

5. Obstacles for Methane to Market

■ **Underground Recovery**

- Conflict with coal mining operations
- Horizontal directional drilling

■ **Surface well drilling**

- Initial stage-needs for technology for reservoir engineering, drilling and gas production
- CMM utilization projects

5. Obstacles for Methane to Market

- Small size
- Methane supplies: unstable
- Power generation: size, cost
- Pipeline System
- Investment and encouraging policy

6. Capacity and Target

- **Preparing Inventory of CMM in Coal Mine Sector**
- **Developing cost-effective Technology for Methane Recovery**
- **Removing Barriers**
- **Technology and economic Policies**
- **Project Planning, working together with USEPA**

Thank You!

4th International CBM/CMM Forum in China

- 1-2 December 2004
- Kunlun Hotel, Beijing
- Co-sponsors:
SWAS, CNCA
USEPA, ADB