The Methane to Markets Partnership: Accomplishments in 2005

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Presentation Overview

1. Methane to Markets Partnership Overview
2. Coal Subcommittee Update
3. Global Overview of CMM Projects and Opportunities
4. Role of UNECE in Methane to Markets
5. Conclusions
Methane to Markets Partnership Overview

• 17 member, international, public-private partnership launched in 2004
• Focus: overcoming barriers to commercial project development to harness methane
• Potential: 50 MMTCE of emission reductions by 2015
  • Equivalent to over 14 billion cubic meters of natural gas

M2M Overview Target Sectors

- Coal Mines
- Oil and Gas Systems
- Landfills
- Agriculture
M2M Overview

Partner Countries

Coal Subcommittee Update

• Successful meetings:
  – Washington, DC (November 2004)
  – Geneva, Switzerland (April 2005)
  – Buenos Aires, Argentina (November 2005)
  – Next meeting: May 2005, Tuscaloosa, Alabama, USA, in conjunction with International Coalbed Methane Symposium

• Leadership:
  – Co-chairs: India and USA
  – Vice-chair: China

• Concrete activities are underway
• Developed a specific action plan to move forward
• Partnership Update
  – Over 100 Project Network Members in the coal sector
Coal Subcommittee Update

Coal Sector Activities

- US Trade & Development Agency feasibility study grants for CMM in China and Ukraine
- US AID sponsorship of in-mine underground drilling program in Ukraine
- US EPA – UNECE program to develop financing capacity for coal mine methane projects
- US EPA and Government of India are working to establish Coal Mine Methane / Coalbed Methane Clearinghouse
- JCOAL support for Jincheng project

Coal Subcommittee Update

Coal Subcommittee Action Plan

- Three key elements:
  1. Overview of methane recovery & use opportunities
  2. Identify and address key barriers to project development
  3. Identify and address country-specific needs, opportunities and priorities
- Continuing activities:
  1. Identify and develop cooperative activities to increase methane recovery & use
  2. Outreach to engage Project Network Members
Coal Subcommittee Action Plan

Identify Key Barriers to Projects

1. Lack of clarity about legal and regulatory issues
   - Especially ownership of the gas
2. Lack of technology and technical knowledge
   - Resource assessment, technology selection, formulating feasibility studies
3. Lack of pilot projects to demonstrate site-specific economic recovery & utilization
4. Lack of financing or capacity to obtain financing

Coal Subcommittee Action Plan

Address Key Project Barriers

1. Address clarity of regulatory issues
   - Developing a white paper on regulatory issues
   - Preparing recommendations for adopting uniform technical standards and terminology
2. Conduct technology transfer activities
   - Workshops and extended training
   - Study tours
   - Establishing information centers or clearinghouses
   - Sponsoring travel to conferences
   - Support development of technology feasibility studies
3. Support development of demonstration projects
4. Identify finance sources and build capacity to obtain financing
   - Participate in Project Expo
   - Conduct project financing workshops
**Coal Subcommittee Update**

**Coal Subcommittee Action Plan**

*Identify and address country-specific needs, opportunities, & priorities*

- Expand database of CMM activities in each country
- Report country-specific regulatory regime for coal mine methane project development
- Identify infrastructure needs for market access
- Identify specific project opportunities within each country

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**Coal Subcommittee Update**

*M2M “Project Expo”*

- Opportunity to bring project opportunities and sites, project developers, and investors together
- Will include both project and technology opportunities
  - All four sectors
- Taskforce has been created to develop a work plan, identify options, and investigate logistical details
  - Planned for mid- to late-2007
Coal Subcommittee Update

Roadmap to the Project Expo

- Identify specific project opportunities within each country
- Identify specific needs to advance the projects
- Address these specific needs (for example):
  - Workshops or intensive training to develop resource assessment, preparation of feasibility studies
  - Identifying appropriate technologies
  - Address fiscal and policy issues
- Develop techno-economic feasibility studies
- Prepare a short list of project proposals to showcase at Project Expo
- Minimum estimated lead time: 18 months

Coal Subcommittee Update

Regional Workshop
Beijing, December 2005

- Jointly sponsorship by four Partner countries:
  - Australia Greenhouse Office
  - Japan NEDO
  - US EPA
  - China State Administration of Coal Mine Safety
- 80 participants from 10 Partner countries
- Successful event!
  - Technical case-studies
  - Panel discussion: International coal companies’ experiences working in China
  - Panel discussion: Reps from Argentina, India, Nigeria, Russia, and Ukraine addressed their country-specific barriers and compared them to needs and opportunities in China
Compilation of profiles of 32 key coal-producing countries
- Overview of CMM emissions, projects, and potential
- Opportunities and challenges to greater CMM recovery and use
- Profiles of individual mines
- References

Status:
- US EPA has developed draft
- Currently under review by Partner countries & Project Network
- First iteration to be completed early 2006 and available via Methane to Markets website
- Global Overview will be integrated with database of CMM activities and database of technologies and technology providers

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Global Overview of CMM Opportunities and Activities

- 14 countries have CMM drainage at active mines
- 12 countries have CMM recovery and utilization activities at active and/or abandoned mines
- > 200 CMM projects worldwide
- > 3.8 billion cubic meters of methane emissions avoided per year

Key issues:
1. Ownership / regulatory frameworks
2. Technology challenges
3. Financial challenges
Global Overview

China

• CMM emissions: 1st globally
  • Nearly 200 MMTCO2e in 2004 (~ 14 billion cubic meters)

• Ranks 1st in global coal production
  • ~90% of coal production is from underground mines
  • ~50% of large, state-owned mines are considered gassy

• Estimated CBM resource base: ~ 31.5 trillion cubic meters
  • About 100 CBM wells in production in 2005

• Over 40 CMM projects operating or being developed at active mines
  • Over 200 mines have drainage systems (2004)
  • Mitigate over 630 million cubic meters/yr
  • Town gas, power generation, industrial applications, vehicle fuel

• Challenges to CMM/CBM development:
  • Most mines are not accessible to gas pipeline network
  • Limited drainage technologies/low drainage rates
  • Regulations for foreign developers is unclear

• Noteworthy project:
  • Jincheng - 120 MW power generation project funded by ADB, World Bank, local entities, JCOAL, etc.

Global Overview

United States

• CMM emissions: 2nd globally
  • 56 MMTCO2e of CMM emissions in 2003 (~ 4 billion cubic meters)

• Ranks 2nd in global coal production
  • About one-third of coal is produced from underground mines
  • Fewer than 50 operating mines are considered gassy
  • 18 underground mines conduct drainage
  • Over 400 gassy abandoned mines identified as potential project sites

• Proved CBM resources: 531 billion cubic meters
  • Estimated resource base: 4 to 11 trillion cubic meters
  • CBM production (2003): 45 million cubic meters

• ~10 CMM projects operating or being developed at active mines
  • Most projects inject natural gas into pipeline network
  • 1.1 billion cubic meters per year emissions avoided (2004)
  • About 20 CMM projects use gas from ~ 30 abandoned mines
  • Demonstration VAM oxidation project

• Few challenges to CMM/CBM development
  • Low electricity prices
  • Methane ownership regulations on federal lands can be unclear
Global Overview

Russia

- CMM Emissions: 3rd globally
  - ~21 MMTCO₂e of CMM emissions in 2003 (~1.4 billion cubic meters)
- Ranks 5th in global coal production
  - 44% of mines are underground (2005); 85% of underground mines are considered gassy
- Coal industry was restructured and privatized (1996 – 2001)
  - 77% of coal now comes from independent producers
- CBM industry not yet commercialized
  - Large resources; exploration underway
  - Gazprom implemented pilot well drilling program (2003)
- CMM utilization projects at mines in Kuzbass and Pechora Basins
  - ~43 million cubic meters emissions avoided, primarily in Pechora
  - Boiler fuel, power generation, mine heating projects
  - UNDP and GEF project (ongoing): remove barriers to financing and implementing CMM recovery and utilization projects
- Challenges to CMM/CBM development
  - Large competing natural gas resources with low, state-regulated gas sales price
  - Lack of appropriate technology
  - Complex rules on foreign investments (PSA required)

Global Overview

Ukraine

- CMM Emissions: 4th globally
  - 27 MMTCO₂e of CMM emissions in 2001 (about 1.9 billion cubic meters)
- Ranks 11th in global coal production
  - Almost all coal production from underground mines, >75% considered gassy (2001)
- Estimated CBM resource base: 1.7 trillion cubic meters
  - No active CBM development projects known
- About 10 CMM projects operating or being developed at active mines
  - ~14% of liberated CMM is recovered and used: 178 million cubic meters avoided (2005)
  - 42 mines have degasification systems
  - CMM uses: power generation; heating / boiler fuel; industrial applications; vehicle fuel
- Noteworthy projects
  - Krasnolmanskaya Mine: US Dept. of Labor / US AID in-mine drilling project
  - Zasyadsko Mine: 131 MW generation project planned in stages (begun 2004)
  - US TDA grant for feasibility study for CBM / CMM project
- Challenges to CMM/CBM development include:
  - Lack of investment in new degasification infrastructure
  - Poor degasification system maintenance
  - No competitive pricing or market system for coal or gas
  - Lack of natural gas transportation infrastructure
Global Overview

Australia

- CMM Emissions: 5th globally
  - 22.6 MMTCO2e of CMM emissions (estimated, 2005), ~1.6 billion cubic meters
- Ranks 4th in global coal production
  - NSW: 59% from underground mines
- Estimated CBM resource base: 8 trillion cubic meters
  - One of three countries in world with commercial CBM industry
- About 11 CMM projects operating at active mines
  - At least 7 additional projects in development
  - 445 million cubic meters of emissions avoided per year
  - CMM projects generate 169 MW capacity
  - First commercial VAM oxidation project scheduled for completion in Spring 2006 at West Cliff Colliery
- Few challenges to CMM/CBM development
  - No national legislative framework for CMM (state level only)

Global Overview

India

- CMM emissions: 6th globally
  - 14.3 MMTCO2e (estimated 2005), ~1 billion cubic meters
- Ranks 3rd in global coal production
- About 15% of production is from underground mines
  - ~24 underground mines classified as "Degree III" gassy mines
- Estimated CBM resource base: 1.5 to 2 billion cubic meters
  - Leased CBM blocks; >30 core holes drilled; 2 pilot wells drilled
- Currently no CMM projects operating, but some drainage in place
- Noteworthy projects / activities
  - Global Environment Fund project: to demonstrate commercial feasibility of utilizing methane gas recovered before, during, and after coal extraction. CMM to be used for power generation and CNG for mine vehicles.
- Challenges to CMM/CBM development include:
  - Technology development due to cost and lack of investment capital
  - Lack of natural gas transportation infrastructure
  - Ambiguous policies regarding CMM development
### Global Overview

#### Poland

- **CMM emissions**: 7th globally
  - ~ 6.7 MMTCO2e or 470 million cubic meters (2003)
  - Coal mining is the source of 21% of national methane emissions
- **Ranks 8th in global coal production**
  - Over 161 million tonnes (2003)
- **Privatization of coal industry underway**
- **CBM resources**: estimated 425 to 1450 billion cubic meters gas in place
- **About 20 CMM projects at active mines**
  - Extensive drainage
  - 363 million cubic meters emissions avoided (2003)
  - Gas uses:
    - Heat, power, coal drying
    - Offsite uses: oil refineries, chemical plants

### Global Overview

#### Germany

- **CMM Emissions**: 8th in the world
  - 7.2 MMTCO2e of CMM emissions in 2003 (about 502 million cubic meters)
  - 94% of CMM emissions are from underground mines (2003)
- **Ranks 7th in global coal production**
  - 13% of coal production is from underground mines
  - 11 active underground mines in 2001
- **Estimated CBM resource base**: 2.8 trillion cubic meters
  - Only a fraction is recoverable
  - No active CBM development projects known
- **About 40 CMM projects operating or being developed**
  - Most at abandoned mines
  - Power generation, pipeline injection, industrial application
  - Mitigate over 640 million cubic meters of emissions a year
- **Few challenges to CMM/CBM development**
  - Strategic downsizing of domestic coal production and of coal industry
Global Overview

United Kingdom

• CMM emissions: 12th globally
  • 3.4 MMTCO2e (2003), ~ 236 million cubic meters
• Ranks 20th in global coal production
  • 57% of coal production from underground mines (2003)
  • About 26 active underground mines (2004)
  • Of 900 abandoned underground mines, ~ 400 are known sources of methane (2004)
• Estimated CBM technical resources: 2.9 trillion cubic meters
  • Economically recoverable resources are a fraction of this
• About 8 CMM projects operating or planned at active mines
  • Most recently, 2 new power projects developed by Alkane
  • About 7 CMM projects operating at abandoned mines and about 8 more planned
  • New projects are typically power generation
• Few challenges to CMM/CBM development
  • Decline in coal production (down 82 percent since the early 1970s)

Global Overview

Czech Republic

• CMM emissions: 13th globally
  • 3.2 MMTCO2e (2003), ~ 221 million cubic meters
• Ranks 12th in global coal production
  • ~ 64 million tonnes
  • 99% of mines are underground
• CBM resources considered negligible
• Several projects using CMM, AMM, CBM
  • One project injects 77 million cubic meters of CMM and 32 million cubic meters of AMM per year into a 200 kilometer pipeline network
• Challenges to CMM development
  • Trend of declining coal production
  • Unusual coalfield topography
Other countries with CMM development potential

- Kazakhstan
- Mexico
- Romania
- South Africa and Botswana
- Indonesia
- Vietnam

UNECE’s Role in the M2M Partnership

- UNECE can continue its leadership role in the Partnership by:
  - Continuing its unique financing initiatives
  - Continuing its on-the-ground work to help economies in transition develop financing for CMM projects
  - Supporting efforts for a successful Project Expo
    - Development of “bankable documents,” pre-feasibility studies
    - Broad dissemination to network of experts
  - Hosting workshops and conferences
  - Leading effort to establish standard terminology
Conclusions

• The Partnership has made great strides over the past year
• Coal Subcommittee has made important progress
  – Developed a robust action plan
  – Poised to pursue country-specific project development in the coming year
• Intermediate goal: develop country-specific “pipeline of projects” for the Project Expo
• Partnership will succeed in making coal mine methane projects a reality only with the support of private sector and multilateral organizations

Thank you!

www.epa.gov/coalbed
www.methanetomarkets.org

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