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COALBED METHANE EXTRA

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Global Coal Mine Methane Utilization: Promising Opportunities

Coal mine methane (CMM) projects capture and utilize methane trapped in coal seams and adjacent strata that are released to the atmosphere as a result of mining activities. These projects reduce emissions of methane, a potent greenhouse gas, while at the same time providing a clean-burning, valuable energy resource. Worldwide increases in energy prices, as well as the increased potential for project financing from emissions credits, have renewed focus on coal mine methane projects in coal-producing countries around the world. Globally, coal mine methane (CMM) utilization projects (in the operational, development, or planning stages) capture and utilize methane from gassy underground coal mines in at least 13 countries worldwide. Figure 1 illustrates the known global distribution of CMM recovery and utilization projects, as of 2004. The total methane emission reductions that could be achieved by these projects are approximately 135 billion cubic feet (Bcf) per year (equal to 3.8 billion cubic meters (Bm3) per year, or 14.8 million tonnes carbon equivalent (MMTCE) per year). This global activity level reflects a growing awareness of the technological practicality and the economic attractiveness of coal mine methane recovery and use.

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Methane to Markets Partnership Update

The second session of the Coal Mine Subcommittee met on April 27–28, 2005, in Geneva, Switzerland, at the United Nations Palais des Nations. The Coal Subcommittee represents one of the three primary sectors involved in the international Methane to Markets Partnership. This meeting was the first working session of the Subcommittee since the inaugural Ministerial Meeting held in Washington, DC, in November 2004. Delegates from nine Partner nations attended the Subcommittee meeting. Participants also included observer country delegates (Czech Republic, Germany, Poland, Slovak Republic, and Romania) and Project Network Members who represented the private sector, non-governmental organizations, and academic institutions. Over the course of the two-day meeting, the Subcommittee developed an action plan consisting of priority, short-term activities that will foster coal mine methane project development.

The Subcommittee meeting also provided opportunity for an open dialogue and discussion forum among the Partners, observer countries, and Project Network members. This discussion was used to develop the activities for the Subcommittee's Action Plan. Mine safety, energy utilization, and applications to methane-reduction strategies through market-based instruments continue to be priority focus areas for coal mine methane (CMM) projects. The final Action Plan for the Subcommittee will be submitted to the Methane to Markets Steering Committee prior to the next Partnership Steering Committee meeting, scheduled to be held in Buenos Aires, Argentina, November 2–4, 2005.

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This article provides an overview of global CMM utilization projects based on EPA research of publicly available data and industry contacts in 13 countries known to have such projects either currently in operation, in development, or in planning (shown in Figure 1). It summarizes the geographic distribution of CMM projects, the types of coal mine methane gas recovered, and specific project end-uses. In some cases, available information indicates that projects are underway in a given country, but no quantitative data are available regarding specific project details, including project type, methane consumption, or power output. Unless specifically stated otherwise, the reported projects are inferred to be operational at active mines. This overview should be viewed as a qualitative, descriptive snapshot of global CMM projects and activities, rather than a comprehensive survey. This research is a work in progress, and EPA welcomes updates and more detailed information about specific CMM projects worldwide.

Sources of CMM Used in Recovery and Utilization Projects

Globally, important differences among coal-producing countries impact the status of their coal mine methane utilization. These key factors include geologic parameters (e.g., gassiness and characteristics of the coal seams); structure and profitability of the mining industry; availability of infrastructure and technology; economic and market characteristics; regulatory oversight of the coal mining industry; and access to financial resources and investors. All of these characteristics influence coal mine methane project development— mine degasification strategies and utilization technologies adopted.

Active mines adopt strategies to keep in-mine methane concentrations at safe levels according to their conditions and resources. Some active mines may rely solely on their ventilation systems to remove methane from the coal seam. In contrast, many gassy mines turn to degasification to reduce in-mine methane concentrations, including in-mine drilling and surface drilling of gob wells or even advance degasification. Of course, the gas quality for these methane sources differs dramatically. Ventilation air concentrations of methane are typically less than one percent, making it difficult to harness this energy effectively. Gob wells may range in methane concentrations from 30 to up to 95 percent. In-mine degasification wells produce methane at widely varying concentrations, anywhere from 30 to 80 percent. Surface degasification (drainage) wells may produce gas that is over 95 percent methane and may be pipeline-quality gas.

Globally, recovery projects utilize three distinct types of coal mine methane to varying extents:

1. Drained coal mine methane gas from active mines (often called simply drained gas)
2. Methane from abandoned mines (AMM); and
3. Ventilation air methane (VAM).

Of these three coal mine methane sources, drained gas is being utilized in many of the 13 countries surveyed here. In some cases, drained gas from advance surface degasification wells may be combined with coalbed (coal seam) methane production.

A number of countries currently exploiting AMM include Australia, the Czech Republic, France, Germany,

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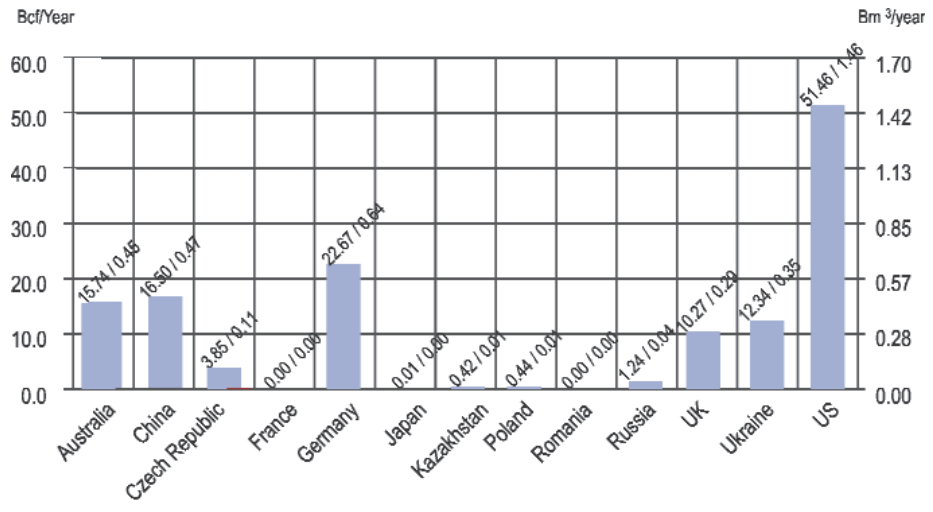

Figure 1. Global Distribution of Methane Utilization from Known CMM Recovery and Utilization Projects*, as of 2004

*Graph represents total potential methane emissions utilization, from projects known to be actively operating, in development, or planned, as of 2004.
Note: This graph is based on publicly available data and therefore may not be comprehensive.

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Japan, Poland, the UK, and the US. At several sites, abandoned mine methane is combined with methane drained from active mines.

At this time, Australia is the only country with experience in utilizing VAM and with concrete plans to develop a VAM project. A test project was using ventilation air methane was run in the UK during the mid-1990s.

Types of Global CMM Utilization Projects

One of the most important factors in determining the end-use for coal mine methane is the mine's location relative to population centers, industrial facilities, natural gas pipelines, electricity transmission facilities, or other potential markets for the gas. Other factors impacting the utilization strategy adopted include market structure and prices for commodities such as natural gas and electricity; desired quality of the gas product; cost to improve gas quality; regulatory oversight over these markets; technology availability; and availability of financing and investment resources.

Currently, global CMM use can be classified into four primary categories:

1. Power generation
2. Pipeline injection for distribution in natural gas systems, either with or without upgrading (this category includes use as town gas or for district heating)
3. Flaring
4. Industrial uses, including chemical feedstock, industrial process fuel (e.g., mine boilers, alumina roaster, coke oven, mine heating, and even vehicle fuels).

Figure 2 illustrates the annual quantity of methane recovered (Bcf/year and Bm^3/year) for all known projects—including those currently operated, in development, or being planned—as of 2004, for each primary use category.

Power generation

As Figure 2 reflects, on a global scale, power generation is by far the most extensively employed option for coal mine methane utilization. CMM-based power production is reported in at least eight countries globally. To varying extents throughout the world, CMM-based power generation is derived from drained gas and methane from abandoned mines, and will soon result from the use of VAM. Figure 3 illustrates the global distribution of CMM power production in terms of MW capacity. Figure 4 shows the total potential volume (Bcf/year and Bm^3/year) of methane recovered from these power generation projects, if each project used CMM to fuel its full generating capacity. Thus, Figure 4 represents a theoretical maximum methane recovery from all CMM power production projects known to be active, in development, or being planned as of 2004.

Pipeline injection / natural gas distribution

Globally, using coal mine methane in natural gas distribution systems ranks second behind power generation in terms of total CMM utilized. The gas may be used "as is" or it may be upgraded to remove contaminants or enriched to increase its heating value. Currently, several countries utilize coal mine methane for natural gas pipeline injection (excluding use of low-quality "town gas"), including Australia, the Czech Republic, France, Germany, the UK, and the US. In China, there is already common use of CMM as town gas or for district heating, although

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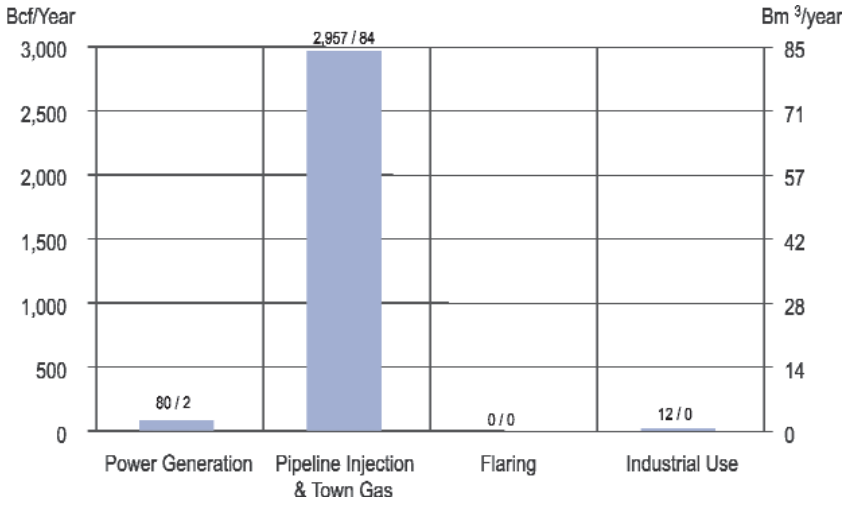

Figure 2. Global CMM Recovery by Project Type*, as of 2004

* Graph represents total potential methane emissions utilization, from projects known to be actively operating, in development, or planned, as of 2004.
Note: This graph is based on publicly available data and therefore may not be comprehensive.

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there are no accurate estimates of the total extent of such usage.

Flaring

Flaring of coal mine methane is not extensively employed globally. Currently, flares of drained gas at active mines are operational in Australia and the UK, and reportedly in Kazakhstan, and are planned in the Ukraine. Flaring has been conducted at an abandoned mine in the US on an intermittent basis.

Industrial uses

Globally, a variety of industrial uses for coal mine methane are reported. CMM is frequently used as a fuel for boilers (including mine boilers), mine heaters, ash drying, coke ovens, refuse incineration, gypsum production, desalination, and air heaters. CMM is also used as a chemical feedstock (e.g., for production of methanol and DME). Figure 5 illustrates the global distribution of CMM mitigation resulting from all industrial uses.

Country Highlights

This summary provides an overview of the known status of coal mine methane recovery and use activities in 13 countries, based on publicly available information, as of 2004. As noted above, this overview is intended as a first step in cataloguing projects worldwide, and EPA welcomes more specific CMM project-based information.

Australia

At present, there are at least 11 CMM projects in Australia, including nine operational projects and two in the planning/development stages. Of these, eight projects utilize drained gas: five internal combustion (IC) engine-based power generation projects, one CMM flare, one gas upgrade and pipeline injection, and one planned project in which CMM is to be co-fired with waste coal. The engine-based power generation projects include one of the largest

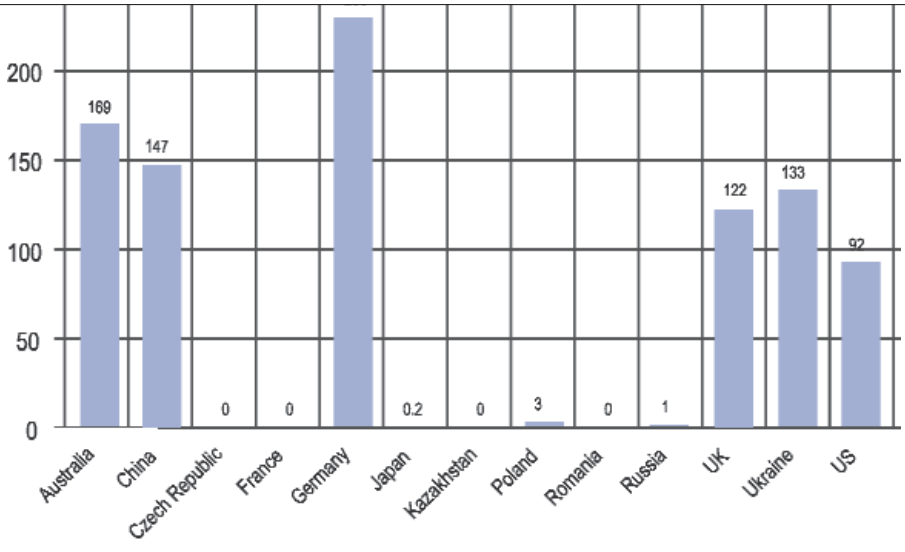

Figure 3. CMM-Based Power Generation Capacity (MW)*, as of 2004

* Graph represents total potential methane emissions utilization, from projects known to be actively operating, in development, or planned, as of 2004.
Note: This graph is based on publicly available data and therefore may not be comprehensive.

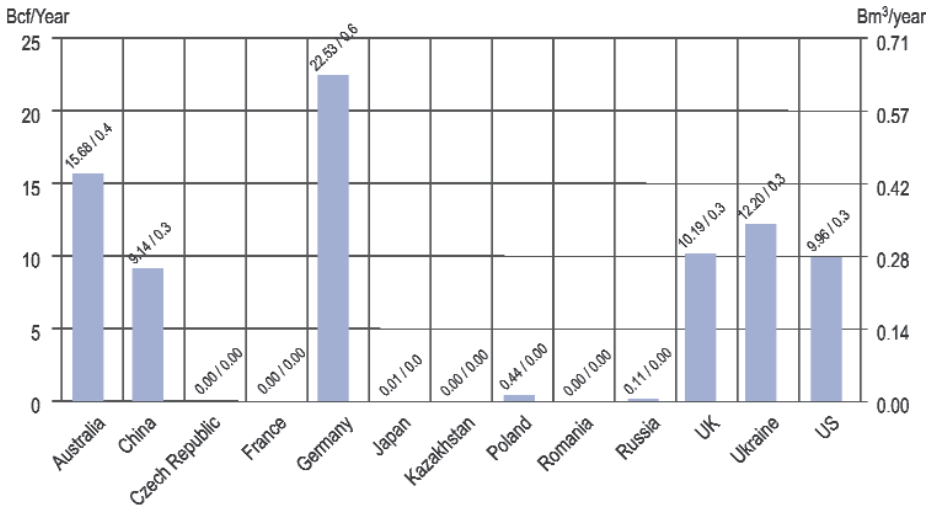

Figure 4. CMM-Based Power Generation Methane Mitigation Capacity, as of 2004

* Graph represents total potential methane emissions utilization assuming power generating capacity is fully utilized, from projects known to be actively operating, in development, or planned, as of 2004.

Note: This graph is based on publicly available data and therefore may not be comprehensive.

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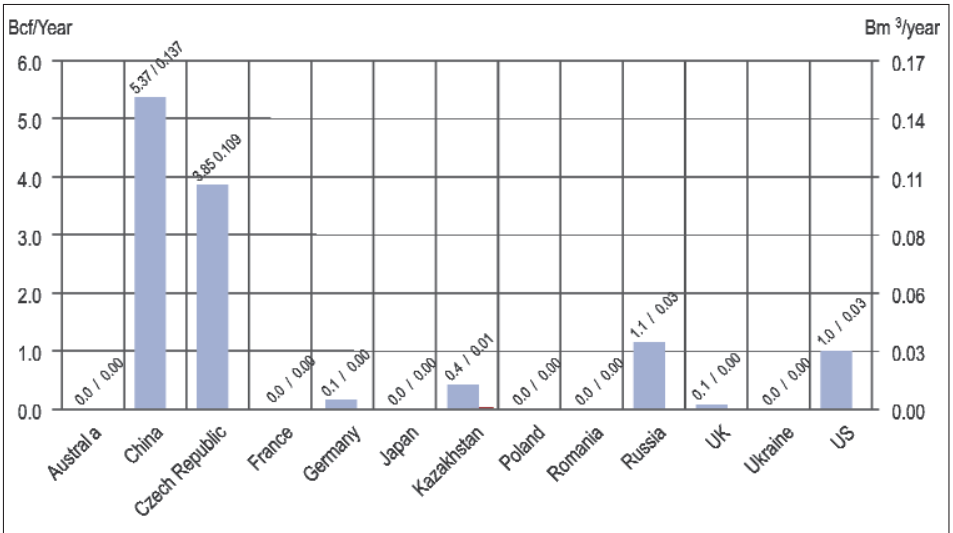

Figure 5. Annual CMM Industrial Use*, as of 2004

* Graph represents total potential methane emissions utilization, from projects known to be actively operating, in development, or planned, as of 2004.
Note: This graph is based on publicly available data and therefore may not be comprehensive.

***Opportunities,** continued from page 4*

Australian CMM projects, a 94-megawatt (MW) project developed by BHP Billiton at Illawarra Coal's Appin and Tower collieries, operated by Energy Developments, Ltd., (EDL) in New South Wales. A 32-MW project is planned at German Creek Coal Mine by Anglo Coal and Energy Developments Ltd.

Three coal mine methane projects in Australia involve the use of ventilation air methane (VAM). Over a 12-month period in 2001–2002, a project at BHP's Appin Colliery demonstrated that thermal flow-reversal technology is capable of boiling water and handling variations in ventilation air methane flow. That demonstration led to a full-scale VAM oxidation project now in development at the West Cliff colliery, known as the "WestVAMP" project. The 94 MW project at Appin & Tower Collieries (mentioned above), uses VAM as combustion air in the Caterpillar internal combustion engines. With these projects, Australia has established itself as a leader in practical, safe VAM capture and use, and it is expected that when the VAM project currently in development comes on-line it will be the world's first large-scale deployment of VAM oxidation and power production technology. Note: for more details on the WestVAMP project, see article in the Fall 2004 *Coalbed Methane Extra*.

Taken together, the Australian coal mine methane power generation projects currently operating or in development account for up to 169 MW of electricity-generating capacity. Annual methane mitigation attributable to the projects will total 15.7 Bcf (equal to 0.45 Bm^3 or 1.7 MMTCE). Over 99 percent of the total mitigation capacity results from power generation projects and the remainder (1%) from a flaring project. Of the power generation projects, over 94 percent of methane mitigation (0.42 Bm^3/year or 1.6 MMTCE/year) will derive from drained gas, and only about 6 percent from VAM.

China

China has a long history of CMM recovery, beginning with underground methane drainage in the 1950s and with surface CMM development beginning in the 1990s. By 2003, nearly 200 coal mines had drainage systems in place. China's vast CMM development potential is just beginning to be tapped. At many mines, CMM is used for town gas or boiler fuel, estimated to account for some 500-million cubic meters of methane annually (Huang et al., 2003). Seven projects use or plan to use drained CMM from active mines for power production, including an 11-MW project at Shuicheng and a 7-MW project at Songzao. The largest power production project in China to date is a planned 120- MW power-generation facility at Jincheng (Shanxi Province). Other CMM projects using drained gas include four industrial applications (using CMM as alumina roaster fuel and in production of steel and ceramics). Of the total potential methane mitigation from CMM projects, 73.3 percent (equal to 12.1 Bcf/year, or 0.3 Bm^3/year, or 1.3 MMTCE/year) will result from projects that are planned or in development.

Czech Republic

In the Czech Republic, approximately 3.8 Bcf (equal to 0.1 Bm^3 or 0.4 MMTCE) per year of methane from both abandoned and active mines is captured and distributed directly via pipeline to industrial end uses, such as technological process inputs and heating. Typically, the project operator extracts AMM and purchases drained

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gas from active mines for subsequent distribution. Approximately 71 percent of the total captured methane is drained gas that is distributed via underground pipelines; the remainder is AMM, distributed via surface pipelines.

France

Currently, no coal mines are operating in France. Reported use of coal mine methane in France includes two industrial fuel applications and one pipeline injection project, all based on abandoned mine methane. The industrial applications involve AMM that is used as fuel for boilers, coke ovens, and an ash dryer.

Germany

Presently in Germany, over 40 coal mine methane projects are reported as operational, in development, or in planning stages. The vast majority of German CMM projects involve power production. Nationally, the power production projects, all reportedly employing internal combustion technology, total over 230 MW of generation capacity. These CMM power projects utilize over 22.5 Bcf (0.6 Bm^3 or 2.5 MMTCE) of methane per year, accounting for 99 percent of the total national CMM emissions reductions. An additional 80 to100 MW of coal mine methane-derived installed capacity is reported, although information about discrete projects comprising this capacity is not available at this time.

In the Saarland, a key German coal basin, a number of operating projects involve CMM for industrial uses, including steel production, combined heat and power, refuse incineration, and gypsum production. In addition, CMM is used in Saarland for pipeline distribution and sale of gas from various active and abandoned mines.

Capture and use of methane from abandoned mines is being actively pursued throughout Germany. Of the total methane mitigation from CMM power production, abandoned mines supply approximately 26 percent (equal to 0.2 Bm^3/year, or 0.6 MMTCE/year) of the total. AMM capture and use for electric power generation accounts for more than 55 percent of all projects underway.

Japan

Japan has no operating coal mines, but two abandoned mine methane projects are reported. One involves CMM-based electrical power generation, using five-30 kW microturbines with a total capacity of 0.15 MW. The net methane mitigation is 0.01 Bcf per year (equal to 0.0004 Bm^3/year or 0.002 MMTCE). The second project uses methane from abandoned mines in a chemical feedstock application for dimethyl ether (DME) production.

Kazakhstan

CMM is reportedly recovered and used for boiler fuel at several active mines in the Karaganda Coal Basin. At present, only 4.3 percent of the total CMM liberated by mining (0.3 Bm^3/year, or 1.1 MMTCE) from both degasification systems and ventilation systems, is utilized. Possible CMM projects for consideration include power production from co-firing CMM with coal, use as the sole fuel in a gas boiler, use for domestic purposes, and use as a feedstock for methanol production.

Poland

Although several potential projects involving use of drained gas and VAM are under consideration in Poland (i.e., feasibility studies have been performed), only two are reported as currently active. One is a 3.2-MW power production project using internal combustion engines. This power project results in 0.4 Bcf (equal to 0.01 Bm^3 or 0.05 MMTCE) per year of methane mitigation. The second active CMM project in Poland is a desalination project.

Romania

Romania is reported to have one relatively small coal mine methane project in operation and two more projects are being developed. It is unclear if these are at active or abandoned mines, and no further details are available at this time. A five-year exploration program is underway to define gas resources in the Jiu Valley. If economically recoverable reserves are found, it is expected that development and gas production will follow.

Russia

Five methane-use projects are reported to be operating in Russia using drained gas from active mines, including four projects in the Pechora basin and one in the Kuznetsk Basin. These projects include one inactive 1.2 MW power generation project, three industrial uses involving stoker boiler fuel, and another industrial heating application. Together, these projects utilize 1.2 Bcf/year (equal to 0.04 Bm^3/year or 0.14 MMTCE/year) of methane. Of this total, the power

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project accounts for only 9 percent (equal to 0.11 Bcf/year or 0.003 Bm^3/year, or 0.01 MMTCE/year). Through a United Nations Development Program (UNDP) Global Environmental Facility (GEF) grant to Russia, one or more coal mine methane projects are being developed, beginning with one mine in the Kuzbass coal region.

Ukraine

CMM fuels industrial boilers at several mines in Ukraine. Two CMM projects in Ukraine (one active and one being planned) involve power generation using internal combustion engines. Together, these power production projects will provide 132.5 MW of reported electrical capacity, utilizing 12.2 Bcf (equal to 0.35 Bm^3 or 1.35 MMTCE) of methane annually. The planned CMM power project, when completed, will be the world's largest, at 131 MW capacity. Another project in the planning stage will flare over 0.14 Bcf/year (equal to 0.004 Bm^3/year, or 0.02 MMTCE/year).

United Kingdom

Power production accounts for over 99 percent of the total annual coal mine methane mitigated in the UK (0.3 Bm3/year, or 1.1 MMTCE). Power capacity at individual project sites typically ranges from 1 to 10 MW. The largest single CMM project reported for the UK, located at an active mine, uses two combined-cycle gas turbines (4 MW total) and a steam-cycle turbine (10 MW) for a combined project capacity of 14 MW. One power production project is also a combined-use project that sends a portion of its CMM flow to flares and to boilers.

The UK is actively pursuing AMM utilization. In fact, AMM fuels 72 percent of the entire UK coal mine methane-fueled power production. Of 27 coal mine methane use projects currently operational or under development in the UK, 20 are power generation projects operating at abandoned mines. Most of these AMM power generation projects use internal combustion engines.

In all, eight enclosed flares are reported to be operating at active UK mines. At least one mine uses CMM for industrial heat applications.

United States

In the US, 34 CMM-use projects are currently reported to be operating or in the planning or development stage. Of these, 13 projects are at active mines. Projects in the US are estimated to recover and use a total of 51.5 Bcf/year (equal to 1.5 Bm^3/year or 5.7 MMTCE) of methane.

Pipeline injection for sale as natural gas accounts for almost 79 percent of the total methane mitigated in the US (40.5 Bcf/year, or 1.1 Bm^3/year, or 4.5 MMTCE). About 20 percent of the total CMM utilized fuels power generation. Most of the US CMM power-generation capacity comes from a single project that uses a combination of drained gas from an active mine and coalbed (coal seam) methane to power two 44 MW gas turbines, although this power plant does not usually operate at full capacity. A minor amount of CMM recovered in the US is used for industrial purposes, such as coal drying and mine heating. These industrial uses account for only 1.0 Bcf/year (0.03 Bm^3/year; 0.1 MMTCE), less than 2 percent of the total CMM utilized annually in the US.

Some 20 projects capture and use methane from 30 abandoned mines for a variety of uses ranging from power generation to pipeline injection. AMM accounts for less than half a percent of the total coal mine methane mitigated in the US.

Conclusion

The opportunity for global CMM project development appears promising. A number of projects around the world are planned or are being developed in some of the leading coal-producing nations, including two of the world's largest CMM projects to date. The important developments in Australian projects to harness the energy in the dilute ventilation air methane stream are also encouraging. While much progress remains to be made on a global scale, these critical projects are advancing methane-emission reductions by providing access to an otherwise-wasted resource. ■

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Natural Gas Market Trends Hold Promise for CMM Development

The US Energy Information Administration's Annual Energy Outlook 2005 predicts that total natural gas use in the US will increase by 39.5 percent, from 22.0 trillion cubic feet (TCF) or 623 Bm^3 in 2003 to 30.7 TCF (869 Bm^3) in 2025. This projection is based on the expectation that most new electrical generation capacity will be natural gas-fueled. Electric power generation is expected to account for 31 percent of the 2025 total gas consumption (Reference: http://www.eia.doe.gov/oiaf/aeo/gas.html).

As a result of the anticipated continued trend toward increasing natural gas prices, toward the end of the forecast period, coal-fueled power generation is projected to become competitive once again. The report predicts that, to feed the expected increase in gas demand, a number of factors including rising natural gas prices and technological innovation will spur natural gas production from unconventional sources.

Production from such unconventional sources, including coalbed and coal mine methane, is expected to increase more rapidly than that from conventional sources. For instance, unconventional natural gas is anticipated to grow from 35 percent of total natural gas production in the Lower 48 States in 2003 to 44 percent of the total in 2025. These projections suggest that market forces over the next two decades may be conducive to successful, profitable coal mine methane utilization project implementation in the US. ■

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The key areas of discussion and for the Coal Subcommittee's Action Plan are described below:

Information on global CMM project technologies, results, opportunities, and needs

There was widespread recognition that active mechanisms are needed for transferring information on project summaries and results, technology descriptions, feasibility studies, financial opportunities, and project development needs. The Subcommittee's draft Action Plan proposes a number of activities to begin to address the needs for compiling global project-related information, including:

(i) A global overview of CMM opportunities;

(ii) Development of a comprehensive coal subcommittee Web site to facilitate access to available tools and clearinghouses;

(iii) Global and regional technical workshop planning;

(iv) Implementation of a proposed mechanism for Project Network members to submit project ideas; and

(v) A work plan for a commercially oriented "Project Expo" in 2006.

In addition, the Administrative Support Group (ASG) has initiated an overarching outreach and communication plan, including a re-developed, comprehensive Methane to Markets Web site to facilitate dialogue and exchange of information among Partners and Project Network members.

Legal and legislative requirements surrounding ownership of CMM gas

There was a consensus among the delegates and Project Network members that more information and guidance are needed on the legal principles and legislative procedures of ownership in each country. The group recognized the great diversity among countries in terms of gas ownership, emissions reduction credit ownership, mineral licensing, product royalties, contract procedures, and the basic legislative process for getting projects approved and permitted. Historically, these idiosyncrasies have been a significant hurdle to project development. The discussion highlighted a critical need for a systematic review of the ownership and legal requirements for CMM project development in each Partner country. In response, the draft Action Plan includes an activity to develop a summary report on ownership issues in Partner countries.

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Uniform technical standards and terminology

The group expressed a strong desire for a uniform set of technical definitions and measurement standards, including translation into several key languages. Practical experiences with non-uniform terminology and standards have resulted in difficulties in comparing CMM project results across countries, in setting legal frameworks under which projects operate, and in reporting and describing project technologies and conditions. There was widespread support for the development of a document on uniform technical standards and definitions by an expert working group. The draft Action Plan identifies the development of this document as a long-term product that would be prepared in coordination and through the leadership of the UNECE Coal Mine Methane program. Country delegates and Project Network members expressed strong interest in participating in this effort through either direct involvement on the working group or through review of the product.

Business planning and investor guidance for CMM projects

Project Network participants expressed the specific need for tools that help to connect project developers, investors, and resource owning companies. Pre-feasibility study guidance that provides rules of thumb through basic financial models or checklists was suggested as a way to help prepare first-stage business portfolios to build investor confidence in a project. Related to this need was the possibility of establishing Coal Subcommittee project criteria that could further define qualitative and quantitative measures. Also, a number of countries offered to share the results of feasibility studies and demonstration studies to help build reference points for financial planning guidance. These ideas were encompassed in a draft Action Plan activity that calls for a global report on financing considerations and investor profiles for individual countries. Several Project Network members expressed a strong interest in leading this activity, with consultation from country experts.

Quantitative emission reduction goals for Coal Subcommittee programs and/or projects

There was much discussion concerning the need for and feasibility of setting emission reduction goals for the Coal Subcommittee program as a whole, as well as a component of individual project criteria. While there was general agreement regarding the importance of setting quantitative goals, there was no clear consensus among Partner countries on what amount and whether quantitative goals for the Coal Subcommittee are practical at this point. Suggestions ranged from setting only qualitative goals to setting progressive reduction targets in the out years. Citing the early stages of the Coal Subcommittee project development, the absence of defined project criteria, and the lack of assigned resources dedicated to project development at this point, a number of participants felt that it may be premature to set quantified reduction goals. For the short term, it was decided that a framework discussion paper on setting quantitative and qualitative Subcommittee goals, with consideration given to the need for specific project criteria, would be included in the Action Plan.

In addition to the specific items addressed above, all Partner countries agreed to active recruitment of members for the Project Network in their own countries. The group recognized that the Project Network is a vital source for project ideas, technology solutions, business development, and communication and outreach. The meeting dedicated periods of the agenda to Project Network participant input, which resulted in important ideas and contributions, particularly in the area of developing commercially viable projects, to the activities planned under the Action Plan.

The draft Action Plan developed by the Coal Subcommittee will be posted on the Partnership's Web page: **http://www.methanetomarkets.org.** ■

CBM/CMM News

North American Coalbed Methane Forum Meeting

The North American Coalbed Methane Forum (NACMF) celebrated its 20th anniversary at its spring meeting, held April 12 –13, 2005, in Canonsburg, Pennsylvania. Formed in 1985 as the Pittsburgh Coalbed Methane Forum, the organization was created to "advance the conservation, development, and production of coalbed methane as a worldwide energy resource." To reflect its geographical scope more accurately, its name was changed in 1994 to the North American Coalbed Methane Forum. Although two other coalbed methane forums (Eastern CBM Forum and the Denver CBM Forum) were in existence during its early years, the NACMF is the only forum to have met regularly—on a biannual basis—over the past two decades.

The Forum has provided an important meeting venue for the US coalbed and coal mine methane (CBM/CMM) community. It became associated with West Virginia University in 1993 and obtains ongoing sponsorship from government and industry. The Forum continues to constitute a vital source of up-to-date information on domestic and international CBM/CMM reserves, development technologies, legal infrastructure, markets, and business climates and to support dialog and interaction among coal mines, CBM/CMM project developers, technology vendors, investors, and the energy industry.

Western States Coal Mine Methane Recovery and Use Workshop

Held in Grand Junction, Colorado, on April 19–20, 2005, this workshop was hosted by Raven Ridge Resources and sponsored by US EPA's Coalbed Methane Outreach Program (CMOP) and several industry sponsors. The workshop addressed a range of topics of interest to coal mine methane project developers in the western US, where coal mine methane utilization has lagged compared to the eastern US. The agenda focused specifically on issues and barriers to coal mine methane utilization faced by western mines.

Presentations provided an overview of CMOP activities, improved CMM recovery strategies and techniques, gas leasing and financing opportunities, CMM utilization options (including methane/waste coal co-firing and ventilation air methane capture and use), coal mine experiences with degasification and CMM utilization, and the regional and national gas markets. The conference provided an opportunity for discussions on practical issues related to successful CMM project development and environmental economics and markets. The West Elk Mine in Somerset, Colorado, (Mountain Coal Co., Ltd.) hosted a group of workshop attendees to tour its surface facilities including its mine degasification and ventilation shafts.

Australian Ventilation Air Methane (VAM) Oxidation Demonstration Project Receives ACARP Award

On April 5, 2005, the Australian resources company BHP Billiton was selected by the Australian Coal Association Research Program (ACARP) for the "Best ACARP-supported Greenhouse Gas Project." BHP Billiton received this award for its project to develop ventilation air methane recovery and utilization at Illawarra Coal's Appin Colliery. Conducted over a 12-month period in 2001–2002, the project verified the efficacy of MEGTEC Systems' VAM-to-energy technology. It successfully demonstrated the ability to handle normal variations of methane concentration in coal mine ventilation air exhaust flows while oxidizing the methane and converting this energy to boil water (see related article on page 1 of the Fall 2004 *CBM Extra*). ■

New Publications

Underground Coal Mine Technical Subcommittee Meeting: Minutes from the April 2005 Methane to Markets Partnership Coal Subcommittee meeting in Geneva (see related article beginning on page 1) will be available on the Partnership Web site (**http://www.methanetomarkets.org**).

Upcoming CBM/CMM Events

2005

Methane to Markets—Private Sector Outreach Workshop, *June 9, 2005, 9 to 4:30 P.M.*

Madison Hotel, Washington, DC (1155 15th Street, NW)

Sponsored by the US Government, American Petroleum Institute, Sold Waste Association of North America, and National Mining Association, this one-day workshop engages private sector entities interested in developing methane emission reduction-and-use projects internationally, focused on oil, gas, coal, and landfill industries.

The workshop is free, but space limitations necessitate registration on a first-come, first-served basis; acceptance based on availability.

Contact: Andrew Dicello at adicello@usaid.gov

Website: **www.methanetomarkets.org**

Fourth International Symposium on Non-CO_2 Greenhouse Gases (NCGG-4): Science, Control, Policy, & Implementation, *July 4–6, 2005*

Utrecht University, Utrecht, The Netherlands

Contact: Han van Dop (Coordinator, Organizing Committee), Netherlands Association of Environmental Professionals

Phone: +31-73-621-5985

Fax: +31-73-621-6985

E-mail: info@ncgg4.nl

Website: **www.ncgg4.nl**

Eighth International Mine Ventilation Congress, *July 6–8, 2005*

Sofitel Brisbane (formerly The Sheraton Brisbane), Brisbane, Australia

Contact: Alison M McKenzie (Senior Conference & Events Coordinator), The Australasian Institute of Mining and Metallurgy

Phone: +61-3-9662-3166

Fax: +61-3-9662-3662

E-mail: conference@ausimm.com.au

Website: **http://www.ausimm.com/mineventilation/home.asp**

Grubengas Tage 2005: German Coal Mine Methane Days, *September 15-16, 2005*

Bochum, Germany

Contact: Dr. Heribert Meiners

Phone: +49-0-201-1-72-14-78

Fax: +49-0-201-1-72-13-75

E-mail: conference@ausimm.com.au

Website: **http://www.dmt-gmbh.net/dates/ggt/ggt.htm**

Coal 2005—Sixth European Coal Conference, *September 26–29, 2005*

Belgrade, Serbia and Montenegro

Sava Congress Centre

Milentija Popovica 9, 11070 Belgrade

Contact: Jelena Andelic

Tel: +381 11 3111549

Email: pco@scentar.co.yu

Website: **www.savacentar.com/ecc05**

31st Biennial International Conference of Safety in Mines Research Institutes, *October 2–5, 2005*

Sofitel Brisbane (formerly The Sheraton Brisbane), Brisbane, Australia

Contact: Mr. Stewart Bell, Safety in Mines Testing and Research Station (SIMTARS)

Phone: +61-7-3810-6302

Fax: +61-7-3810-6330

E-mail: stewart.bell@nrm.qld.gov.au

Website: **www.nrm.qld.gov.au/simri**

International Conference on Coal Science and Technology, *October 9–14, 2005*

Okinawa Convention Center

Okinawa, Japan

Contact: Osamu Yamada

Phone: +81-29-861-8423

Fax: +81-29-861-8417

Email: iccst@m.aist.go.jp

Website: **http://unit.aist.go.jp/energy/iccst**

2006

11th US/North American Mine Ventilation Symposium, *June 5–7, 2006*—Call for papers

Pennsylvania State University, Penn State Conference Center and Hotel, University Park, Pennsylvania, USA

Contact: Rachel Altemus, University of Pennsylvania

Phone: (814) 865-3439

Fax: (814) 863-5709

E-mail: rla7@psu.edu

Website: **www.egee.psu.edu/USMVS2006**

GHGT-8: 8th International Conference on Greenhouse Gas Control Technologies, *June 19–23, 2006*

The Research Council of Norway

Trondheim, Norway

Email: info@ghgt-8.no

Website: **www.ghgt-8.no**

Contact CMOP

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www.methanetomarkets.org

EPA

Methane to Markets