United States
Environmental Protection Agency

Office of Air and Radiation
6207-J

EPA-430-N-00-004
September 2005

COALBED METHANE EXTRA

A publication of the Coalbed Methane Outreach Program (CMOP)

www.epa.gov/coalbed

Generating Power with Drained Coal Mine Methane

Earlier CBM Extra articles have illustrated the variety of opportunities for coal mine methane (CMM) utilization including pipeline injection, industrial use, and flaring (see, for example, the June 2005 issue). Internationally, power generation remains the most extensively employed CMM use option because the requirements for its viable application are flexible and the most easily adapted to a wide range of mine characteristics. CMM power production projects currently exist in Australia, China, Germany, Japan, Poland, Russia, United Kingdom, Ukraine, and the United States. The roughly fifty projects operating at abandoned and active mines range in output from 150 kW to 94 MW and total more than 300 MW. Among the additional projects currently in development, some are planned to exceed 100 MW.

This article describes the three technologies most commonly used today for generating electricity from coal mine methane, internal combustion engines, gas turbines, and microturbines. The most critical characteristics and features of these technologies such as efficiency, output, and size are highlighted. Meanwhile, several specific examples of power production projects operating at mines around the world are considered. The

Generating Power, continued on page 2

In this issue ...

To obtain CMOP reports, call 1-888-STAR YES.

Access documents electronically from the "Documents, Tools, and Resources" pages on our Web site at **www.epa.gov/coalbed.**

To subscribe to *CBM Extra* provide contact information to Pamela Franklin at Franklin.Pamela@epa.gov or to Barbora Jemelkova at Jemelkova.Barbora@epa.gov

To subscribe to CBM Notes, e-mail a subscription request to energystar@optimuscorp.com with "SUBSCRIBE" in the subject line.

Overview of Global Coal Mine Methane Ownership

In November 2004, fourteen countries entered into an agreement to reduce global methane emissions, the Methane to Markets (M2M) Partnership (see Methane to Markets Update on page 8). At its meeting in April, the M2M Coal Technical Subcommittee developed an action plan comprising priority, short-term activities that will foster CMM project development in M2M Partner countries.

Partner Countries Addressed:
Argentina
India
Russia
Australia
Italy
South Korea
Brazil
Japan
Ukraine
United Kingdom
Canada
Mexico
United States
China
Nigeria

One issue that Subcommittee members identified as a critical obstacle to project investment and development was uncertainty about CMM ownership in various partner countries. Without a clear understanding of who owns CMM and how the rights to its profitable utilization can be obtained, projects may be viewed as too risky to gain support from the investor community. In response, CMOP has developed a draft White Paper intended to provide an overview of coal mine methane ownership issues in Partner countries (see box). The report does not constitute a legal analysis, nor does it intend to make recommendations to resolve any issues that are identified. The report is intended to be a living document that is updated as more information becomes available and as ownership licensing requirements change.

Overall, distinctions are made between owners of the surface land, mineral rights, and gas rights. In most countries profiled in this document ownership of the gas rights (CMM or natural gas)

Overview, continued on page 8

Generating Power,
continued from page 1

consolidation of this information demonstrates that there is no "one-size-fits-all" approach for generating electricity. What may be most appropriate for one mine because of its site-specific conditions and needs may not be viable for another.

Technologies to Generate Power from CMM

The technologies available to generate power from drained gas have several advantages over other end-use options. First, they impose no location requirements other than sufficient on-site space and appropriate terrain for installation. Second, either type of equipment can operate using medium-quality gas, although, depending upon the level of impurities in the gas, plant designers may recommend gas pre-treatment to maximize the life of the unit. As long as regional electricity prices are sufficiently high, the resulting power can offset the mine's own energy costs associated with mine equipment, conveyor belts, ventilation fans, and coal preparation plants. Alternatively, the electricity produced can be sold to the grid via existing transmission lines.

Once decision makers at a mine choose power generation from the list of CMM end-use options, they must analyze a number of site-specific factors such as the current and projected CMM flow rate, the gas heating value (i.e., the average methane concentration), and the duration of projected gas production in order to identify the most appropriate power-generation system. They may also identify and evaluate potential thermal markets such as space heating or the supply of cooling for deep mining levels. Noise, air, and water pollution constraints should also be considered. Finally, installation and maintenance costs can be estimated at a site-specific level.

The three technologies commercially available today to generate power from drained CMM—internal combustion engines, gas turbines, and microturbines—are outlined below. The most salient characteristics of each technology, summarized in Table 1, highlight both the differences and similarities between the technologies. They generally reflect the first layer of information in which a mine would be interested when considering power generation. The value ranges shown in the table-particularly the cost values-were approximated by several industry experts. Site-specific conditions and actual manufacturer data are needed to determine more accurate values.

Another promising technology option exists but, with a typical installation cost of $4,500 per kW, has not yet been shown to be cost-effective on a large scale. Fuel cells rely on electrochemical reaction rather than combustion to generate electricity. Methane from an abandoned mine in Ohio was used to power a fuel cell under a technology demonstration grant funded by the U.S. Department of Energy.

Internal Combustion Engines

Internal combustions (IC) engines are the most popular technology choice for electricity production at coal mines around the world. In many cases, they are the default option for such projects. The technology is simple and easily available off-the-shelf, and diesel engines can be converted to run on natural gas. Systems are typically

Table 1
Typical Power Generation Technology Parameters

	Gas Turbines	IC Engines	Microturbines
Typical Output Range (MW)	1.5 to 180	1.0 to 30	0.03 to 0.25
Average Required CMM Emissions (cfd)	About 500,000	About 300,000	About 100,000
Output Flexibility	Fair	Good	Excellent
Compatibility with VAM	Fair	Good	Unknown
Waste Heat Recovery	Excellent	Good	Fair to Poor
Other Benefits	Accept lower methane concentrations	Higher efficiency	Suitable for decreasing methane production at abandoned mines
Typical Installation Cost ($/kW)*	650–1,000	800–1,200	1,500–2,000
Typical Maintenance Cost ($/kWh)*	0.003–0.008	0.006–0.01	0.003–0.01

*Highly case specific
Sources include various experts and CMOP Technical Options Series Brochures, 1998 and 2004

comprised of a group of engines each attached to a generator, providing the mine with great flexibility in expanding or downsizing the system over time. IC engines, each typically capable of generating from about 0.1 to 30 MW, have higher efficiencies on average than either gas turbines or microturbines. However, IC engines require a slightly higher methane concentration—typically 45 percent minimum.

One appealing element to this technology is the relative ease with which ventilation air methane (VAM) can replace ambient air as combustion air in IC engines. This helps improve overall efficiency and mitigates more methane. Furthermore, IC engines are capable of cogeneration, though admittedly not as effectively as turbines. For example, in the Pniówek Mine in Poland, the heat from two engines successfully supplies cooling power for deep mining levels.[1]

Globally, the most sizeable example of an IC engine project-consisting of ninety-four, 1 MW capacity Caterpillar engines-can be found at the Appin and Tower Collieries in Australia. The methane concentration and supply rate at this colliery fluctuates, so smaller-scale units were chosen to maximize efficiency. At any given time, engineers operate at full load only those units required to handle the gas output while leaving the rest switched off.[2] Furthermore, Tower Colliery used VAM as combustion air at its fifty-four units for several years, another reason behind the IC engine choice.

www.epa.gov/coalbed

Gas Turbines

Although they are prevalent in traditional natural gas power generation plants, turbines have not been as popular as IC engines for producing power from CMM. In fact, only two turbines are currently used to generate electricity from CMM, one in the United Kingdom and one in the United States. Turbines operate by compressing air and then injecting CMM to produce combustion. The resulting hot, compressed gas expands as it passes through the turbine and spins the rotors to generate electricity. Compared to microturbines and most IC engines, gas turbines require higher methane flows-about 500,000 cubic feet per day for a 1.5 MW unit-but can accept an average methane concentrations as low as 35 percent. Another feature of gas turbines is that they produce exhaust that contains more of the input energy and at higher temperatures than IC engines. This hot gas can be used to dry coal, heat the mine, or generate additional heat through cogeneration. Turbines are easily configured for combined cycle operation; the turbine exhaust serves as a power source for a waste-heat boiler that generates steam to run a steam turbine that, in turn, drives a generator.

The VP/Buchanan mines operated by CONSOL in the United States use two 44 MW simple-cycle gas turbines onsite to generate electricity for the grid at times of peak demand. The flow of methane at this site is relatively reliable because the project makes use of both coal mine and coalbed methane resources. Therefore, the flexibility that IC engines offer the Appin & Tower Collieries would not appeal as much to the VP/Buchanan mines. Furthermore, the dozens of IC engines that would be required to operate a project of this output size could not be switched on quickly, a necessity for a peak power generation facility.

UK Coal Mining employs turbines at the Harworth Colliery and takes advantage of the cogeneration opportunity provided by the technology. Two combined-cycle gas turbines produce 7 MW total power plus exhaust heat to raise steam that drives a steam turbine. Output for the three turbines can exceed 12 MW when supplementary firing is used. The plant has been in operation since 1993, making it the oldest CMM power generation project in the United Kingdom.[3]

Generating Power, continued on page 5

1 Communication from Kazimierz Gatnar, Head Engineer at Jastrzebka Coal Company

2 **http://www.methanetomarkets.org/docs/australia_profile.pdf and Communication from Shi Su at CSIRO**

3 **http://www.coal.gov.uk/pdfs/dticbmdoc.pdf** and **http://www.methanetomarkets.org/docs/uk_profile.pdf**

Recent Energy and Climate Change Activities of the U.S. Government

Energy Policy Act Signed

On August 8th President Bush signed the long-awaited Energy Policy Act of 2005. The legislation will not renew Section 29 tax credit nor will it offer explicit incentives or subsidies for coalbed methane (CBM) or coal mine methane (CMM) production. However, The Act did include some provisions that may be relevant to the CMM and CBM industries. To view the complete text of the Act, search for Bill Number HR 6 at **http://thomas.loc.gov**.

- A framework was created for federally regulating CBM development in states that have experienced but not recently taken action to resolve disputes regarding CBM resource ownership on Federal lands. *See Section 387.*
- A program for the research, development, and demonstration (RD&D) of coal mine technologies was established, including technologies that increase methane recovery efficiency. See Section 964.
- A RD&D program was established for unconventional gas exploration and production that addresses various technological challenges, including those associated with greenhouse gas (GHG) mitigation and carbon sequestration. *See Section J.*
- A National Climate Change Technology policy was established as a national strategy to promote deployment of technologies and practices that reduce GHG intensity. The strategy will assist projects in developing countries that reduce GHG intensity, including clean coal and carbon sequestration projects. *See Title X, particularly Subtitle B.*
- Laws affecting potential conflicts related to development and ownership of private and federal CBM reserves in the Powder River Basin were identified for review. *See Sections 1835 and 1836.*

Developed World Renews Commitment to Climate Change Mitigation

When world leaders, including President Bush, convened for the Gleneagles G8 Summit (July 6-8, 2005), one of the topics they addressed was climate change. The leaders recognized the challenges posed by tackling climate change, achieving clean energy implementation, and assuring sustainable development. They reaffirmed their commitment to supporting the United Nations Framework Convention on Climate Change (UNFCCC) and to working in partnership with emerging economies to achieve sustainable reductions in greenhouse gas (GHG) emissions worldwide. Acknowledging that the energy decisions made in the near term will have a substantial effect on the ability to achieve cost-effective cleaner energy over the longer term, the leaders committed to:

- Promote technological innovation and clean technology deployment,
- Assist developing countries to secure private investment and benefiting from technology transfer, and
- Raise awareness of the challenges posed by climate change and support effective information transfer to enhance sound decision making regarding the world' energy systems.

Among the specific steps identified in the Gleneagles Plan of Action is encouraging methane capture and beneficial utilization by supporting the Methane to Markets Partnership (see related article on page 8).

U.S. and Five Other Nations Announce New Climate Partnership

The United States has joined with Australia, China, India, Japan, and South Korea to create an Asia-Pacific Partnership on Clean Development and Climate. This new initiative was announced on July 28th at the Association of South East Asian Nations (ASEAN) Regional Forum in Vientiane, Laos. It will accelerate the development and deployment of cleaner, more efficient technologies to meet national pollution reduction, energy security, and climate change concerns in ways that promote economic development and reduce poverty. At present, the six nations have agreed on a vision statement that outlines the Partnership's goals, objectives, and potential areas of

collaboration. It is anticipated that a non-binding compact and framework (e.g., institutional and financial arrangements) will be further defined. In describing the Partnership on July 27th, President Bush said "This new results-oriented partnership will allow our nations to develop and accelerate deployment of cleaner, more efficient energy technologies to meet national pollution reduction, energy security, and climate change concerns in ways that reduce poverty and promote economic development." He has directed Secretary of State Condoleezza Rice and Secretary of Energy Sam Bodman to meet with their counterparts to advance the Partnership by providing direction for joint work, and a ministerial meeting is scheduled for November in Adelaide, Australia.

USAID Announced Call for Public-Private Alliance Proposals

The US Agency for International Development's (USAID) Bureau for Economic Growth, Agriculture, and Trade (EGAT) announced a special call for concept papers related to the Methane to Market Partnership under its Global Development Alliance (GDA) mechanism. USAID seeks to develop public-private alliances that offer innovative ways to support the core activities of the Partnership. Those activities include developing improved emissions estimates, identifying cost-effective opportunities to recover methane emissions, and improving regulatory and financial conditions necessary to attract investment. Project proposals in the form of short concept papers related to Brazil, Colombia, India, Mexico, Nigeria, Russia, and Ukraine that address these and other related activities may be submitted to USAID missions or to appropriate Washington operating units for regional or global projects. Proposals related to other Methane to Market member countries will be entertained as well. Project proponents are encouraged to speak with the appropriate USAID mission staff prior to submitting proposals.

For more information, including a list of Methane to Market core activities and submission procedures, see: **www.epa.gov/methanetomarkets/** or **www.usaid.gov/gda.**

Generating Power,
continued from page 3

Microturbines

Currently, microturbines are the least popular technology for electricity generation from CMM. Microturbines operate much like gas turbines except the high-speed turbine, compressor, and generator are packaged into a container the size of a refrigerator. Their relatively small output range—30 to 250 kW each—limits their applicability and usefulness to small CMM flows. However, microturbines are compact, quiet, clean and reliable, and they work well in remote areas.

Small mines with very low methane emissions, as well as abandoned mines, whose methane recovery and production decrease with time, may be well-suited for microturbines. For example, from 2000 to 2005, the abandoned Akabira Coal Mine in Sumitomo, Japan, utilized five microturbines each with a generating capacity of 30 kW. Several factors made the microturbine very appealing at this site. Only about 0.5 million cubic meters (17.7 million cubic feet) of CMM was recovered and utilized per year, a flow small enough to rule out the use of IC engines or turbines.[4] In addition, Japanese regulations are less restrictive for turbine use than engine use. Finally, the low maintenance and operating requirements of the microturbine system proved attractive.[5]

Conclusion

Several options exist for power generation from drained coal mine methane. The three technologies outlined in this article have operated commercially at coal mines while other promising technologies, such as fuel cells, are being developed and demonstrated. As more mines around the world consider recovery and utilization of their methane, they will evaluate their site conditions against the characteristics of different end-use options to make their choice. Some mines may have unique circumstances that will rule out all but one option while others may be able to choose more freely from two or three.

4 **http://www.methanetomarkets.org/docs/japan_profile.pdf**

5 Communication from Hiroaki Hirasawa at Japan Coal Energy Center

CBM/CMM News

CMOP Welcomes New Technical Specialist

CMOP is pleased to add a new Program Manager to its staff. Barbora Jemelkova, who is originally from the Czech Republic, recently earned her Masters Degree in Public Policy from the Woodrow Wilson School at Princeton University where she focused on economics, finance, and energy policy. Prior to graduate school Barbora spent several years as a researcher for an environmental economic think tank as well as a financial and regulatory consultant to energy utilities. Her background falls in both the domestic and international arenas, having worked in China and the Republic of Georgia. She came to us in late June through the Presidential Management Fellowship Program.

She can be reached at Jemelkova.Barbora@epa.gov.

Two New CBM Projects Announced in China

PetroChina Company Ltd. signed a contract with U.S.-based CDX Gas LLC to drill two multi-lateral horizontal CBM wells and carry out mining tests in Quinshui Basin, Shanxi. CBM resources are abundant within the block, to which PetroChina owns all mining rights. In addition, German-based Ruhr Group Company signed a cooperative agreement with Lu'an Mining Group Co Ltd and Shanxi Coking Coal Group Co. Ltd. for joint development of CBM resources in Shanxi Province. The project is expected to reach commercial production by 2007.

Update on Commercial-Scale VAM Project in Australia

MEGTEC Systems has announced that installation of its VOCSIDIZER thermal flow-reversal units at BHP Billiton's West Cliff Colliery in Australia (located an hour's drive south of Sydney) has been completed. The steam cycle and power generation components for what will be the world's first large-scale ventilation air methane-to-power project are scheduled for installation in the coming months. Start up is planned for the end of 2005 with the plant being fully operational by the first quarter of 2006.

CONSOL Creating Gas Subsidiary

Pittsburgh-based CONSOL Energy, a producer of coal and coalbed methane, recently announced that it is creating a subsidiary, CNX Gas, to handle its gas business. The company is creating CNX Gas as a separate business entity, and CONSOL will sell 18.5 percent of common stock in the unit. The company did not give a valuation for the unit or that stake.

The company also issued a report (commissioned from Schlumberger Data and Consulting Services) that summarizes proved, probable, and possible oil and gas interests controlled by CNX Gas, as of March 31. Total proved reserves are estimated at 21.5m barrels of oil and 1,093,278 million standard cubic feet (MMscf) of gas.

Government of Kazakhstan Awards Tender for CBM/AMM

At the end of 2004, TOTAL Kazakhstan LLP won a state tender for a CBM development project on the Taldykuduk area of the Karaganda coalfield in Kazahkstan. Currently the National Innovation Fund and TOTAL are preparing to implement the first stage of the project: exploration of the field via drilling of six testing wells. Once results of the first stage are successfully captured, the Fund and TOTAL will work to attract domestic and foreign investments in the amount of $180–220 million to develop and commercialize the CBM opportunities.

For more information contact Saule Arapova: arapova@nif.kz or see the Web site http://www.nif.kz/index.php.

Upcoming CBM/CMM Events

2005

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
Web site: **www.nrm.qld.gov.au/simri**

4th European Conference on Green Power Marketing, *October 6–7, 2005*
Berlin, Germany
Phone: +41 (0)44 296 87 09 Fax: +41 (0)44 296 87 02
Web site: **http://www.greenpowermarketing.org/index1.html**

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
Web site: **http://unit.aist.go.jp/energy/iccst**

North American Coalbed Methane Fall Forum, *October 18–19, 2005*
Laveview Inn and Resort, Morgantown, West Virginia, USA,
Contact: Dr. Kashy Aminian
E-mail: Khashayar.Aminian@mail.wvu.edu

The 1st China International Conference on Coal Mine Gas Control and Utilization, *October 26–27, 2005*
The Kerry Center Hotel, Beijing, China
Contact: Anna Wang
Phone: +96-10-6446-3993 Fax: +96-10-6446-3003
E-mail: wcuihua@yahoo.com.cn
Web site: **www.coal-china.org.cn, www.ncics.org.cn**

Methane to Markets Partnership—Steering Committee Meeting and Coal Technical Subcommittee Meeting, *November 2–4, 2005*
Buenos Aires, Argentina
Contact: Erin Birgfeld
Phone: 202-343-9079 Fax: 202-343- 2202
E-mail: birgfeld.erin@epa.gov
Web site: **www.methanetomarkets.org**

7th Annual Unconventional Gas Conference, *November 8–10, 2005*
Telus Convention Centre, Calgary, Alberta, Canada
Contact: Kerri Markle
Phone: (403)218-7720
E-mail: info@csug.ca
Web site: **www.csug.ca**

5th International Symposium on Coalbed Methane/Coal Mine Methane in China, *November 30–December 1, 2005*—Call for papers open through October 1, 2005
Kunlun Hotel, Beijing, China
Contact: Ms. Liu Xin
Phone: +0086-10-84657948 Fax: +0086-10-84657948
E-mail: cbmc@public.bta.net.cn
Web site: **http://www.coalinfo.net.cn/coalbed/meeting/2004/040802/m2004.htm**

2006

United Nations Economic Commission for Europe (UNECE) Ad Hoc Group of Experts on Coal Mine Methane, *31 January–1–February, 2006*

United Nations Economic Commission for Europe (UNECE) Eighth Session of Ad Hoc Group of Experts on Coal in Sustainable Development, *February 2–3, 2006*
Palais des Nations, Geneva, Switzerland
Contact: Catherine Pierre
Catherine.pierre@unece.org
Tel: +41 22 917 4140 Fax: +41 22-917-0038

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, Pennsylvania State University
Phone: (814) 865-3439 Fax: 814) 863-5709
E-mail: rla7@psu.edu
Web site: **www.egee.psu.edu/USMVS2006**

World Energy Council Regional Energy Forum—FOREN 2006, *June 11–15, 2006*
Neptun, Romania
Phone: (+4021) 346.43.30; (+4021) 346.47.31
Fax: (+4021) 346.45.46
E-mail: foren2006@cnr-cme.ro
Web site: **www.cnr-cme.ro/foren2006**

GHGT-8: 8th International Conference on Greenhouse Gas Control Technologies, *June 19–23, 2006*—Call for papers open through September 23
The Research Council of Norway, NTNU Campus, Trondheim, Norway,
Contact: Mrs. Mari Sæterbakk
Phone: +47 73 59 52 65 Fax: 47 73 59 51 50
E-mail: info@ghgt-8.no
Web site: **www.ghgt-8.no**

Methane to Markets Update

The Methane to Markets Partnership expanded its membership to 16 countries, adding two new Partner countries: South Korea (on June 23rd) and Canada (on July 14th). South Korea's Director General of the International Cooperation Bureau in the Ministry of Environment, Young-Woo Park, said that by joining the Partnership the "Republic of Korea will be able to enhance … energy independence, preserve economic growth, improve air quality and reduce emissions of greenhouse gases." In a similar vein, Canada's Minister of the Environment, Stéphane Dion, remarked that their participation "… demonstrates Canada's commitment to both technology transfer and technology deployment as a way of achieving global greenhouse gas reductions."

The Partnership's next meeting will be hosted by the Government of Argentina November 2–4, 2005, in Buenos Aires. The Steering Committee and the three technical Subcommittees (coal, landfills, and oil and gas) will meet to report progress and plan next steps. Please visit the Web site (www.methanetomarkets.org) to register on-line and to find forthcoming agenda and hotel information. Project Network (PN) members are particularly encouraged to register. Your attendance is the best way to contribute your valuable input to the Coal Subcommittee and help guide its agenda. Individuals interested in becoming PNs are encouraged to fill out the on-line agreement.

Methane to Markets

Overview, *continued from page 1*

appears to rest with the national government, which in turn issues licenses for resource development according to its specific laws. CMM use authorization typically carries with it requirements for payment of fees or royalties, although such payment may not be required for on-site uses. For example, the government in Australia waives fees for gas used on-site. In some cases local administrations (e.g., states) may impose licensing or other requirements that are in addition to those levied by the federal government. Users also must perform a reasonable amount of exploration or development to retain a lease.

In some cases, the holder of coal exploitation rights can also develop the CMM resource. To do so, however, likely would require securing a methane development license separate from that for coal development. It is important to note that in many countries the ownership status of CBM or CMM (e.g., is it in the coal estate?, the gas estate?) is inconclusive because it has yet to be tested legally.

The legal ownership status of ventilation air methane (VAM) has not yet been defined since it has not yet been established as a commercial enterprise. It may be that in some countries the process for gaining rights to productively use VAM might be the same as for other types of CMM.

The final version of the White Paper will be posted on the M2M and CMOP Web sites soon (**http://www.methanetomarkets.org** and **http://www.epa.gov/coalbed**, respectively).

Address inquiries about the *Coalbed Methane Extra* or about the USEPA Coalbed Methane Outreach Program to:

Pamela Franklin
Phone: 202-343-9476
E-mail: franklin.pamela@epa.gov

or

Barbora Jemelkova
Phone: 202-343-9899
E-mail: jemelkova.barbora@epa.gov

Our mailing address is:
U.S. Environmental Protection Agency
Coalbed Methane Outreach Program, 6207J
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Visit our Web site at:

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