



# COALBED METHANE EXTRA

A publication of the Coalbed Methane Outreach Program (CMOP)

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## **Second International Methane Mitigation Conference Identifies Need for Joint Efforts**

The Second International Methane Mitigation Conference, held June 18-23, 2000, in Novosibirsk, Russia, drew 200 participants from nearly 30 countries to address opportunities and issues related to methane mitigation. Methane is a potent greenhouse gas, and implementing methane emission reduction strategies can improve operational efficiency, provide a viable energy source, and improve agricultural productivity. During the conference, participants developed a stronger understanding of the specific measures that can lead to the most pragmatic and cost-effective emission reductions, and set forth recommendations to encourage the development of projects.

The Conference, jointly organized by the Russian Academy of Sciences and the U.S. EPA, with co-sponsorship from a number of private and governmental bodies, included presentations on a variety of topics related to greater project realization such as project finance, markets for emission credits, institutional barriers, new technical options and actual project opportunities. During the conference's source-specific technical sessions, participants shared information on and experiences in mitigating methane emissions from coal mining, natural gas systems, solid waste landfills, and agricultural and natural sources. This exchange of information continued during field trips, where conference participants had the opportunity to visit methane sources in southwestern Siberia, and to meet with local experts to discuss technical merits of different methane mitigation measures.

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**Coal Mining Session Tour. Methane Recovery at Chertinskay Mine.**

## **Industry News**

### **CMM/CBM Help Fuel Consol Energy's Fourth Quarter Earnings**

Consol Energy Inc., the nation's leading producer of bituminous coal, more than doubled its fourth quarter earnings (April-June, 2000) according to a recent company news release ([www.prnewswire.com/micro/CNX](http://www.prnewswire.com/micro/CNX)). The company reports that coal mine methane/coalbed methane (CMM/CBM) from its operations in southwest Virginia contributed 24% of earnings before income taxes (EBIT). Mr. Michael Nemser, Senior Vice President and CFO, said "The expansion of our coalbed methane gas business has proven to be a good investment." About two-thirds of the methane produced and sold from Consol's CMM/CBM operations is from horizontal and gob wells associated with their longwall mining operations in Buchanan County. Consol, formerly partnered with MCN Energy on the project, purchased MCN's interest last February for \$180 million ([www.consolenenergy.com](http://www.consolenenergy.com)).

(Industry News continued on Page 2)

## International Developments

### **India Initiates CMM/CBM Recovery and Utilization Program**

The Global Environmental Facility ([www.gefweb.org](http://www.gefweb.org)) and the Government of India are supporting a project to demonstrate extraction and utilization of CMM at the Moonidih and Sudamidih coal mines near Dhanbad in the state of Bihar, India. The estimated cost of the five-year project is about \$15 million. In May, a delegation from India visited the U.S. to study the latest production and utilization developments. A second study tour to Germany is scheduled for September. The UNDP is the implementing agency for the project.

of captured methane is vented. Thus, the project challenges involve more effective and low-cost methane drainage techniques and innovative methane utilization technology.



**Moonidih Coal Mine, Bihar, India.** Photo courtesy of Advanced Resources.

pressure). The Kemerovo center recently acquired all of the equipment necessary to perform gas desorption work as well as the equipment to conduct pressure transient tests. With this equipment, the Center can cost-effectively obtain information on important reservoir properties and present the results in an industry standard format. As part of the program, a business plan will be developed to help commercialize the Kemerovo center. For more information, please contact Oleg Tailakov at the Russian Coalbed Methane Center at [tailakov@mail.stanet.ru](mailto:tailakov@mail.stanet.ru).

### **Yangquan CMM Capture and Utilization Project**

The Asian Development Bank ([www.adb.org](http://www.adb.org)) is funding a feasibility study of coal mine methane capture and utilization at the Yangquan coal mine complex in Shanxi Province, China. The five active mines at Yangquan produce over 15 million tons of coal annually (ranked second in China), while capturing 115 million m<sup>3</sup>/year (4 Bcf/year) of methane, the most in any mine in China. Large-diameter drainage tunnels driven above the target coal seams are the primary method for draining methane. This technique is effective in capturing over 90% of the methane liberated by longwall mining, but is extremely costly. Surface gob and fraced wells have not been successful. Because Yangquan's town gas market is saturated, some two-thirds

Preliminary work indicates that horizontal steerable drilling would be low-cost and effective at methane capture, and would also identify in advance karstic collapse pits that seriously hamper coal mining operations, and thus could stabilize methane production rates. Analysis of utilization options points to an array of approximately 20, small (1 MW) reciprocating engines, similar to BHP's Tower and Appin CMM utilization project in Australia. Final results are expected later in Fall 2000.

### **Russia to Develop CBM/CMM Reservoir Evaluation Capabilities**

The Russian Coalbed Methane Center in Kemerovo, Russia, with support from U.S. EPA, is developing the capacity to assess key CBM/CMM reservoir parameters (e.g., gas content, permeability,

## Industry News

(continued from Page 1)

### **Senate Addresses Conflicts Between CBM Operators and Coal Producers**

The Senate Energy Committee recently passed Senate Bill 1950 (S.1950) to help resolve conflicts between CBM producers and coal mine operators in the Powder River basin. The bill, introduced by Sen. Mike Enzi of New Mexico, sets forth a defined fair-market valuation based conflict resolution process for the two parties and allows the coal companies to deduct the conflict resolution costs from future coal mining royalty payments to the government. A companion bill has been introduced into the House. For more information, visit [www.senate.gov](http://www.senate.gov).

## Ukraine Gears Up for CMM/CBM Development

The potential for commercial CMM/CBM development in the Ukraine is high given its combination of gassy coal mines and heavy reliance on imported natural gas. Partners for Economic and Environmental Reform (PEER) will make available shortly several important publications covering CMM/CBM in the Ukraine.

**Inventory of Ukrainian Coal Mine Methane Emissions.** PEER, with U.S. EPA support, recently completed a comprehensive coal mine methane (CMM) emissions inventory for the years 1990 through 1999. During the study period, methane emissions declined from 2,638 gigagrams (Gg) (135 Bcf) to 1,346 Gg (69 Bcf). The reduction in CMM emissions follows a similar 50% decline in coal production over the ten-year period.

The study focuses on the two major coal-producing basins: The Donetsk Basin, in the east and southeast of Ukraine, and the Lviv-Volyn Basin in the western part of Ukraine. Both mining areas contain bituminous and sub-bituminous coal resources and both employ longwall mining. Underground, surface, and post mining emissions estimations were taken into account when calculating the overall methane emissions.

Ukrainian mines currently capture 546 Gg (28 Bcf) -- 13% of the total liberated -- with about one-third of this amount, 174 Gg (9 Bcf), utilized. Of the 52 Ukrainian mines that have degasification systems, only 11

utilize the methane. The most commonly used degasification technique in Ukrainian mines is to drill cross-measure boreholes that degasify the strata overlying and underlying the coal seam. Cross-measure boreholes generally



*Compressed CMM For Vehicle Use, Ukraine.*

produce gas with methane concentrations between 30 and 80 percent. Short horizontal boreholes (30 to 50 meter in length) are also employed as a technique to drain methane from unmined longwall panels. The captured gas stream is often contaminated before it reaches the surface due to leaks in the gathering and pipeline system.

Ukraine has set a target for CMM/CBM production of 8 billion cubic meters (283 billion cubic feet) by 2010. Because Ukraine now relies heavily on imported natural gas, CMM/CBM would displace imports and reduce foreign currency expenditure.

The Ukrainian government has initiated programs, such as the National Energy Conservation Program and the Program of

Reducing Natural Gas Consumption, which, among other things, encourage methane utilization. Efforts thus far include the use of CMM to fuel site vehicles, as a substitute for coal in mine boilers, and for power generation in diesel electric generators.

**Ukrainian Coal Mine Methane Development Handbook.** The Ukrainian Coal Mine Methane Handbook will be ready for distribution by November 1, 2000. The handbook will highlight twenty-nine Ukrainian coal mines with high potential for CMM development projects. Selection criteria for the mines included specific methane content of coal

seams and surrounding strata, total CBM/CMM contained in the mine reserve area, annual production exceeding 250,000 raw tonnes per year, and a mine life exceeding ten years.

**Business Plans for Coal Mine Methane in Ukraine.** Business plans for CMM projects in Ukraine will be available later this fall. The plans are divided into two parts: the Komosomolets Donbassa Mine and the Skochinsky Mine. Each plan assumes a three year drilling program, with a mix of 144 standard and gob wells. Both plans are based on the utilization of Western drilling and completion equipment, Western technologies, and experience gained from successful international projects.

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**Ukraine Gears Up for CMM/CBM Development**

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Based on the assumptions made, both projects promise substantial profit. Reports are available for potential developers to access their interest in a commercial CBM projects in Ukraine. For more information on the inventory, handbook, or business plans as well as additional information on Ukraine's CMM/CBM potential, please contact Mr. Jerry Triplett at PEER at [trip@public.ua.net](mailto:trip@public.ua.net).

**Publications**

**New Publication Reviews Best Practices for GOB Degasification**

The recently published *Enhanced GOB Gas Recovery* presents best practices for GOB degasification to increase GOB gas production and improve recovered gas quality. Specific effective, low-cost practices can improve productivity and gas quality at existing systems. The practices cover a wide range of techniques, including borehole placement, borehole integrity, water separation, GOB sealing, pipe materials, and system monitoring and control. This publication is available from the web at [www.epa.gov/coalbed](http://www.epa.gov/coalbed). Hard copies are available from the distribution center by calling **1-888-STAR-YES**.

**Second International Methane Mitigation Conference Identifies Need for Joint Efforts**

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The range of technological and finance options for methane projects that were presented at the conference demonstrate that extensive opportunities exist to cost-effectively reduce methane emissions.

Participants concluded that additional strategies and actions are needed to overcome barriers to expanded development of methane mitigation projects.

Drawing from the diversity of topics presented and discussed at the conference, the participants developed the following recommendations for future work:

- Improve communication and information exchange by encouraging ongoing and expanded coordination within the methane mitigation community, and explore existing and emerging media to convey and translate information. In response to this recommendation, U.S. EPA recently created a bulletin board to post and share information on methane mitigation efforts. The web site address is: [www.ergweb.com/methane](http://www.ergweb.com/methane).
- Share the results of successful projects and new technologies.
- Compile and create country-

*The conference demonstrated that extensive opportunities exist to cost-effectively reduce methane emissions.*

specific reports to identify regulatory or institutional constraints that may inhibit the introduction of new methane mitigation projects.

- Identify organizations that have an interest in supporting projects and research, and develop guidelines and case studies that clearly present the funding criteria of each organization.
- Establish a common set of standards and language for methane mitigation projects to ease communication and reduce uncertainty.
- Continue to explore the opportunities and incentives provided by the changing global energy markets.
- Expand the portfolio of economic analyses for the various methane end-use options.

Additional information on the conference, including the full-text of papers, a participant list, the conference recommendations, and the bulletin board, are available on the conference web site at [www.ergweb.com/methane](http://www.ergweb.com/methane). Conference proceedings are available in English and Russian in printed or CD ROM formats, and may be obtained by contacting the U.S. EPA distribution center at +1-888-782-7937.



## A GHG Market Update: What's the Role of Coal Mine Methane?

This is an active period in the development of national and global greenhouse gas (GHG) markets. Brokerage houses such as Natsource ([www.natsource.com](http://www.natsource.com)), Evolution Markets ([www.evolutionmarkets.com](http://www.evolutionmarkets.com)), Environmental Financial Markets, LLC ([www.envifi.com](http://www.envifi.com)), Cantor Fitzgerald ([www.cantorfitzgerald.com](http://www.cantorfitzgerald.com)), and others have significantly expanded their GHG brokerage staffs and presence over the past year.

Although the term GHG "credit" is used liberally in discussions of ongoing market transactions, the term does not yet have any legal standing. National or international crediting systems do not yet exist, and none of the transactions occurring in the market today have received formal regulatory approval. Thus, transactions being pursued today are, to some extent, speculative, although some sellers are guaranteeing that their "credits" will be validated.

Because GHG crediting systems do not yet exist, the number of GHG transactions to date is limited. Some companies are beginning to pursue GHG transactions for a variety of reasons such as coming up the learning curve, complying with voluntary commitments, gaining market advantage as being environmentally responsible, and long-term risk management. Firms are investigating a variety of transaction types, including the sale



**In-Mine Horizontal Drilling for CMM Capture.**  
Photo courtesy of REI.

of "banked" credits, direct investments in mitigation projects, and the purchase of options on future credit streams from a project or company.

The existing GHG market encompasses many different types of projects, from solar rural electrification to tropical forest conservation. Landfill methane projects are particularly common right now. CMM projects have not yet played a major role in GHG markets, although in 1996, the state of Oregon approved a CMM project as part of a mitigation portfolio for a proposed power plant. Northwest Fuel Development, Inc. ([www.northwestfuel.com](http://www.northwestfuel.com)) is the project developer; the project was structured and packaged as an offset by Trexler and Associates, Inc. ([www.climateservices.com](http://www.climateservices.com)).

Today, more firms are looking closely at the GHG mitigation opportunities available from CMM projects -- domestic and international -- and GHG ownership provisions are commonly inserted into CBM/CMM contracts. CMM projects need to be differentiated from deep-seam gas projects, which probably will not qualify for GHG trading because the gas would not otherwise have escaped to the

atmosphere. According to Laura Kosloff, Vice-President of Trexler and Associates, "Many CMM projects will have creditable



**Gob Well, Pennsylvania.**  
Photo courtesy of REI.

emissions as trading rules develop and well-placed CMM projects may command favorable pricing terms." The emissions reductions achieved from CMM projects are generally straightforward to measure, monitor, and verify. Matthew Mendis, President of

Alternative Energy Development, Inc. (AED) and author of the recently published paper, "Market Based Framework for CDM Transactions", states that "to qualify for trading, GHG credits from developing countries should result from projects that clearly demonstrate economic additionality [to what would have occurred otherwise] and contribute to sustainable development. Most CMM projects in developing countries can be shown to easily meet these basic criteria." Several GHG transactions built around CMM projects are currently being negotiated and may be announced in coming months. These projects are located in the United States as well as overseas.

Kosloff also believes that current trends suggest both that the GHG market is poised for explosive growth as the rules are clarified and that CMM projects will likely play a much more important role in future GHG markets than they have to date.

## New Technologies for Treating Coal Mine Ventilation Air

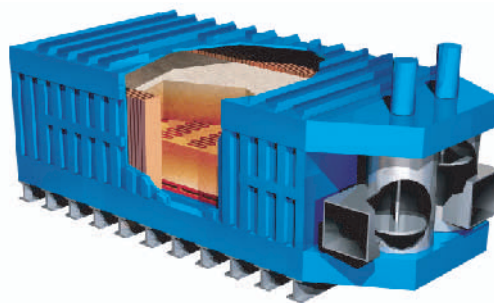
Methane emissions from mine ventilation systems account for 70% of all U.S. coal-related methane emissions. The global methane emissions from ventilation air is equivalent to approximately 200 million tonnes of carbon dioxide. The efficient treatment of mine ventilation air poses a difficult problem due to the large air volumes and variable and dilute methane concentrations (<1% methane). MEGTEC Systems and the CANMET Energy Diversification Research Laboratory have developed systems for mitigating these low methane concentration emissions.

MEGTEC's VOCSIDIZER®

([www.megtec.com](http://www.megtec.com)) is a single-bed, flameless, high temperature regenerative oxidizer for the treatment of airborne waste gas flows. The VOCSIDIZER was developed in Sweden in the early 1980s and is a commercially proven process for the thermal oxidation of volatile organic compounds, with about 600 installations in operation worldwide. The VOCSIDIZER is a flexible unit that can be configured to reflect site conditions. The unit can be used simply to destroy methane or, where viable, low quality heat can be recovered or a fully integrated power generation facility can be provided. MEGTEC is investigating options for demonstrating a full-scale facility. For more information, please

contact Mr. Martin Key, Strategy and Business Development Manager by e-mail: [mkey@megtec.com](mailto:mkey@megtec.com).

CANMET's Energy Diversification Research Laboratory ([www.nrcan.gc.ca](http://www.nrcan.gc.ca)) and its industrial partners are developing a catalytic flow-reversal reactor technology, CH4MIN, that can economically treat methane as dilute as 0.1% with no



MEGTEC's VOCSIDIZER®

requirement for external heat. The CH4MIN technology couples catalytic oxidation with regenerative heat exchange. Its technological strength results from the direct-contact heat transfer rates of its fixed beds, which are one order of magnitude greater than the transfer rates of classical (recuperative) heat exchangers. This reduces capital and operating costs and maximizes heat recovery and operating stability.

CANMET plans to grant the rights to use the CH4MIN technology to a company or consortium that is able to finance the development of the first industrial unit and can develop a commercialization plan. The proposed first project includes the

installation of an industrial unit able to treat 10 cubic meters (350 cf) per second of ventilation air which will contain on average 0.7% methane. This will lead to the production of 1.8MW of recoverable heat and a net reduction of 30,000 tonnes of CO<sub>2</sub> equivalent per year (450,000 tonnes over the expected life of the project). The total cost of the project is estimated at US\$1.5 million. For more information regarding the CH4MIN technology, please contact Mr. Yvan Roy at [yvan.roy@nrcan.gc.ca](mailto:yvan.roy@nrcan.gc.ca).

## Publications

### New Publication Covers Mine Ventilation Air

The U.S. EPA Coalbed Methane Outreach Program encourages these and other technologies for the destruction of dilute methane found in mine ventilation air. Ventilation air accounts for about 71 Bcf of domestic CMM emissions and as much as 875 Bcf worldwide. U.S. EPA recently published the report, *Technical and Economic Assessment: Mitigation of Methane Emissions from Coal Mine Ventilation Air*, that examines current and evolving methods for destroying and/or potentially using ventilation air methane. In addition to presenting the results of a technical evaluation of these technologies, the report addresses energy conversion options to generate project revenues and contains an economic analysis of actual and hypothetical projects. The publication is available off the web at [www.epa.gov/coalbed](http://www.epa.gov/coalbed). Hard copies are available by calling the distribution center at 1-888-STAR-YES.



## Upcoming Events

### **International Workshop on Investment Opportunities for Coal Mine Methane Projects Beijing, China September 20 and 21, 2000**

This workshop, sponsored by the State Administration of Coal Industry and the U.S. Environmental Protection Agency and organized and hosted by the China Coalbed Methane Clearing House, will provide parties interested in developing coal mine methane projects with helpful information, data, and contacts. The first day of the conference will include presentations and discussions regarding development policies, planned infrastructure construction, and financing options for CMM projects. Day two focuses on specific CMM opportunities at the Jinchieng and Huaibei coal mines and serves as the venue for the Business Advisory Committee. For more information please contact Karl Schultz at [schultz.karl@epa.gov](mailto:schultz.karl@epa.gov) or visit the workshop website at [www.ravenridge.com/HTML/china.htm](http://www.ravenridge.com/HTML/china.htm).

### **Innovative Technology for Coalbed Methane in the Appalachian Basin Daniels, West Virginia September 13, 2000**

The Petroleum Technology Transfer Council, in association with several regional organizations, is sponsoring a one-day symposium on the latest coalbed methane

extraction technology. An introduction will review the CBM geology and resource estimates of the Appalachian basin, followed by presentations on exploration and exploration technology. Advance registration by September 6th is necessary. For more information please contact Mark Hoffman at (304) 293-2867 x 5446 or via e-mail at [mhoffma2@wvu.edu](mailto:mhoffma2@wvu.edu).

### **North American Coalbed Methane Forum (NACMF) Morgantown, West Virginia, Oct 31 - Nov 1, 2000**

The Fall session of the NACMF will be held at the Lakeview Conference Center in Morgantown, WV. This will be the 15th Anniversary of the NACMF and a special agenda is planned. For more information, contact Khashayar Aminian at (304) 293-7682 x3406 or via e-mail at [kaminian@wvu.edu](mailto:kaminian@wvu.edu).

### **The 2001 International Coalbed Methane Symposium Tuscaloosa, Alabama, USA May 14 - 18, 2001**

The University of Alabama has announced a call for papers for its 2001 Coalbed Methane Symposium. Topical categories to be addressed include international project, resource assessment, reservoir characterization and modeling, drilling technology, and environmental and legal issues. Abstracts are due not later than June 15, 2000. For further

information and to obtain a registration form, contact Ms. Gwendolyn Hood by e-mail at [ghood@ccs.ua.edu](mailto:ghood@ccs.ua.edu).

### **Seventh International Mine Ventilation Congress Krakow, Poland June 17-22, 2001**

This conference, sponsored by the Mining Committee of the Polish Academy of Sciences, will bring mining engineers, scientists, and researchers together to discuss current and emerging mine ventilation issues. In addition to technical presentations, equipment and product exhibitors will be present, and there will be site visit opportunities. For more information, contact Waclaw Trutwin, Strata Mechanics Research Institute, Polish Academy of Sciences, 30-059 Krakow, ul. Reymonta 27, Poland (e-mail: [trutwin@img-pan.krakow.pl](mailto:trutwin@img-pan.krakow.pl)), or visit the conference website at [www.emag.katowice.pl/IMVC](http://www.emag.katowice.pl/IMVC).



### ***Roger Fernandez Receives Mansfield Fellowship***

Congratulations go to Roger Fernandez, Program Manager in the Coalbed Methane Outreach Program, who received a prestigious fellowship with the Mansfield Center for Pacific Affairs. Under this fellowship, Roger will spend 10 months studying Japanese language and culture, and then work in Japan for 14 months with the Ministry of International Trade and Industry collaborating on voluntary programs to reduce greenhouse gas emissions.

Roger will be missed by many in the coalbed methane community and at U.S. EPA. Since he joined CMOP in 1996, he has contributed to the program's success in countless ways, through his dedication to working with people in industry to find profit in their methane, through his willingness to follow through on difficult challenges to ultimate success, and through his open, honest, and constructive attitude that permeated every initiative he has managed. Good luck, Roger. We will miss you.

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