



COALBED METHANE EXTRA



The Improved Marketing Outlook for Coal Mine Methane after FERC 636

Inside: See page 4 for discussion of coalbed methane ownership!

The Federal Energy Regulatory Commission (FERC) created new opportunities for the sale of coal mine methane (CMM), including both pure methane and lower-quality products, when it issued Order 636 in 1992. That Order changed the natural gas industry from regulated to market-based, and supply and demand forces (rather than federal regulators) now determine prices for natural gas as well as CMM. In addition, the Order also provided gas producers with greater flexibility. For example, producers now have access to a wide variety of potential markets because they can sell gas through marketers or directly to local distribution companies (LDCs) or to end users. As a result, Order 636 has had a profound effect on gas marketing and has created a new genre of distributors, marketers, and buyers who compete on price and service.

New Market Aids CMM Sales

The current natural gas market environment spawned by Order 636, with its new services, players, competition, and efficiency, offers many benefits to CMM producers and their customers. CMM producers may now target specific markets and tailor sales contracts to suit operating characteristics unique to gas produced at coal mines.

Expanded markets — CMM producers can execute sales contracts under any arrangement that meets the customer's needs (e.g., with any marketer, LDC,

interstate pipeline company, or large end-user). Continuing expansion in gas pipeline capacity

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should further enhance CMM producers' ability to access such new markets. (The Energy Informa-

tion Administration reported in May that inter-regional pipeline capacity reached an all time high in 1997, and additional expansion is planned).

Accommodation for gas flow fluctuations — CMM producers have several options to reduce the impact of flow variations that are common in coal mining. Marketers can supplement CMM flows with other gas sources to maintain steady delivery to customers during

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Coal Mine Methane Improves Mine Operations!

Jim Walter Resources, Inc. (JWR) is using coal mine methane (CMM) to solve a seasonal operational problem at three of their mines. Water that naturally leaks into the mine ventilation shafts would freeze in the winter if the temperature of the large volume of air pulled into the mine by the ventilation system were to drop below freezing. If that water froze it could form large icicles, a potential hazard, and could block the hoist equipment in the shafts.

For years JWR used propane heaters at these mines to heat the intake ventilation air when ambient air temperatures were at or below freezing. A combined heater and blower system simply

introduces hot air into the ventilation air intake stream to increase the temperature of the incoming air just enough to keep it from freezing the water that penetrates the shaft. Recently, however, JWR converted their ventilation air preheating system to run on CMM that they capture in the mine. The CMM is a cheaper fuel than propane, and its use now saves JWR approximately \$100,000 per year (total for the three mines). Thus, through this simple yet effective innovation, JWR has converted a traditional mine safety problem (methane) into a cost-effective solution to a seasonal operational problem.



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periods of low activity at the mine. The producer (or the marketer working on behalf of the producer) can use hedging to guarantee gas delivery during low flows. Hedging with a futures contract avoids the need for the producer to pay penalties or to purchase gas on the spot market to fulfill a contract.

{Note: For more information on hedging and futures see "A Guide to Energy Hedging" by the New York Mercantile Exchange.}

Ability to adjust quality — Some marketers may have the ability to adjust the quality of CMM that is below pipeline specifications by blending or enrichment, or by a combination of the two. For example, if marketers have access to very high quality natural gas it can be blended with relatively small quantities of off-quality CMM to produce a product that conforms to pipeline standards. Also, enrichment systems that remove contaminants from gob gas are coming on the market. In applying such technologies, Northwest Fuel Development, Inc. is using pressure swing adsorption to remove carbon dioxide and nitrogen from methane at a mine in Ohio. Similarly, at four mines in Pennsylvania, EnviroGas Recovery Inc. and CBE Inc. are undertaking a gas enrichment project employing catalytic, amine, and cryogenic processes to remove carbon dioxide, oxygen, and nitrogen, respectively, from methane.

Greater opportunity to reap the benefits of storage — Once producers gain free access to markets of their choosing, they can

realize the higher prices during demand peaks if they have access to, or develop their own, storage facilities.

{Note: Potential opportunities for gas storage are evaluated in a new EPA report entitled "Technical and Economic Assessment of Coalbed Methane Storage in Abandoned Mine Workings", October 1998.}

Possibility of selling greenhouse gas offsets credits — Although not yet a widespread practice, the trading of greenhouse gas offset credits ("carbon credits") may hold

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a potential source of revenue or financing for the CMM project developer. The beneficial consumption of methane from coal mines is an important element in the fight to mitigate global climate change, and already commands a recognized value in the marketplace in the form of marketable carbon credits. (Activity on the Chicago Board of Trade as of 8/98 indicates a market value ranging from US\$1.00 to \$1.50 per ton of CO₂ equivalent.) With improved access to energy users, CMM producers will have greater opportunities to bundle such credits with gas or coal purchase agreements, to sell the credits in exchange for equity shares in a project, etc.

Market opportunities for lower-quality CMM — The U.S. EPA, working in conjunction with industry, has studied opportunities for CMM producers to sell, via dedicated pipelines, medium-Btu coal mine gas to local industries and utilities who can cofire it with coal, oil, or natural gas. Relatively small amounts of methane cofired with coal can achieve significant reductions in NO_x and SO_x, and such reductions are increasingly valuable as emissions trading credits. The January 1998 issue of "COALBED METHANE EXTRA" and two recent U.S. EPA reports (i.e., "Technical and Economic Assessment of Coal Mine Methane in Coal-Fired Utility and Industrial Boilers in Northern Appalachia and Alabama" and "The Impacts of FERC Order 636 on Coal Mine Gas Project Development") provide more detailed information on cofiring opportunities.

New Market Players and Roles

Order 636 has resulted in a new natural gas market environment with new players, old players with changed roles, and many new and more efficient ways of conducting business. The industry retained the traditional parties that operated the nation's gas industry before 1992: producers who drill and operate gas wells; pipeline companies who transport gas long distances; LDC's who are the primary natural gas retailers; and end-users. The marketer is the major new player who has taken over some activities traditionally performed by the pipeline companies, and who has also created new roles that better serve gas producers and customers alike. The marketer is the middleman, or merchant, who aggregates gas supply, repackages the gas,

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arranges for its transportation, and markets the gas to LDC's or large end-users. Other services offered by marketers include financing, hedging, gathering, processing, and related support services.

Parties also may find advantages in sharing or merging roles, depending on the situation. For example, it is possible for several CMM producers to form their own marketing company which, to be competitive, must attain significant economies of scale. The activities of the Southern Natural Gas Company (SONAT) in the Black Warrior Basin in Alabama illustrate how a company, operating through separate divisions and joint ventures, may assume several roles to bring CMM to market. SONAT, acting as a producer at Drummond Coal's Shoal Creek Mine, sells the gas to a marketer that is another corporate division, SONAT Marketing, which sells the gas to an LDC and other markets using the intra-state pipeline system.

Thus, by making the natural gas industry market based, FERC Order 636 provides much greater marketing flexibility than previously existed. It opened substantial new markets for coal mine methane because CMM producers now have much greater latitude in executing sales agreements, including the possibility of bundling greenhouse gas offset credits with gas sales or of selling the credits outright. The ability to accommodate fluctuations in gas production flows and to adjust gas quality also has been increased. In addition, the FERC action resulted in the evolution of new market players and roles, thereby further expanding CMM marketing opportunities.

Recent Publications

Technical and Economic Assessment of Coalbed Methane Storage in Abandoned Mine Workings
(10/98, Document Number EPA-430-R-98-019)

This report evaluates the potential viability of using closed/abandoned underground coal mines as methane storage facilities. Specifically, it assesses two gas storage concepts: storage in abandoned mines and storage in closed areas of active mines. The report first addresses annual natural gas market trends in the United States, the potential advantages to CMM projects of local gas storage, and the current level of experience with gas storage in abandoned mines. Subsequently, it discusses technical issues relating to gas storage in abandoned mines, including the availability of abandoned mines near current commercial CMM projects, and presents a conceptual storage facility design for a hypothetical CMM pipeline injection project. It then provides an economic analysis of the conceptual facility. Although gas storage in sealed areas of active mines does not appear to be a viable option, the report concludes that select abandoned mines could be suitable for gas storage and could provide significant economic advantages to coalbed methane projects. Such storage may be particularly advantageous to larger coalbed methane projects where gas markets and prices fluctuate.

Legal Issues Related to Coalbed Methane Storage in Abandoned Coal Mines in Virginia, West Virginia, Pennsylvania, Utah, Colorado, and Alabama (6/98)

This is a series of "white papers" that survey issues affecting the ownership of coalbed methane stored in abandoned or closed underground coal mines (see article on page 4). Six state-specific white papers are available, as is a seventh compilation volume that addresses all six states. These papers briefly survey the history of coalbed methane development and introduce arguments for deciding ownership from the perspectives of the coal owner, the oil and gas owner, and the surface owner. They describe court cases addressing such ownership issues (decided cases, settled cases, and pending cases), and discuss the federal regulatory environment pertaining to coalbed methane. The papers summarize coalbed methane development in each state, describe the state regulatory environment, discuss the status of underground storage of gas in the state, identify agencies having jurisdiction over CBM storage, and address issues related to CBM storage that are unique to each state.

Copies of these reports can be ordered by calling 1-888-STAR-YES.



Ownership of Stored Coalbed Methane Investigated

With the growing recognition of coalbed methane's (CBM) resource value has come a need to resolve certain issues pertaining to its ownership in reference to the storage of CBM in closed/abandoned underground coal mines (see related article in the May 1998 "COALBED METHANE EXTRA"). Specifically, addressing the following questions is becoming increasingly important:

- Who has the power to grant storage rights?
- Who owns the (abandoned/closed) container space once the mineral it held is depleted?
- Who determines when the mineral is actually depleted?
- Who owns the abandoned mine and shafts?
- Who owns the cushion gas remaining in the mined void?

These issues have been researched by the U.S. Environmental Protection Agency (U.S. EPA), and the results of that effort are presented in a June 20, 1998 white paper entitled "Legal Issues Related to Coalbed Methane Storage in Abandoned Coal Mines in Virginia, West Virginia, Pennsylvania, Utah, Colorado, and Alabama".

{Note: Individual, state-specific white papers are available in addition to the six-state compilation.}

That report describes ownership arguments that derive from the

vantage point of the coal owner, the oil and gas owner, and the surface owner. Coal owners can assert that because the methane is an integral

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part of the coal resource, ownership of the coal seam also conveys ownership of the gas contained therein. The gas owner may argue that because CBM is essentially identical in composition to natural gas, and because the techniques for its removal from a coal seam are very similar to its removal from any other subsurface formation, ownership of gas rights includes ownership of the CBM. Although arguing from the weakest position, the surface owner also may claim an interest in the CBM stored in a closed/abandoned mine in states where ownership of the container space reverts to the surface owner once the coal is removed.

The report cites a number of legal cases wherein these and similar issues have been argued, and reports on their outcome. It also provides an overview of the current status of these issues in each of the six target states. Specifically, for each state the following information is provided: the history of coalbed

methane development in that state, the regulatory environment, agencies having jurisdiction over underground storage, any past or existing underground storage of gas in the state, and state-specific issues related to CBM storage in underground mines.

Three states (Virginia, West Virginia, and Pennsylvania) have adopted a general rule that once the mineral resource (coal) is no longer recoverable, the container space reverts to the surface owner. However, the U.S. EPA report emphasizes that even in these three states ownership will probably be decided in practice based on situation-specific facts rather than on a generalized rule. In the other states, the outcome of container space ownership decisions is even less clear.

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Furthermore, additional questions relating to ownership of the cushion gas in an underground storage facility also are unanswered.

The report concludes that many of the ownership and other issues it identifies pertaining to CBM storage in closed/abandoned underground coal mines are as yet unresolved. While there is a body of legal cases that provides some valuable guidance, precedent remains to be set for many important elements of this subject.



Upcoming Events

98' International Symposium on Safety Science and Technology (98'ISSST)

Beijing, China

October 7-10, 1998

This symposium will provide an opportunity to review and debate the state-of-the-art in safety science and technology and to promote the development and application of methods for enhancing the safety and reliability of complex technological systems. Presenters will address a host of topics potentially of interest to CBM project developers, including: relationships between production and safety, environment and safety, economics and safety, etc.; design and evaluation of man/machine systems and human interfaces; systems analysis and numerical simulation of fires, explosions, noise, etc.; and risk assessment/risk management. For registration information, contact Professor Feng Changgen, Beijing Institute of Technology, by phone at 86-10-68912764 or by e-mail at cgfeng@public.east.cn.net.

Investment Opportunities in Coalbed Methane

London, England

October 15 & 16, 1998

A conference will be held to examine and highlight the substantial investment opportunities offered by CBM worldwide. CBM projects will be evaluated, case studies will be presented, the current state-of-the-art in CBM technology will be addressed, and policy and regulatory issues will be explored. Information specific to CBM opportunities and issues in the UK, America, China, India, Poland, Russia, the Czech Republic, and Australia will

be provided. In addition, prior to the conference, 2 ½-day workshops will be held on: Successful Implementation of Coalbed Methane Projects, and Successfully Achieving International Implementation of Commercial CMM Projects. To register, contact E. Rogers by phone at +44-171-252-272 or by e-mail at erogers@smiconferences.co.uk.

North American Coalbed Methane Forum Morgantown, West Virginia October 20, 1998

The North American Coalbed Methane Forum will hold its next biannual meeting in Morgantown, West Virginia on October 20, 1998 at the Lakeview Resort. A reception the evening of October 19th will precede the meeting. Technical topics to be addressed include CO₂ sequestration in coal deposits, CBM conversion to methanol, and horizontal drilling. In addition, reports on CBM activities in the U.S., Canada, Russia, Ukraine, and Poland will be presented. The preregistration deadline is October 12, 1998. For additional information, contact Kashy Aminian, Coordinator, by phone at (304) 293-7682 (ext. 406), by fax at (304) 293-5708, or by e-mail at kaminian@wvu.edu.

Coalbed Methane Investment Promotion Seminar Beijing, China November 9-11, 1998

The United Nations Department of Economic and Social Affairs (UNDESA) and the Chinese Bureau of Coal are jointly hosting a Coalbed Methane (CBM)

Investment Promotion Seminar to be held in Beijing in early November. Other organizations supporting the seminar are the U.S.

Environmental Protection Agency, the United Nations Development Programme, and the China United Coalbed Methane Corporation. The principal objective of the seminar is to increase the understanding between Chinese authorities and potential investors of the legal, regulatory, institutional, and policy issues that relate to the development of CBM projects in China. Speakers will include representatives from appropriate Chinese agencies and coal mining, gas, and electric industries as well as experts from outside China. Governmental issues, gas and power marketing opportunities, environmental permitting requirements, information dissemination, investment issues, tax incentives, and project structure options will be addressed. For more information contact Mr. Li Shaoyi, UNDESA, by phone at (212) 963-8797 or by e-mail at Lis@un.org.

International Workshop on Coalbed Methane Recovery and Utilization Beijing, China November 12-13, 1998

Sponsored jointly by the U.S. Environmental Protection Agency and the China Coalbed Methane Clearinghouse, this workshop will bring together coalbed methane (CBM) specialists and representatives of CBM companies, equipment suppliers, governmental departments, and international

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organizations. Technical sessions will focus on issues of particular relevance to developing CBM projects in China, including: innovative technologies and experiences in CBM recovery and utilization, how to effectively develop CBM resources in China, economics of CBM projects, and means of identifying opportunities for investment in China's CBM industry. To register, contact Mr. Zhu Chao, China Coalbed Methane Clearinghouse, by phone at 0086-10-64664317 or by e-mail at CBMC@PUBLIC.BTA.NET.CN.

U.S. EPA/CMOP Conference Pittsburgh, Pennsylvania Spring 1999

As in past years, the U.S. Environmental Protection Agency's Coalbed Methane Outreach

Program will hold its annual Spring conference in Pittsburgh, Pennsylvania. Details about the conference will be forthcoming. In the interim, advance information can be obtained from Roger Fernandez, U.S. Environmental Protection Agency, by phone at (202) 564-9481 or by e-mail at fernandez.roger@epa.gov. Mr. Fernandez also will be pleased to receive suggestions relating to the topics and issues to be covered in the conference.

International Coalbed Methane Symposium Tuscaloosa, Alabama May 3-7, 1999

The 1999 International Coalbed Methane Symposium will be held at the Bryant Conference Center at the University of Alabama in Tuscaloosa, Alabama, USA. The symposium will focus on both

innovative and basic technologies for gas extraction and utilization, and will encompass coalbed methane, tight gas sands, and Devonian shales. Contact Gwen Hood at (205) 348-7192 for more information.

Mine Ventilation Symposium University of Missouri-Rolla June 7-10, 1999

The University of Missouri-Rolla will host the 8th U.S. Mine Ventilation Symposium. The symposium will address a host of topics, including methane drainage, and will place equal emphasis on theoretical analysis and practical applications. For more information, contact Dr. J. C. Tien via e-mail at tien@umr.edu, or visit the symposium Web site at <http://www.umn.edu/~tien/symp.html>.

Seminar and Roundtable on Coalbed Methane Development and Potential

The World Bank and U.S. Environmental Protection Agency (U.S. EPA) jointly sponsored a one-day seminar and roundtable regarding the untapped resource and investment opportunity of CBM development. In the morning, speakers presented an overview of CBM technologies, financing, and past project experience. The afternoon roundtable provided a forum for the exchange of information by representatives of multilateral, bilateral,

and private sector organizations involved in promoting, developing, or implementing CBM projects. The potential for collaborative support for the development of CBM projects with the U.S. EPA and World Bank also was explored in the roundtable session.

For more information, or to request copies of the roundtable proceedings, contact Karl Schultz, U.S. Environmental Protection Agency, by phone at (202) 564-9468 or by e-mail at schultz.karl@epa.gov.

CMOP Contact Information

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