



# COALBED METHANE EXTRA

A Publication of the Coalbed Methane Outreach Program (CMOP)

www.epa.gov/coalbed



## Financing Coal Mine Methane Recovery and Utilization Projects

### Introduction

Global methane emissions from the coal mining sector can be reduced by recovery and utilization projects that collect methane gas from coal mines and use it productively, for example to generate electricity or to provide fuel to households and industry. Often, the critical barrier to developing such coal mine methane (CMM) projects is securing financing.

U.S. EPA's Coalbed Methane Outreach Program (CMOP) estimates that over 200 CMM projects are already in operation around the world. Many more project opportunities exist, especially in developing countries and countries in transition. These opportunities are being eagerly pursued and encouraged by project developers, technology vendors, coal mine companies, and government officials. Several factors have prompted the resurgent interest in CMM projects around the world. First, the steep growth in global energy demand has catalyzed the search for new, unconventional sources of natural gas and power. Second, programs such as the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint

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## Methane to Markets Update

### 4<sup>th</sup> Coal Subcommittee Meeting held in Tuscaloosa, Alabama

On May 22-23, over 30 representatives from M2M Partner countries, the Project Network, and other private-sector companies and NGOs participated in the 4<sup>th</sup> Coal Subcommittee meeting, held in conjunction with the International Coalbed Methane Symposium in Tuscaloosa, Alabama, USA. Coal subcommittee members from Argentina, Australia, China, India, Italy, Japan, Mexico, Russia, and the U.S. provided updates on country-specific activities and projects, and identified key items for the action plan. Project Network members and other attendees also provided valuable input to guide the Subcommittee's activities over the coming year and beyond. One of the key outcomes was to set a strategy for ensuring strong participation from the

Coal Mine sector at the 2007 Methane to Markets Partnership Expo. Visit the Methane to Markets website to download all presentations made at the meeting along with updated action plan and meeting minutes (<http://www.methanetomarkets.org/events/past.htm>). The next Coal Subcommittee meeting is scheduled for October 6, 2006, in Brisbane, Australia, just prior to the COAL21 Conference in Australia's Gold Coast.

### Asia-Pacific Partnership on Clean Development and Climate (APP)

The Asia Pacific Partnership (APP) comprises representatives from Australia, China, India, Japan, South Korea, and the United States, and focuses on promoting technologies

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Implementation (II) have created financial incentives to develop projects that reduce greenhouse gas (GHG) emissions. Third, multi-national collaborative initiatives such as the Methane to Markets Partnership (<http://www.methanetomarkets.org>) have focused on overcoming the policy, regulatory, legal, and technical barriers that inhibit project development.

In order to secure project financing for CMM projects in countries such as China, India, Ukraine, or Mexico, a project developer or investor must demonstrate the potential project's technical and financial viability, usually through pre-feasibility studies (PFS), full feasibility studies (FS), and technology demonstrations. These analyses may be financed by the project developer or investors, although some financial support may be available (e.g., through the U.S. government). Actual project financing consists of a mixture of direct project investment (equity), loans (debt), and carbon financing, which may provide a revenue stream based on mitigated carbon emissions. Another critical component of project financing is reducing the project or financial risk through capital guarantees, as well as risk insurance.

Many funding and investment sources emphasize sustainable development, environmental protection, and climate change mitigation as important components of projects that they finance. CMM projects are attractive because they can support all of these objectives.

This article describes types and sources of funding that may be available to project developers and investors that are interested in

pursuing CMM project opportunities particularly in developing countries or economies in transition. It briefly summarizes pre-feasibility and feasibility studies and technology demonstrations. It provides a guide to key parties involved in project financing (equity, debt, or carbon financing) as well as project risk reduction support. This article provides an update to the information contained in two previous guides—*Catalog of Coal Mine Methane Project Finance Sources* (2002) and *A Guide to Financing Coalbed Methane Projects* (1997)—both available on the CMOP Web site <http://www.epa.gov/cmop/resources/reports/finance.html>.

### Pre-Feasibility and Feasibility Studies

One of the first steps in project development typically involves performing a prefeasibility study (PFS) to evaluate potential project options. The PFS is a first-order analysis of possible project configurations including location, size, technology to be employed, market(s) to be served, costs, and revenues. It identifies one or more options that appear to be technically feasible and economically attractive. Typically the PFS will be conducted at a level of detail adequate to broadly identify project finance needs. It will consider varying levels of debt and equity, as well as expected revenues, to roughly estimate cash flow under various scenarios. Should the PFS indicate a potentially viable project, a more in-depth analysis such as a full Feasibility Study (FS) may be conducted. The FS focuses on the

project configurations that provide the least risk and greatest return on investment.

Depending on the location and nature of the project, prospective project developers may be able to access U.S. government funding to support the PFS/FS efforts for CMM projects.

- The U.S. Trade and Development Agency (USTDA) provides funding to facilitate the export of U.S. technologies, products, and services to developing and transitional countries. Applications for USTDA feasibility study grants and technical assistance grants can be submitted via two mechanisms: (1) sole source by a US company partnering with a project abroad, or (2) competitive bidding by a foreign grantee. USTDA has provided grant funding to assess the feasibility of several CMM projects. For instance, USTDA funded a study of potential ventilation air methane (VAM) utilization projects in Poland. In addition, the agency supplied the grant funding for project design and related planning at the Jincheng Anthracite Coal Mining Group's Sihe Mine in Shanxi, China, which involves a 120 MW CMM- and coalbed methane (CBM)-based power generation project. Most recently, the agency provided about US\$500,000 in grant funding for a feasibility study of CMM/CBM development potential in Ukraine.
- U.S. EPA's CMOP supported prefeasibility analysis of VAM development potential at five mines in the Huainan Mining Group in 2005. This study identified one

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<http://www.epa.gov/coalbed>



location as offering a technically feasible and economically attractive project opportunity.

- The U.S. Agency for International Development (USAID), as part of its Methane to Markets commitment, also has offered funding support for methane mitigation projects. USAID missions in countries such as India and Ukraine have offered Global Development Alliance (GDA) funding support to energy industry representatives, research and academic groups, financial institutions, and non-governmental organizations to assist in promoting methane capture and productive use.

## Demonstration Projects

Often field demonstrations of new technologies or new applications of existing technologies are necessary to provide tangible evidence of the technology's operational efficacy to regulators, project developers, project hosts, or investors. Such demonstrations can generate the confidence needed to commit time, materials, and funding to technology deployment at commercial scale.

Grant funding may be available to support technology demonstration projects. Examples of grant-supported technology demonstrations for CMM projects include the following:

- USA: Field trials of (1) pressure swing absorption (PSA) and (2) high-throughput continuous PSA gas upgrading technologies conducted in the Appalachian coal fields, supported by Department of Energy funding in the late 1990's.
- Australia: the world's first large-scale VAM-to-power demonstration project is under construction with funding in part provided by Australia's Greenhouse Gas

Abatement Programme. Also, Australia's Commonwealth Scientific Industrial Research Organization (CSIRO) and the Australian Greenhouse Office are collaborating with China's Shanghai Jiaotong University and the Huainan Coal Mining Group to support a pilot-scale demonstration of CSIRO's VAM catalytic turbine (VAMCAT) in China. Initially demonstrated with grant funding from the Australian Coal Association Research Programme, the VAMCAT demonstration in China will be conducted under Australia's Bilateral Climate Change Partnerships Program and the Australian Government International Science Linkage Program.

## Equity and Debt

Project developers typically will need to obtain part of the requisite project finance by securing a loan. Lenders usually will require that the developer invest equity in the project to demonstrate their confidence in the project's success and willingness to risk their own financial resources. Acceptable debt-to-equity ratios vary from lender to lender. For example, CMOP's experience indicates that debt to equity ratios of 60:40 (debt: equity) or 75:20 are not uncommon for international CMM projects under consideration in China. The actual ratio preferred by any given lender usually reflects the project's perceived risk as well as the borrower's financial stability.

Following are brief descriptions of some key sources of debt finance whose mission and focus are consistent with CMM emission mitigation projects, and which have provided CMM project financing in the past.

- Asian Development Bank (ADB - <http://www.adb.org/>) – The ADB is

a multi-lateral development organization of 65 member countries that strives to improve the social welfare of people in the Asia and Pacific regions. It can provide projects with technical assistance, grants, and loans. In recent years the ADB has given particular focus to supporting clean energy projects under its Energy 2000 policy which seeks to reorient the energy sector in member countries to address regional and global environmental effects.

- The European Bank for Reconstruction and Development (EBRD - <http://www.ebrd.com>) – Owned by 60 countries and two intergovernmental institutions, the EBRD invests primarily in private enterprises, usually with commercial partners. Among the types of projects that are eligible to receive EBRD financing are technology upgrades. In addition, the EBRD has joined FondElec Group, Inc., (a global infrastructure funds manager) and the Dexia Bank of France to create the Dexia-FondElec Energy Efficiency and Emissions Reduction Fund, L.P, a private equity fund focused on environmental protection. The fund offers an investment vehicle to fund projects in Central and Eastern Europe that will utilize clean, renewable energy and/or energy efficient technologies to improve industrial processes and mitigate climate change.
- The Global Environment Facility (GEF - <http://www.gefweb.org>) – Working through three implementing agencies (the World Bank, the UN Development Programme, and the UN Environment Programme), the GEF provides cost-sharing grants and concessional funding to help developing countries fund projects



and programs that protect the environment, such as climate change mitigation projects. The GEF Operational Strategy requires that any GEF-funded activity relating to climate change be fully compliant with the directives of the UNFCCC.

- The World Bank (<http://www.worldbank.org>) – In addition to its carbon funds, The World Bank also can provide traditional finance for projects that are consistent with its mission. Projects that are smaller than the bank’s preferred minimum lending threshold of ~US\$50 million may be bundled with other development activities to construct a finance package of adequate size.

### Carbon Financing

Many CMM utilization projects will be capable of offering economic returns that are sound enough to attract investors and lenders. Others, however, may be too marginal on their own to offer attractive

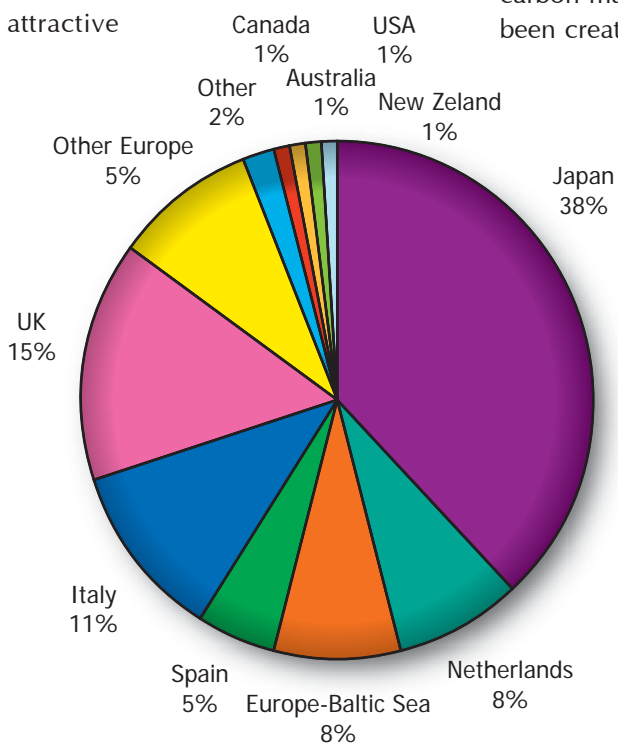
investment opportunities. The sale of Emission Reduction Units (ERUs) generated by JI projects or Certified Emission Reductions (CERs) generated by CDM projects can offer project developers an attractive supplemental revenue stream. In most cases carbon credit revenues alone will not be adequate to provide the level of funding necessary for project planning and implementation. Carbon credits are particularly useful for improving the cash flow of projects that are otherwise economically marginal and unattractive to investors. In fact, with world carbon prices now ranging from US\$5.00 to \$10.00 per tonne of CO<sub>2</sub> equivalent and above, carbon finance can add substantially to a project’s balance sheet.

Recent carbon market activity is reflected in Figure 1. A considerable number of organizations have been involved in creating and defining the various carbon markets currently in existence. The fact that new carbon funds continue to emerge demonstrates the vitality of the current global carbon market. Some markets have been created by governments, others

by multilateral institutions, and yet others by private sector business entities.

#### Government Sponsors:

- Austrian JI/CDM Program (<http://www.ji-cdm-austria.at>) – Launched in September of 2003, the Austrian JI/CDM Program allows Austrian entities to invest in JI and CDM climate protection projects in central and eastern European countries as well as in developing countries and those with economies in transition (EIT) in exchange for the carbon emission reductions. Qualifying projects include those involving combined heat and power, energy efficiency, and waste management.
- Baltic Sea Region Testing Ground Facility (TGF - <http://www.nefco.org/page.asp?headerid=70&subid=71>) – Supported by Denmark, Finland, Germany, Iceland, Lithuania, Norway, and Sweden and managed by the Nordic Environment Finance Corporation, the TGF invests in projects that can provide cost effective emission reductions. Potential host countries are those located in the Baltic Sea Region, including Poland, Russia, and Ukraine. Although the TGF’s focus is on energy-related projects, eligible projects also include those that reduce greenhouse gases such as methane.
- Belgian JI/CDM Programme (<http://www.klimaat.be/jicdm tender/>) – Under this program, launched in May of 2005, the Belgian State is purchasing carbon emission reductions from JI and CDM projects. Although the first tender has closed, a second tender is



**Figure 1. Recent Carbon Credit Market Activity (percent of total sales by purchasing country - Jan. 2005 to Mar. 2006)<sup>1</sup>**

<sup>1</sup>Source: Carbon market overview presented by Kentaro Yabe, The World Bank, at the May 23, 2006 Methane to Markets Coal Subcommittee meeting in Tuscaloosa, Alabama.



expected to be issued in Fall of 2006. The State can offer up-front payments of up to 50 percent of the contract value to facilitate project implementation and also can offset some of the cost of preparing requisite documentation. Eligible projects are those that were not implemented prior to 2000, that mitigate greenhouse gas (including methane) emissions, and that will generate carbon emission reductions

### CMOP Press:

The Methane to Markets Partnership was featured in the May 2006 issue of International Longwall News. *Check it out.*

at least in the 2008-2012 period.

- Danish Carbon Tender (<http://www.DanishCarbon.dk>) – DanishCarbon.dk purchases carbon emission reductions from JI and CDM projects in Central and Eastern Europe. Remaining deadlines for submitting Project Idea Notes under the current tender are August 1, 2006, and November 1, 2006. Eligible projects include methane capture and use, and those with an approved CDM methodology (such as CMM projects) will receive higher priority.
- Finnish Drive for Emission Reductions (Finnder - <http://www.environment.fi/default.asp?node=18806&lan=EN>) – Finnder strives to purchase carbon emission reductions from JI and CDM projects (especially those with existing CDM methodologies) in any geographic locale. The organization seeks projects that can generate at least 250,000 tonnes of greenhouse gas emission reductions by 2012. Finnder is willing to provide up-front

payments up to 50 percent for projects that can offer delivery guarantees.

#### Private Sponsors:

- European Carbon Fund ([http://www.europeancarbonfund.com/about\\_ecf.php](http://www.europeancarbonfund.com/about_ecf.php)) – The ECF purchases primarily project-based carbon emission reductions from developing and EIT countries. The Fund invests in projects that can generate from 50,000 to 1,000,000 tonnes per year of carbon emission reductions for vintages from 2005 through 2012. Forward payments are possible.
- Natsource GHG Credit Aggregation Pool (GG-CAP – <http://www.natsource.com/news/index.asp?n=453>) Natsource, a broker of carbon emission reductions, announced in May 2003 that it would establish a Greenhouse Gas-Credit Aggregation Pool (GG-CAP). The GG-CAP is intended to allow its members (including some of the largest energy and utility, consumer product, and manufacturing companies in Europe, Japan, and North America) to obtain carbon emission reductions from a diverse portfolio of international CDM and JI-derived emission reductions. Eligible projects will provide reductions in the 2005 – 2012 period, and will include fugitive emission reduction.
- Icecap Carbon Portfolio (<http://www.icecapltd.com/index.asp>) – Launched in March of 2004, Icecap Ltd purchases JI and CDM carbon emission reductions for its clients and partners. In so doing it strives to apply innovative pricing strategies to secure reductions at a discount to prevailing market prices.
- Japan Greenhouse Gas Reduction Fund (JGRF - <http://www.jcarbon.co.jp>) – This fund was

established in 2004 and includes over 30 commercial and financial entities. The JGRF purchases carbon emission reductions from projects in many countries. It is managed by Japan Carbon Finance Ltd and invests in a variety of project types, including fuel switching and fugitive emission mitigation.

- KfW Carbon Fund (<http://www.kfw.de/carbonfund>) – Germany's KfW Bankengruppe has established the KfW Carbon Fund to purchase JI and CDM project-derived carbon emission reductions. Projects in sectors other than large hydropower, nuclear, CO<sub>2</sub> sinks, or forestry and land use can qualify so long as they generate at least 50,000 tonnes of CO<sub>2</sub>e per year.

#### Multilateral Organization Sponsors:

- ADB Clean Development Mechanism (CDM) Facility (<http://www.adb.org/cdmf/>) – In addition to providing loans and technical assistance, the ADB's CDM Facility focuses on supporting projects that reduce greenhouse gas emissions, that are located in an ADB developing member country, and that contribute to poverty reduction and sustainable development in the member country. The CDM Facility can assist in project development as well as facilitate the sale of project-based carbon credits.
- IFC-Netherlands Carbon Facility (INCaF - <http://www.ifc.org/carbonfinance>) – The International Finance Corporation and the Government of the Netherlands formed the INCaF to benefit the Netherlands by purchasing GHG emission reductions created by projects in developing countries. Methane recovery projects are among the project types listed as being potentially eligible.



- Multilateral Carbon Credit Fund (MCCF - <http://www.ebrd.com/new/pressrel/2006/57may21.htm>) – The European Bank for Reconstruction and Development established this fund to assist its 27 member countries in securing carbon emission reductions from JI and CDM projects. Although it does not specifically mention methane reduction, it does support fuel switching projects among other types.
- World Bank Carbon Funds (<http://carbonfinance.org>) – The World Bank has followed its landmark Prototype Carbon Fund (PCF) (now closed) with eight other carbon funds that were created to secure high-quality greenhouse gas emission reductions from specific sectors and geographic locations. Of the eight, five may be appropriate for CMM emission reduction projects:
  - o Danish Carbon Fund – In January of 2005 the Danish Carbon Fund was initiated to assist the Danish public and private sectors to meet the country's carbon emission reduction commitment. Qualifying projects are those that contribute to sustainable development in the host countries while delivering cost-effective emission reductions.
  - o The Netherlands CDM Facility – This fund purchases carbon emission reductions solely from CDM projects.
  - o The Netherlands European Carbon Facility (NECaF) – This fund purchases carbon emission reductions solely from JI projects.
  - o Spanish Carbon Fund – This fund was established in 2004 to purchase carbon emission reductions from climate change mitigation projects that

contribute to sustainable development in developing and EIT countries. Among eligible projects are those that reduce industrial emissions of greenhouse gases.

- o Italian Carbon Fund – This fund was established in Fall of 2003 to provide Italian public and private sector entities with a means of purchasing greenhouse gas emission reductions from JI and CDM projects.

### Project Risk Reduction Support

Certain U.S. institutions offer assistance to reduce the risks that domestic companies may face when exporting their products or services abroad. For example, in addition to traditional loans, the Export-Import Bank of the United States (Ex-Im Bank - <http://www.exim.gov>) can provide working capital guarantees and credit insurance. It also offers certain specialty financial products to companies that export environmental goods to foreign companies that are unable to obtain traditional financial support. Similarly, the Overseas Private Investment Corporation (OPIC - <http://www.opic.gov>) helps U.S. businesses deal with the risks inherent in doing business overseas. OPIC provides a range of traditional finance resources, such as loans and loan guarantees. In addition, it offers financial products specifically designed to reduce export risk, such as Political Risk Insurance in emerging markets where political drivers are developing or uncertain.

### Examples of Integrated Project Financing

The 120 MW Shanxi CMM/CBM-to-power project offers an example of how a mix of finance sources can

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## 2<sup>nd</sup> Western States Coal Mine Methane Recovery and Use Workshop

*Presented by EPA's Coalbed Methane Outreach Program and Raven Ridge Resources, Incorporated*

**September 26-27, 2006**  
*Two Rivers Convention Center,  
Grand Junction, Colorado*

Representatives from coal mining companies, technology vendors, and US and state governments will share their perspectives on coal mine methane opportunities in the Western U.S.

To view the complete workshop agenda and to register, please visit [www.ravenridge.com/workshop2006.htm](http://www.ravenridge.com/workshop2006.htm)

### *This workshop is cosponsored by:*

BCK Engineering, Inc.  
Colorado Oil and Gas Association (COGA)  
EPA's Coalbed Methane Outreach Program  
Norwest Corp./Norwest Questa Engineering/Norwest Applied Hydrology  
Oxbow Mining, LLC/Gunnison Energy Corp.  
Peabody Natural Gas, LLC  
REI Drilling  
Schauenburg Flexadux Corp.  
SGS North America, Inc.  
Target Drilling, Inc.





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to reduce greenhouse gas emissions from eight key sectors, including coal mining. On April 18-21, in Berkeley, California, the U.S. government hosted a meeting of the Policy Implementation Committee (PIC) and Task Force Members. The purpose of this meeting was to advance the development of Action Plans for the eight program areas identified at the Sydney Ministerial meeting in January 2006. Task Force Guidelines and Action Plan Guidelines were adopted by the PIC, and each of the Task Forces met for the first time with the objective of identifying Action Plan projects and activities. EPA's Acting Assistant Administrator for Air & Radiation, Bill Wehrum, represented EPA on the PIC. A second PIC meeting was announced for October 2006. The U.S. delegation to the Coal Mining task force includes representatives from U.S. Department of Interior, Office of Surface Mining; U.S. Department of Energy; U.S. EPA, Coalbed Methane Outreach Program; the National Mining Association; Peabody; and CONSOL Energy. The Coal Mining Task Force was chaired by the U.S. and co-chaired by India. The Task Force reviewed country coal mining task forces and identified preliminary areas of interest to pursue for the action plan, which is expected to be completed by the end of August 2006.

### **Germany Becomes 18<sup>th</sup> M2M Member Country**

On 3 July, Germany signed the Methane to Markets Terms of Reference and officially became a Partner of M2M. In particular, Germany has



**Co-Chairs Pamela Franklin and Subrata Chaudhuri and Acting Vice-Chair Liu Wenge**

strong experience, technology, and knowledge of advanced waste management practices in landfills, implementing gas pipeline rehabilitation programs in local gas distribution networks, and coal mine methane-based power projects. Germany is the fourth country to join the Partnership since the initiative's launch in 2004, joining 14 charter Partners including the U.S. More information is available in a [M2M press release](#).

### **Location Selected for Partnership Expo**

The Expo Committee has selected Beijing, China as the location for the Methane to Markets Partnership Expo schedule for the fall of 2007. The event will serve to showcase methane project opportunities and methane recovery and use technologies across all Partnership sectors. The Expo will also include technical sessions and high-level

government participation. Stay tuned for further details.

### **M2M Highlighted at International Meeting on Clean Energy and Climate**

On May 2, the U.S. and Canada co-hosted a successful Methane to Markets side event at the United Nations Commission on Sustainable Development Meeting in New York City. This interactive Partnership event drew over 40 attendees from the private sector, multi-lateral development banks, NGO's, and national and regional governments. The event served to educate key stakeholders about the Partnership and provided a forum for discussion of experiences in implementing successful methane capture and use projects, as well as the benefits and opportunities associated with participating in M2M. The side event featured presentations by Environment Canada, U.S. EPA, the World Bank, the Alberta Energy and Utilities Board, and Caterpillar Inc.



**Methane to Markets**



## CBM/CMM News

### Busy Quarter of Conferences for CMOP

CMOP staff participated in numerous conferences this spring and summer. On April 29, CMOP attended and presented at the **North American Coalbed Methane (NACBM) Spring 2006 Forum** in Canonsburg, PA. This consortium of CBM and CMM industry experts has been meeting bi-annually for over twenty years. On June 6, Dina Kruger, Director of EPA's Climate Change Division, gave the keynote speech at the **11<sup>th</sup> U.S./North American Mine Ventilation Symposium** in University Park, PA. From June 13 -15, CMOP operated an exhibit booth at the **National Coal Show** in Pittsburgh, PA. In conjunction with this event, CMOP also hosted a Roundtable Breakfast on June 14 to hold informal discussions with industry participants about issues facing CMM development in the U.S..

CMOP has been actively involved in international conferences this quarter as well. Staff made a presentation on the Methane to Markets Partnership at the **International Coalbed Methane Symposium** on May 25 in Tuscaloosa, AL. CMOP staff also traveled to Kemerovo, Russia on June 19 and 20 to participate in a conference on **Coal Mine Methane: Recovery, Utilization, and Investment Opportunities**. This conference was hosted by Uglemetan, a CMOP grantee, to convene international investors, NGOs, government representatives, and coal mine management interested in the development of CMM projects in Russia.

### VAM Oxidation Demonstration Project Scheduled in U.S.

MEGTEC Systems has signed an agreement with CONSOL Energy Inc to conduct a field demonstration of its VOCSIDIZER™ technology for oxidizing ventilation air methane. The project, which is partly funded by EPA's Coalbed Methane Outreach Program and the Department of Energy's National Energy Technology Laboratory, will be commissioned in fall of 2006 at an abandoned CONSOL mine in West Virginia. The project will simulate varying VAM concentrations and will consume approximately 30,000 cubic feet per minute (~50,000 m<sup>3</sup>/hour) of simulated ventilation air from the mine. This demonstration succeeds others previously conducted in the UK and in Australia. The first such demonstration conducted at the Thoresby Mine in Nottinghamshire in the 1990's showed that the VOCSIDIZER could oxidize a typical VAM flow from a gassy underground mine. More recently, projects in Australia not only provided additional proof of the ability to oxidize VAM to produce heat but also demonstrated that steam can be produced from the methane oxidation reaction. As a direct outgrowth of those demonstration projects, the world's first large-scale VAM-to-power project is under construction at the West Cliff Colliery in New South Wales. The CONSOL project will be the first VOCSIDIZER application in the United States.

### Caterpillar Signs Contract with Jincheng CMM Project

With support from EPA, TDA, and other federal partners, U.S.-based engine manufacturer Caterpillar Inc. has landed a \$58 million contract from China to supply the power generation equipment for the world's largest power plant fueled by coal mine methane (CMM). The power plant will produce 120 megawatts (MW) of electricity from coalbed and coal mine methane from the Sihe mine in Jincheng, in addition to exhaust gas heat that will be recovered to produce usable hot water and steam for the mining operations. This project is the result of collaborative efforts between the public and private sectors through the Methane to Markets Partnership, a U.S.-led initiative that now includes 17 partner countries, including China. This project also supports the goals of the Asia-Pacific Partnership on Clean Development and Climate, of which China and the U.S. are members.

### Australians Offer Training on Coal Mine Safety

On May 25, the government of the northeastern Australian state of Queensland announced it is offering mine safety management training for a number of overseas miners. Six officers from the Vietnam Department of Geology and Minerals will spend six months at the government mine safety research organization Simtars, mines minister Henry Palaszczuk said. "The aim of this project is to equip the participants with a working knowledge of the systems that we have in place in



## Upcoming CBM/CMM Events

### 2006

#### 6th European Conference on Coal Research and Its Applications

5-7 September 2006

Canterbury, UK

Contact: Dr A.W. Thompson, School of Chemical, Environmental & Mining Engineering,

Tel: +44 115 951 4198

Fax: +44 115 951 4115

Email: alan.thompson@nottingham.ac.uk

#### Meeting World Energy Needs by Improving & Increasing Coal Utilization

11-12 September 2006

Meadowview Conference Center, Kingsport, TN

Phone: 276-964-6363 or 9088

Fax: 276-964-6342

Email: ecc@netscope.net

URL: [www.easterncoalcouncil.org](http://www.easterncoalcouncil.org)

#### Clean Coal: Securing the Future

13-14 September 2006

London, UK

URL: <http://www.coaltrans.com>

#### Brown Coal and Power Engineering International Conference

13-15 September 2006

Most, Czech Republic

email: Filipikova@vuhu.cz

URL: <http://konference.vuhu.cz>

#### Fundamentals of Coalbed Methane & Shale Gas

18-19 September 2006

The Fairmont Palliser, Calgary, Alberta

Phone: 1-877-927-7936

URL: [www.canadianinstitute.com/FOCS](http://www.canadianinstitute.com/FOCS)

#### UNECE Workshop on Geomechanical and Geodynamic Aspects of High Efficiency Extraction of Coalmine and Coalbed Methane

20-22 September 2006

St Petersburg, Russia

Hotel Pribaltiyskaya and VNIMI

Institute

Contact: Alexandre Chachine, Clark

Talkington

e-mail:

alexandre.chachine@unece.org;

Clark.talkington@unece.org

telephone: +4122 917 2451/2671

URL: [http://www.unece.org/ie/se/docs/w\\_stpe\\_cmm.html](http://www.unece.org/ie/se/docs/w_stpe_cmm.html)

#### 2nd Western States Coal Mine Methane Recovery and Use Workshop (hosted by EPA's CMOP and Raven Ridge Resources)

26-27 September 2006

Two Rivers Convention Center

Grand Junction, CO

Phone: (970) 243-3222

URL: [www.ravenridge.com/workshop2006.htm](http://www.ravenridge.com/workshop2006.htm)

#### Advanced Reserves Classification, Reporting and Management 2006

28-29 September 2006

The Thistle Marble Arch, London, UK

Phone: +44 (0) 20 7368 9300; UK

Freephone: 0800 652 2363

Fax: +44 (0) 20 7368 9301

Email: enquire.iqpc.co.uk

URL: [www.oilandgasIQ.com/2751a](http://www.oilandgasIQ.com/2751a)

#### Methane to Markets Partnership Coal Mine Methane Technical Workshop sponsored by USA, Australia, and Japan

4-5 October 2006

Marriott Brisbane, Brisbane Australia

Information forthcoming at:

<http://www.methanetomarkets.org/events/index.htm>

#### Methane to Markets Coal Subcommittee Working Meeting

6 October 2006

Marriott Brisbane, Brisbane

Australia

Information forthcoming at:

<http://www.methanetomarkets.org/events/index.htm>

#### China International CBM/CMM Fall Workshop

17-18 October 2006

Empark Grand Hotel, Beijing, China

URL: <http://www.coalinfo.net.cn/english.htm>

#### 15th International Coal Preparation Congress

17-20 October 2006

Beijing International Convention

Centre, Beijing, China

Contact: Kevin McMillan or Sun Jiaohua

Phone: 013 6915291 or +86 10 6422 9939

Email: kmcmillan@anglocoal.co.za

or sjiaohua@chinasafety.gov.cn

#### Second International Conference on JI Projects in Ukraine, "Climate Change and Business" -

Call for abstracts; deadline August 15, 2006,

23-25 October 2006

Kyiv, Ukraine

Phone: +(38 044) 453-28-56

Fax: +(38 044) 456-94-62

Email: [jiconference@biomass.kiev.ua](mailto:jiconference@biomass.kiev.ua)

#### 8th Annual Unconventional Gas Conference (hosted by the Canadian Society for Unconventional Gas)

15-17 November 2006

Telus Convention Centre

Calgary, Alberta, Canada

Contact: Kerri Markle

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Queensland," Palaszczuk added. The Queensland government added it was also preparing to install, commission, and train staff at the Singareni Collieries Company in India in the operation of Camgas mine gas monitoring systems. Staff in the Department traveled in May to the company's site at Kothagudem in south India to undertake installation and training to install the system. Developed by Simtars, Camgas is an ultra-fast micro gas chromatograph used in analyzing complex mixes of gas. Along with specialised software, it determines the toxicity and explosive potential of gases in underground coal mines, and can quickly detect dangerous conditions and provide an early warning system against a possible disaster. Six of the latest Camgas systems were sold to China early last year, the government added.

### CMOP Welcomes New Environmental Engineer

CMOP is pleased to add a new Program Manager to its staff. Jayne Somers is a professional engineer with 25 years experience in sustainable energy, environment and capacity building. She is a specialist in mitigating climate change, particularly air pollution control and clean energy projects in the United States, Africa, Asia, Latin America, and East/Central Europe.

Dr. Somers joins us from the Wisconsin Department of Natural Resources Air Program and is currently Vice-Chair of the Air and Waste Management Association

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## Announcement: Four New Publications Available

### CMM Global Overview Launched on M2M Website

A new publication has been finalized and posted on the Methane to Markets website. *The CMM Global Overview* profiles the coal, coal mine methane, and coal bed methane industries of all 18 Methane to Markets member countries and 14 additional coal-producing countries worldwide. The publication's introduction contains information and data on all 32 profiled nations in one place for easy reference. Developed by USEPA (CMOP), the *CMM Global Overview* is being posted in Final Draft For Public Comment and Review form; please forward any comments to [Jemelkova.Barbora@epa.gov](mailto:Jemelkova.Barbora@epa.gov). Visit the M2M website to download the entire document or individual country profiles (<http://www.methanetomarkets.org>).

### Two new U.S. EPA Reports on Global Non-CO<sub>2</sub> GHG

The EPA's Climate Change Division has just released two reports on global non-CO<sub>2</sub> greenhouse gas (GHG) projections and mitigation. The non-CO<sub>2</sub> GHG include methane, nitrous oxide, and a set of fluorinated compounds. These EPA reports have undergone an external peer review consistent with the guidelines of the U.S. EPA Peer Review Policy. Both reports are available at <http://www.epa.gov/nonco2/econ-inv/international.html>.

- *Global Anthropogenic Emission of Non-CO<sub>2</sub> Greenhouse Gases 1990-2020* provides historical and projected estimates of emissions

from over 90 countries and eight regions for all major non-CO<sub>2</sub> GHG emission sources. Historical and future trends are shown by region and by gas. The emissions data can be downloaded in spreadsheet format for further analysis.

- *Global Mitigation of Non-CO<sub>2</sub> Greenhouse Gases* provides a global cost analysis of all non-CO<sub>2</sub> greenhouse gases for 2010, 2020, and for a few sectors, 2030. The results of this analysis are marginal abatement curves (MACs) that reflect aggregated breakeven prices for implementing mitigation options in over 15 key sectors and disaggregated at the regional levels. The MAC data sets can be downloaded in spreadsheet format for further analysis.

### EPA Examines New Coal Technology in Recent Report

A new technology can help provide electricity from coal in an environmentally sustainable way, according to a technical report EPA released on July 7, 2006. The technology, known as Integrated Gasification Combined Cycle (IGCC), partially burns coal to generate gas. EPA examined the environmental impacts of IGCC technology as part of the agency's continued efforts to understand how the latest available science and technology could lead to a cleaner method to generate power from coal. The report, *Multipollutant Emission Control Technology Options for Coal-Fired Power Plants*, is available at <http://www.epa.gov/airmarkets/articles/control.html>



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(AWMA) Sustainable Development and Global Climate Change Technical Committee. In 2000, she developed the Madison Climate Protection Plan for the City of Madison Engineering Division. Previously, Dr. Somers managed USAID global energy and environmental training programs and implemented a USAID technology transfer project in Ghana, West Africa.

Dr. Somers received her Ph.D. from the University of Wisconsin – Madison in integrated strategies for reducing volatile organic compound and carbon dioxide emissions.

She holds bachelor degrees in Engineering and Environmental Science from Rutgers University and a Masters Degree in Energy Management from the University of Pennsylvania. Jayne can be reached at [somers.jayne@epa.gov](mailto:somers.jayne@epa.gov).

**Financing, continued from page 6**

combine to make planning and developing even very large projects feasible. A grant from USTDA (for US\$502,850) supported project design and development of technical specifications. The Asian Development Bank provided a US\$117.4 million loan for project implementation. To demonstrate their commitment to the project, the Jincheng municipal government and two mining industrial groups are providing roughly \$60 million in equity capital. The Japanese Bank for International Cooperation (JBIC) also provided \$20 million in loan financing. Project cash flow also will be supplemented by the sale of carbon credits (4.5 million tons CO<sub>2</sub> equivalent) to the World Bank's Prototype Carbon Fund. Another example is the ADB-funded

CBM/CMM development project to be hosted by the Fuxin Mining Group in Liaoning Province, China. The project will improve CBM and CMM extraction, distribution, and utilization at the Fuxin mines. The ADB provided a US\$15.8 million loan to supplement the private equity of a local holding company. In addition to the loan, the ADB's Clean Development Mechanism Facility helped to structure the sale of carbon credits to two buyers (UK-based ICTJ Limited and Natsource Europe Limited). The project's cash flow will be further supplemented by generating power for the mine and selling methane to local users.

**Conclusion**

A host of finance and revenue sources are available to CMM project developers in developing countries and countries of transition. By tapping appropriate sources, funding can be secured for all phases of the project development cycle, from prefeasibility studies, to technical specification development, to pilot/demonstration studies and full implementation. The organizations outlined in this article contribute to the project development process in several ways. Some provide risk reduction products to mitigate a technology or service provider's concerns about entering foreign markets. Others provide lending and related financial assistance for projects that offer environmental benefits and contribute to sustainable development and poverty alleviation. Still others purchase carbon credits and thereby supplement a project's cash flow. The preceding examples demonstrate that by mixing equity investment with financing available from a mix of sources, project developers can support even the largest CMM development projects.

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[www.methanetomarkets.org](http://www.methanetomarkets.org)

