



Inside this issue:

Feature Article: Workshop 2-6
Main Points

Initiative Presents at CDM 4
Asia 2008

CCII Symposium and 5
Workshop Announcement

Registration of Three 5
CMM Utilization Projects

Contact Us, Other 6

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Feature Article: Guizhou CMM Workshop Expands Spectrum for Localized CMM Development

On July 16 and 17 this summer, over 130 experts gathered in Guiyang, Guizhou to discuss practical solutions for coal mine methane recovery and utilization, the development of which promises to improve mine safety as well as reduce the emission of harmful greenhouse gases. Distinguished delegates included chief engineers of 33 Guizhou coal mines and supporting Guizhou government agencies, like the Guizhou bureaus of Environmental Protection and Coal Mine Safety, the co-hosts of the workshop, and the Coal Mine Administration and Development Research Center for the Guizhou Government.

Organized by the Guizhou International Cooperation Center for Environmental Protection, a special feature of the workshop included the invitation of several other domestic and international guests and speakers. Guests of honor in-

cluded representatives from the United States Environmental Protection Agency, who provided funds for the workshop, China Coal Information Institute, and the International Energy Agency. Other guests and speakers came from 24 other CMM development and financing companies. These esteemed guests helped to broaden the availability of technological information as well as the potential for CMM recovery and utilization development opportunities in Guizhou.

The workshop included presentations and discussions covering an overview of general CMM development occurring in China and Guizhou, safe and effective CMM drainage and utilization specific to Guizhou circumstances, and financing options. From these discussions emerged

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(Continued on page 2)

(Continued from page 1)

the following main points.

Opening Session and Session 1-Overview

Chunbao Zhai, Deputy Director of Guizhou Environmental Protection Bureau, and Fuqing Chen, Deputy Director of Guizhou Coal Mine Safety Bureau, opened the workshop, highlighting the sister benefits of mine safety and reduced greenhouse gas emissions resulting from CMM recovery and use. Barbora Jemelkova, from the Coal Mine Outreach Program of the U.S. Environmental Protection Agency, went on to describe the activities of the Methane to Markets Partnership (M2M) (www.methanemarkets.org) which promotes developing methane as a commercially viable clean energy resource. This program, of which China is a partner, helps to identify and promote project opportunities while also addressing any barriers to potential project development. It has funded two technology demonstration projects (VAM oxidation and explosive-range methane combustion technology) and one pre-feasibility study of a VAM project in China. In addition, it has launched three full-scale feasibility studies for CMM projects in China in support of M2M and the second US-China Strategic Economic Dialogue (SED), which plans to help develop up to 15 CMM projects in 5 years in China.

Raymond Pilcher, of Raven Ridge Resources, neatly summed up the progress of CMM development in China for the past two decades. CMM projects are now developing rapidly throughout China. However, for CMM to remain commercially viable, developers must look beyond the short-term gains, likely resulting from employing inefficient technologies and relying only upon Kyoto Protocol credit trading incentives, and instead begin investing in long-term futures by means of advanced technology and alternative investment options.

Liu Wenge, Director of China CBM Clearinghouse of the China Coal Information Institute, delivered a general picture of CMM recovery and utilization in China with detailed and updated data and information including a summary of related incen-



tive policies. In particular, the new CBM (CMM) Emission Standards (Trial) may create disincentives for CMM development by requiring China coal mine companies to utilize CMM with methane concentrations above 30% starting from 1 July 2008 for new coal mines and 1 January 2010 for all coal mines. In this case, such utilization projects will have difficulty in proving additionality and lose potential CDM revenue. When asked to comment on this new Standard, Liu said recommendations for utilization, rather than requirements, may provide a middle solution. Despite that, Mr. Liu emphasized that even without CDM benefits, projects should be carried out for emissions reductions and for safety's sake.

Shiyan Hu, Chief Engineer of Guizhou Coal Mine Administration, introduced CBM resources in Guizhou and described the prospects for CMM development. The estimated CBM geological reserve is 3.15 trillion m³ and two third of it is stored in only 15 tectonic units. Right now CBM development in Guizhou

is sparse, with only one surface drainage project at the exploration stage. CMM utilization is also limited to 50 million m³ out of 350 million m³ total drainage per year. Nonetheless, he described how a pilot surface drilling project and demonstration utilization projects are being carried out to meet the target: 100 million m³ of CBM per year (100% utilization rate) and 1.6 billion m³ of CMM per year (75% utilization rate).

Overall, as the largest CMM emitter, China has come a long way in CMM development. More progress is inevitable as results from multiple demonstration projects emerge. As China takes on greater leadership in this industry, this is an industry Guizhou can tap into. Considering increasingly tighter regulations on methane emission and current opportunities and support from the international community, this Initiative would like to recommend Guizhou coal mine companies, especially large ones, take actions to reach out for potential cooperation opportunities.

They should take advantage of this encouraging environment before it comes to the point when CMM utilization becomes a requirement by law or regulation.

Session 2-Drainage

Of first priority and interest for Guizhou coal mines is mining safety and effective removal of CMM. However, if CMM quantity and quality is enhanced via improved technology and management, then CMM can become a valuable clean energy resource, which reinforces both mining safety and production. Zugen Long from the Guizhou Coal Mine Design and Research Institute analyzed two coal and gas outburst accidents in Guizhou, which are becoming the major accidents in Guizhou coal mines, stating the reason is the

(Continued on page 3)

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(Continued from page 2)

“failure of meeting the drainage standards or failure of following pre-mining drainage designs”. Long suggested that in-seam pre-mining drainage under the complicated geology in Guizhou is not sufficient to avoid coal and gas outburst accidents. Drainage efforts and other measures must be extended to nearby areas.

Fuqing Chen, Deputy Director General Guizhou Coal Mine Safety Bureau, further provided a detailed account of the difficulties in draining methane by explaining the formation history of Guizhou coal seams, which are located closely to each other and have low permeability. Current drainage methods focus on the working coal seam, yet nearby coal seams contribute up to 60% of gas in the working area. They must be included in the drainage design. In addition, current drilling technologies need to be improved to meet the geological challenges.

Mike Pitts, Subsurface Director of Green Gas International, presented a case study of utilizing simple, inexpensive drilling techniques and equipment for recovering gas in a gassy, kilometer-deep mine by working a simple 'U' ventilated retreat longwall producing a million tons of coal per year. This drilling method applies to coal mines at any depth with very low permeability while producing gas with methane concentrations above 50%.

Finally, the case studies of Panjiang Coal and Power Group, from Guizhou, and Chongqing Songzao Coal and Power Ltd., provided the audience with useful experiences of CMM recovery and utilization. Shouqin Huang, Chief Engineer of Panjiang, discussed how drainage efficiency at their mines increased up to 51.2% due to improved recovery methods and technology. However, 70% of the drained gas has low methane concentrations (below 30%). With annual CMM recovery at 160 million m³, Panjing has ambitious plans to utilize the CMM by in-

stalling 88 units of gas engines with a total capacity of 45MW. Other utilization options include providing

In effect, applying good management, appropriate techniques and technology, and providing incentives to recover high quality methane can cost-effectively improve safety and coal production while producing a valuable clean energy resource.

CMM to local residents as town gas.

Ankun Zhang, on behalf of Changwen Huang, Chief Engineer of Chongqing Songzao, also expressed that Songzao's successes to work on outburst coal seams under similar geology and geography as Guizhou's were due to reliance on multiple technical improvements. These improvements and breakthroughs include outburst alarming systems, drilling techniques and equipments, integrated drainage and mining designs, and management based on information systems. As a result, not only gas outburst accidents are avoided, but also drainage efficiency, gas quality and quantity, and roadway driving progress are greatly improved.

Though these presentations include successful practices in different coal mines with similar geology to Guizhou's, this Initiative is convinced that efficient and effective drainage among Guizhou coal mines is possible and necessary for mining safety. In effect, applying good management, appropriate techniques and technology, and providing incentives to recover high quality methane can

cost-effectively improve safety and coal production while producing a valuable clean energy resource.

Session 3-Utilization

This session demonstrated numerous technologies available for CMM utilization. Zoey Wang, from Caterpillar, one of the most well known CMM power generator distributors, described the services available for China, and Southwest China in particular, via ECI-Metro Engineering Machinery Service Co., Ltd. One of the most noteworthy CMM projects for Caterpillar in China is the Jincheng Sihe 120 MW cogeneration power plant.

Richard Mattus presented the impressive successes of MEGTEC Systems' VOCSIDIZER VAM technology, and how they can assist in implementing this technology in China. Now shown to be commercially viable, via Project WestVAMP in Australia, it greatly expands the options available for CMM development, increasing the profitability of emissions control. By 2009, we should be able to hear more of the VOCSIDIZER production successes in China.

Shengdong Group, presented by Jiazhong Yang, also presented their nationally recognized, China Top Brand, power generators. Most noteworthy were the Shengdong technologies that claim to offer solutions for the transportation and use of low-concentration methane. This is significant for China mines due to the prevalence of low-concentration methane (around 11% of the total CMM emissions, compared to 5% of high concentration gas), and the related safety issues of low concentration methane. Of second note was Shengdong's introduction of their VAM oxidation equipment, which completes their goal to become a “coal mine methane zero-emission solution provider” to coal mines in China.

Yasonobu Kikui, Gas and Power Investment Co., Ltd., described how

(Continued on page 4)



(Continued from page 3)

their VPSA technology, using newly developed adsorption material, can upgrade low quality CMM for utilization, increasing CMM concentrations from 20-30% up to 45-90%. They are currently carrying out a pilot project using this technology in China. Any results from this pilot project will interest Guizhou coal mine companies who are struggling with CMM drainage concentration.

Kejian Yang, from Beijing Guoneng Energy Technology Co. Ltd., introduced their pioneering low-temperature purification and liquefaction technology. This technology is unique in purifying and liquefying methane from CMM in one step. The low pressure and low temperature mechanisms ensure safe processing of CMM, and product purity can reach greater than 99%. Based on their pilot project that processes 260,000 m³ CMM (35% methane) per day and yields 22,000 tons of LNG annually, Mr. Yang also outlined the economic benefits of utiliz-

ing liquid CMM compared to power generation, noting company profits are likely to be higher (i.e. higher product prices for liquid CMM), as well as benefiting from more extensive applications, including the flexible uses as civilian, vehicle and industrial fuel gas.

The [CMM utilization] trend is leaning towards making possible the safe and efficient use of low-concentration CMM, and capitalizing on the capture and use of VAM, which accounts for above 80% of the total CMM emissions in China coal mines, including that of Guizhou.

Based on the technologies presented at the workshop, it is apparent that much progress has been made, and continues, to adapt technology to the real conditions of CMM utilization in China. The trend is leaning towards making possible the safe and efficient use of low-concentration CMM, and capitalizing on the capture and use of VAM, which accounts for above 80% of the total CMM emissions in China coal mines, including that of Guizhou.

Session 4-Financing

Beyond the obvious safety and environmental benefits, developing CMM recovery and utilization to the point of profitability has its merits.

After all, this is the real incentive for promoting CMM development with coal mines. However, the path to financing the advanced and commercially viable technologies is not always so obvious. The workshop introduced several companies specializing in comprehensive CMM development and financing packages, through which most employ the Clean Development Mechanism (CDM) carbon credit trading system.

Dafei Huang from EEA Fund Management, a CDM project developer and CER buyer, introduced general procedures of using CDM as a financing method for CMM utilization projects and other related issues. EEA has signed more than 100 CDM projects in China of which 11 have already been registered with EB. With an experienced management team, EEA offers coal mine companies flexible financing options and strong support for CDM application.

Climate Change Capital, presented by Rick Zhang in partnership with Matt Hill of Harworth Energy, is one of the companies offering comprehensive CMM development and financing packages concentrating on the abatement of VAM. For example, CCC will buy, install and help maintain their chosen thermal oxidation technology, by employing the coal mine application knowledge of Harworth Energy Ltd., and arrange the financing via their specialization.

(Continued on page 5)



On other Fronts...

Initiative Presents in CDM Asia 2008

On July 31, Mr. Boni Jiang, this Initiative's Project Manager, was invited as a guest speaker for a workshop focusing on CBM/CMM development in China during CDM Asia 2008 in Shanghai. Mr. Jiang delivered a presentation "CBM/CMM CDM Project Potential – Opportunities, Risks and Strategies: a case study of Guizhou CMM Recovery and Utilization Initiative". During the 3-hour workshop Mr. Jiang answered questions from about

20 participants from China, India, South Korea, Indonesia, and Italy.

By being invited as guest speaker, it is an indication that this Initiative, an outreach project focusing more on Guizhou, has expanded its influence outside Guizhou. We look forward to communicating and sharing our experiences with other parts of China and even more Asian countries.

in CDM (from preparing PDD's up to project verification). Echoing the morning's VAM utilization technology presentations, Zhang laid out a detailed financing picture for a VAM project, which is no longer a technological experiment but an emerging business model that could be applied to most coal mines.

Since the financing models are critically based on CDM, it is reasonable for people to question project sustainability after Kyoto Protocol ends in 2012, when there may not be carbon credit trading under the CDM system. In this regard, Evolutions Markets, a leading environmental commodity broker, presented at the workshop by Marco Terruzzin, provided perspectives on the emerging voluntary emission reduction markets that are expected to open up in the United States, outside of the current Kyoto Protocol trading schemes. So, can CMM utilization projects in Guizhou access this voluntary market to seek financial support? Yes, but now it is very limited compared to the CDM scheme. According to Terruzzin, only 7% of traded carbon credits in 2007 were from CMM utilization projects. In addition, the price of carbon credits in the American voluntary market is only \$4-6 per ton, much less than a common CER price of 10 Euros (about \$14.6) per ton among many CDM projects in China.

The Pansan CER experience, presented by Yan Wang from Huainan Mining Group, imparted very prac-

(Continued on page 6)

In the News...

Keep an Eye on Registration of Three CMM Utilization Projects

The UNFCCC EB released the 41st Meeting Report on 2nd August. Most notably, three CMM utilization projects from Henan Province have made significant progress towards registration. These projects are Yima Coal Industry (Group) Co., Ltd. CMM Utilization Project (which has been registered with a retrospected date of 2 August 2008), Zhengzhou Coal Industry (Group) Co., Ltd. Coalmine Methane Utilization Project, and Pingdingshan Coal (Group) Co., Ltd. Methane Utilization Project (which EB agreed to register upon submission of corrections). There are two significant implications of these three projects. First, they all utilize low concentration CMM (below 30%) for power generation. The registration of this group of projects may provide fresh testimony for the ongoing debate on whether low concentration CMM can or should be utilized. Second, they all have VAM abatement activity by using Megtec's Vocsidizer technology. They will become the first VAM CDM projects in China and in the world.

Upcoming CMM Events in China

The 8th International Symposium on CBM/CMM and Carbon Trading in China & International Workshop on Mine Methane Emission Reduction in China

December 4, 2008: The 8th International Symposium on CBM/CMM and Carbon Trading in China is hosted and organized by China Coal Information Institute (CCII) and co-sponsored by China State Administration of Coal Mine Safety and the US Environmental Protection Agency. Topics include technologies for methane degasification and utilization, including ventilation air methane.

December 5, 2008: International Workshop on Mine Methane Emission Reduction in China is organized by CCII and Australia's CSIRO. Topics include issues affecting CMM project development in China, including study results from three major research projects funded by the Australia-China Bilateral Climate Change Partnership.

There is more on the Internet at:
<http://www.coalinfo.net.cn/english.htm>

Where: Kunlun Hotel in Beijing, China

Registration: \$400 for the Symposium and no separate fee for the workshop.

For registration and topic information, please contact:

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(Continued from page 5)

tical CMM development knowledge to the audience, after having just received about 200,000 tons of CERs from their CMM utilization CDM project (second registered CMM project and first CMM project with CER issuance). Some of the advice they wish to convey to the CMM development community are 1) in the general climate of so much support for emissions reductions, seize this golden opportunity to receive CDM assistance with foreign capital and advanced technologies; 2) ensuring the safety of coal mine operations and gas utilization are complementary to each other, in effect improving the coal extraction rate as well; 3) the success of the project depends on a competent team of professionals, due to the rigorous procedures and sheer amount of required data and its daily management; 4) when choosing partners, the coal mining enterprise should also be aware of the international market changes as well as the policies behind CDM development and the time requirements, especially in order to protect the interests of project owners; 5) despite its great importance in the CMM development process, monitoring equipment and measuring devices that conform to CDM verification requirements are

still immature in China. Imported equipment is expensive and difficult

Voluntary emission reduction markets are growing and might eventually become one of the most important financing sources for CMM utilization projects. However, CDM remains the main incentive for investors and coal mine companies.

to maintain. It is imperative that this equipment be developed domestically; 6) and finally, within the purchase agreements, there should be flexibility available to handle CER production fluctuation. Also, in order to ensure the greatest benefits, utilize the floor price plus upside benefit since CER prices vary greatly in the international markets.

Fawn Glen, from Green Gas, a specialized and experienced CMM project developer worldwide, provided the final presentation that outlined the methods for maximizing the returns, and mitigating the risks, from a CMM utilization project. There are multiple and reinforcing aspects to consider from the design of the project up to the delivery of CERs. A successful CMM utilization project, in sum, is dependent upon continuous and safe mining activity, improved drainage efficiency and gas quality,

optimized operating hours that can achieve economies of scale, maximized emissions reductions and carbon credits value, and careful risk analysis and management.

Voluntary emission reduction markets are growing and might eventually become one of the most important financing sources for CMM utilization projects. However, CDM remains the main incentive for investors and coal mine companies. The market provides coal mine companies many choices for CMM project cooperation domestically and internationally. The experiences from Pansan project and Green Gas would be very good references for Guizhou coal mine companies to carefully choose partners and build internal capacities to grasp opportunities.

As one of the major components of this Initiative, this workshop successfully brought key stakeholders together, such as technology providers, investors, coal mine companies, and government authorities, to focus on developing project-oriented CMM utilization opportunities among Guizhou coal mines. The workshop might not be the first one of this kind, but we are sure it is not the last thing this Initiative will do in Guizhou. We would be happy to continue to assist you on your unfinished pursuit during the workshop. Please feel free to contact us.



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The Guizhou CMM Initiative is hosted by Guizhou International Cooperation Center for Environmental Protection (GZICCEP), which is affiliated with the Guizhou Environmental Protection Bureau. Find out more at <http://www.gziccep.com>.

The CMM Recovery and Utilization Initiative for Guizhou Province, China is funded in full under Assistance Agreement No. EPA-OAR-CCD-06-08 awarded by the U.S. Environmental Protection Agency. EPA support for this Initiative does not imply endorsement of any products or commercial services.

This grant supports the Methane to Markets Partnership which promotes clean energy projects together with a multitude of international partners while sustaining economic growth in the partner regions. Learn more at <http://www.methanetomarkets.org/>.

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