Coal Mines Subcommittee
4 March 2021
Virtual Meeting

MEETING MINUTES

Introduction

The Global Methane Initiative (GMI) held its 30th Coal Mines Subcommittee meeting virtually on 4 March 2021. The meeting featured presentations about tools and resources for coal mine methane (CMM) mitigation projects and was held jointly with the online meeting of the 16th Session of the United Nations Economic Commission for Europe's (UNECE) Group of Experts on Coal Mine Methane (GoE-CMM) from 3-4 March 2021.

16th Session of the UNECE GoE-CMM

Discussions during the online meeting of the UNECE GoE-CMM primarily focused on the future of the Group. Following presentations about new CMM-related projects and initiatives undertaken in ECE member states, the Group acknowledged the importance of CMM capture and use and agreed to work towards the development of rules, regulations, and standards to encourage the financing and development of CMM degasification and use projects. Feedback received during the meeting focused on the challenges of the coal sector related to the closure of coal mines and potential cessation of coal mining activities, which reflects feedback received from participants during other recent workshops. Noting the depth of relevant expertise and experience within its membership, the Group considered offering support to member states that are seeking to shut down coal mines to help prepare the communities for mine closure and reorientation of local economies.

30th GMI Coal Mines Subcommittee Meeting

The 30th meeting of the GMI Coal Mines Subcommittee meeting, attended by more than 80 participants (see Annex 1), was held virtually from 13:00 to 14:30 UTC on 4 March. The meeting was opened by Mr. Raymond Pilcher, Chair of the UNECE GoE-CMM, and was followed by welcoming remarks by Ms. Volha Roshchanka, GMI Coal Mines Subcommittee Co-Chair for the United States. Ms. Roshchanka provided introductory remarks on behalf of all Co-chairs followed by the technical presentation below (see agenda in Annex II).

All presentations and the meeting agenda can be found on the GMI website at https://globalmethane.org/events/details.aspx?eventid=586.

GMI Secretariat News and Updates

Ms. Monica Shimamura, Director of the GMI Secretariat, presented news and updates on recent GMI activities and upcoming priorities. During the GMI Steering Committee meeting held on 2-3 December 2020, there was a consensus to extend the GMI's charter by 10 years to March 2031. Priorities over the next decade will include elevating international awareness of the critical need to take action now to reduce methane emissions as well as using GMI's technical expertise to facilitate methane reductions. GMI intends to leverage its strategic partnerships to improve collaboration, including formalizing partnerships with the World Bank and International Energy Agency. The re-chartering of GMI also provides opportunities for the Coal Mines Subcommittee to:

- expand its membership and identify sector-specific organizations with whom to partner,
- deliver technical solutions for methane mitigation, and
- update the Subcommittee Action Plan to establish priority activities for the next 3 years.

Ms. Shimamura informed participants about the upcoming GMI online event scheduled for 3 June 2021 that will feature keynote speeches from global leaders on methane about policies to achieve climate goals, opportunities for global action, and next steps for engagement. She also promoted the recently redesigned GMI website which was enhanced with improved navigation and organization to facilitate access to tools and resources.

Ms. Shimamura also discussed the potential UN International Year or Decade for Methane Management. GMI Partners and Partner countries could have opportunities to get involved and participate; for example, the Coal Mines Subcommittee could host technical workshops and study tours, develop technical tools and resources, sponsor research on mitigation measures, and conduct pilot projects or pre-feasibility studies.

Overview of CMM Mitigation Resources Available through GMI and CMOP

Ms. Roshchanka provided an overview of tools and resources available through GMI and the U.S. EPA's Coalbed Methane Outreach Program (CMOP). Ms. Roshchanka discussed several GMI and CMOP tools aligned to the steps in the CMM project lifecycle as follows:

- *Gather Background Information*
  - **GMI** – CMM Country Profiles: Contains 37 country profiles in the CMM sector
  - **CMOP** – Coal Mine Methane Developments in the United States: Provides an overview of U.S. CMM emissions, CMM use, and federal and state policy incentives
- *Identify Project Opportunities*
  - **GMI** – Pre-feasibility and Feasibility Studies in GMI Countries: Includes more than 50 studies in 11 GMI Partner countries
  - **CMOP** – Map of U.S. CMM Opportunities: Includes data submitted by coal mines to the U.S. Greenhouse Gas Reporting Program and data from the U.S. Greenhouse Gas Inventory
- *Evaluate CMM Resources*
  - **GMI** – Conducting Pre-Feasibility Studies for Coal Mine Methane Projects Training: Introduces principles to assess the potential of developing CMM mitigation projects
- *Assess the Market for CMM*
  - **GMI** – CMM Market Studies: Identifies opportunities for CMM mitigation and utilization projects
  - **CMOP** – State Renewable Energy Programs: Summarizes state approaches to incorporate CMM into their renewable or alternative energy portfolio standards
  - **CMOP** – Emerging Incentives for the Development of CMM Emission Reduction Projects: Details state and federal financial and regulatory incentives for CMM emission reduction projects
- *Analyze Cash Flows*
  - **GMI and CMOP** – CMM Cash Flow Model: Evaluates the financial viability of recovering and utilizing CMM
  - **CMOP** – Coal Mine Methane Finance Guide: Summarizes finance sources and requirements to secure financing for CMM projects
- *Develop and Operate a Project*
  - **GMI** – CMM Mitigation and Utilization Technologies: Provides a list of technologies, tools and providers
  - **GMI** – CMM Project List: Contains information more than 200 coal mine methane recovery and utilization projects
  - **CMOP** – Coal Mine Methane Industry Contacts: Provides contact information for CMM and coalbed methane industry and government contacts

Tools to Assist with Evaluating CMM Project Opportunities in Active Mines and AMM Resources

Dr. Ozgen Karacan, U.S. Geological Survey, stated that CMM is a safety concern in active coal mines and that it can be captured prior to or during mining to generate energy and reduce an operation's environmental footprint. After mine closure, significant amounts of abandoned mine methane (AMM) can continue

accumulating in abandoned coal mines or in sealed areas. After noting that standard tools and approaches are not applicable for CMM and AMM resource assessments, Dr. Karacan discussed two resources:

- **Methane Control and Prediction (MCP) Software** – This software offers two sets of methane prediction models (for specific U.S. conditions and for other U.S./international conditions) with deterministic and stochastic options to allow better control of design parameters. Applying this software for methane-capture and control-related challenges will help improve mine safety and identify opportunities for capturing and utilizing methane.
- **Probabilistic Assessment Methodology for CMM and AMM Resources** – This methodology uses a four-step probabilistic approach, with different data availability options, to predict CMM and AMM resources and potential production timeframe.

A Training Simulator for Management of Underground Methane Drainage Boreholes

Dr. David Creedy, Sindicatum Sustainable Resources, provided a demonstration of the Management of Underground Methane Drainage Boreholes simulator that is used to train managers and methane drainage staff at coal mines. The simulator was developed for use in China to demonstrate how to:

- Increase the concentration of drained methane for safe transport and utilization
- Optimize pure methane flow captured
- Avoid occurrence of explosive mixtures in the methane drainage system

Dr. Creedy discussed various scenarios with regulator valves open and closed to demonstrate the need to monitor and regulate the cross-measure gas drainage borehole to achieve optimal methane concentration.

CMM and AMM Calculation Methods in German Hard Coal Mines

Dr. Stefan Möllerherm, Research Center of Post-Mining, provided an overview of calculation methods and data visualizations for the following:

- Gas Storage and Gas Content – Graph of sorption isothermal curves for dry coal to plot gas content and methane pressure
- Gas Content Determination – Charts showing how total gas content varies by distance in the strata for the Rhenish coal seam and Westphalian coal seam
- Gas Content – Maps showing gas content and graphs displaying residual gas content after mining (to show reduction of the gas content after three seams had been mined)
- Gas Utilization from Abandoned Mines – Diagram showing a degassing vent, compressor, cogeneration, and transformer at an abandoned mine operation

Pre-feasibility Study Training by GMI

Mr. Clark Talkington, Advanced Resources International, discussed the characteristics, benefits, and limitations of three options to evaluate the technical and economic feasibility of a CMM project:

- Desk study – First order analysis based on limited data
- Pre-feasibility study – More detailed analysis with site-specific information
- Feasibility study – Detailed analysis sufficient to support project financing

He then noted that EPA and GMI have directly or indirectly supported the development of approximately 50 CMM feasibility and pre-feasibility studies in 11 countries. Several lessons learned have been identified while supporting these studies, the most important of which is that inadequate analysis or poor study preparation may result in the rejection of potentially feasible CMM projects. GMI is developing two online training courses to help stakeholders conduct pre-feasibility studies:

- Pre-feasibility Study Training for Methane Drainage and Use at Working Mines
- Pre-feasibility Study Training for Methane Recovery and Use at Abandoned Mines

The goal of these courses is to introduce users to the principles for completing a thorough and technically sound pre-feasibility study, including:

- Data needs for technical and financial analyses
- Methods to assess methane resources
- Criteria to evaluate effectiveness of methane drainage
- Considerations for evaluating markets and project risks
- Standard metrics for financial analyses

CMM Project List: Analysis of Current Status & Trends

Dr. Nazar Kholod, Pacific Northwest National Laboratory, provided an overview of the GMI CMM Project List that was developed to track and analyze CMM projects around the world. The project list is an excellent source of information about operational and former/future CMM projects that includes data about project status; project end use type; descriptions of projects, mines, and equipment; and emission reductions, where available. The project list includes 328 known projects at various stages of operation:

- 260 operational projects: 156 CMM projects and 104 AMM projects
- 36 projects under development
- 32 closed/not operational projects

Countries with the largest number of operating CMM and AMM projects are: China, United States, Germany, Czech Republic, and the United Kingdom. Common end uses for operational projects are:

- Generate heat or power (or both) – 66%
- Flaring – 13%
- Gas sales – 12%

The average annual emission reduction per project (where data are available) is 150,000 $MTCO_2$, but only 30% of the projects include information on annual emission reductions.

Close of the GMI Coal Mines Subcommittee Meeting

Ms. Roshchanka provided closing remarks on behalf of GMI, and she reiterated that there are many tools available to assist stakeholders with the implementation of CMM utilization projects. She encouraged participants to help identify other potential new members for the Coal Mines Subcommittee and other sector-specific organizations with whom GMI could partner. She noted that the Subcommittee would soon begin working on renewing its Action Plan to identify priorities for the next 3 years, and she also encouraged attendees to participate in the GMI online event in June 2021.

ANNEX I

GMI Coal Mines Subcommittee Meeting Participants

Name	Organization
Aida Haračić	BiH, MoFTER
Anna Spirina	Russian Mission to UN
Artur Badylak	JSW S.A.
Badarch Mendbayr	Mongolian Nature and Environment Consortium (MNEC)
Barun Sharma	
Bobbie Foot	BHP
Brahim Benattia	United Nations Office at Geneva
Bruce Chisholm	Preemptive Pollution Initiatives, Inc.
Catherine Witherspoon	ClimateWorks
Cevat Karacan	U.S. Geological Survey
Clark Talkington	Advanced Resources International
Clemens Backhaus	A-TEC Anlagentechnik GmbH
Colin Kuehnhanss	European Commission - DG ENER
Corina Sheridan	Gulf Coast Environmental Systems
Dariusz Obracaj	AGH University of Science and Technology
David Creedy	Sindicatum Sustainable Resources
Dorota Taranowicz	Poland Ministry of State Assets
Özgür Acir	Association of Geological Researches
Edan Prabhu	Prabhu Energy Labs
Edoardo Trottini	Waga Energy
Emilia Chodukiewicz	Ministry of State Assets
Emmanuella Ontoyin	
Enkhtaivan Dashnyam	Permanent Mission of Mongolia
Evgeny Alexeyev	Methane Center, Kazakhstan
Florin Tobescu	Romanian Energy Regulatory Authority (ANRE)
Grant Wach	Dalhousie University
Huang Shengchu	China Coal Strategies Research Center
Igor Yashchenko	Ministry of Energy and Coal Industry of Ukraine
Jacek Skiba	Central Mining Institute of Katowice
Jack Lewnard	Advanced Research Projects Agency - Energy (DOE ARPA-E)
Janusz Jureczka	Polish Oil and Gas Company
Javier Cañas	EIT Climate-KIC
Jerzy Hadro	Polish Geological Institute
Jia Qing Rong	Shanxi Coking Coal Group
Jin Zhixin	Shanxi Coking Coal Group
Joe Donahue	Abt
Joseph Essandoh-Yeddu	Ghana Energy Commission
Judd Swift	Synfuels Americas
Knutson Anthony	Wood Mackenzie
Koichiro Kimura	Mitsui & Co Ltd
Koichiro Yasukawa	Mitsui & Co Ltd

Konstantin Kolikov	National University of Science and Technology MISIS
Lata Kusum	United Nations Framework Convention on Climate Change
Lesley Sloss	IEA Clean Coal Center
Lukasz Kroplewski	Polish Oil and Gas Company
Mackay Melanie	Trillium Geoscience
Magdalena Chawula-Kos	World Bank
Malcolm McDowell	Methane Strategy/DG Energy
Maxim Titov	ENERPO Research Center
Meredydd Evans	Pacific Northwest National Laboratory
Michael Oshchepkov	ENERPO Research Centre
Michael Stanley	World Bank Group
Michal Drabik	UNECE
Miroshnychenko Vadym	DTEK Energy
Monica Shimamura	U.S Environmental Protection Agency
Nazar Kholod	Pacific Northwest National Laboratory (PNNL)
Neil Butler	HEL-East Ltd
Oleg Tailakov	JSC VostNII
Ozgen Karacan	U.S. Geological Survey
Peter Cain	rokdok Services Inc
Pierre De Pasquale	Responsible Mining Foundation
Piotr Kasza	Oil and Gas Institute/National Research Institute
Rajiw Lochan	Central Mine Planning and Design Institute
Ray Pilcher	UNECE
Remi Pelon	World Bank Group
Renata Cicha-Szot	INiG-PIB
S. Rao Chitikela	RC-WEE Solutions
Sam Tremaine	Tetra Tech
Sarah Chadwick	Abt
Sebastian Swaczyna	Jastrzębska Spółka Węglowa SA
Selina Huang	China National Coal Group Corp.
Sergey Shumkov	Skochinsky Institute of Mining
Sergiu Robu	Institute of Power Engineering of Moldova
Shekhar Saran	Central Mine Planning and Design Institute
Shen Jingming	
Shi Su	Commonwealth Scientific and Industrial Research Organization (CSIRO)
Shlyapin Alexey	Russian Academy of Sciences
Stefan Moellerherm	Technische Hochschule Georg Agricola
Steve Michener	Tetra Tech
Valeriy Zakharov	Russian Academy of Sciences
Vitaly Shumkov	Scientific and Technical Mining Association
Vladimir Yuvonin	Energy Efficiency Technology Institute
Volha Roshchanka	U.S Environmental Protection Agency
Wendy Beach	USA Synfuels Americas
Yurly Bobrov	The Association of Mining Towns of Donbass

ANNEX II

GMI Coal Mines Subcommittee Meeting Agenda
4 March 2021

13:00-13:10 UTC	**Welcome from UNECE and GMI** *Ray Pilcher, Chair, UNECE Group of Experts on CMM* *Volha Roshchanka on behalf of GMI Coal Mines Subcommittee Co-Chairs*
13:10-13:20 UTC	**GMI Secretariate Update** *Monica Shimamura, GMI Secretariat*
13:20-13:30 UTC	**Overview of Tools and Resources Available through GMI and CMOP** *Volha Roshchanka, U.S. Environmental Protection Agency (United States)*
13:30-13:40 UTC	**Tools to Assist with Evaluating CMM Project Opportunities in Active Mines and AMM Resources** *Özgen Karacan, U.S. Geological Survey (United States)*
13:40-13:50 UTC	**A Training Simulator for Management of Underground Methane Drainage Boreholes** *David Creedy, Sindicatum Sustainable Resources (UK/China)*
13:50-14:00 UTC	**CMM and AMM Calculation Methods in German Hard Coal Mines** *Stefan Möllerherm, Research Center of Post-Mining (Germany)*
14:00-14:10 UTC	**Pre-feasibility Study Training by GMI** *Clark Talkington, Advanced Resources International (United States)*
14:10-14:20 UTC	**CMM Project List: Analysis of Current Status &Trends** *Nazar Kholod, Pacific Northwest National Laboratory (United States)*
14:20-14:30 UTC	**Summary of Action Items and Adjourn** *GMI Coal Mines Subcommittee Co-Chairs*