Prefeasibility Study Training by GMI

Clark Talkington Advanced Resources International, Inc.



GMI Coal Subcommittee Virtual Meeting 4 March 2021

3 Options to Evaluate the Technical and Economic Feasibility of a Coal Mine Methane (CMM) Project

	Option	Characteristics	Benefits	Limitations
1	Desk Study First order analysis based on limited data	Basic assumptionsSimple financial modeling	 Eliminates projects with no clear chance of success early at low cost and effort 	 Positive results are far from conclusive
2	Prefeasibility Study More detailed analysis with site-specific information	 More detailed review of gas resources Review of gas drainage Gas production forecast More thorough financial analysis 	 Conclusions are more defensible than a desk study Although relatively detailed, costs are still significantly less than a feasibility study Supports further investigation through a full feasibility study 	 Not an investment grade document Dependent on data provided by 3rd party
3	Feasibility Study Detailed analysis sufficient to support project financing	 Thorough report investigating the economic and technical feasibility of project development 	 "Investment grade" document for 3rd party finance Some data obtained during course of study through original investigation 	• Expensive



GMI Support for Feasibility and Prefeasibility Studies

Desk Study

- 2 Prefeasibility Study
- 3 Feasibility Study

EPA and GMI have directly or indirectly supported the development of about

50 CMM feasibility and prefeasibility studies in

11 countries

- Identify potential projects while evaluating their technical and economic feasibility
- Initial focus on full feasibility studies
- Since 2011, shift to prefeasibility studies
 - More effective use of resources
 - Broader range of project types
 - More countries

Environmental Topics	Laws & Regulations	About EPA	Search E	PA.gov
coalbed Metha	ane Outreach	Program	CONTACT US	SHARE f 💌
CMOP Home	Cool M	ino Motha	no Intor	antional
Learn About Coal Mine Methane (CMM) Frequent Questions	Activit	ies	ine mien	lationa
CMM Sources	You may need a PE	OF reader to view some of th	e files on this page.	International
Mitigating CMM Emissions	See EPA's About PI	<u>DF page</u> to learn more.		Partners
Project Resources CMM Recovery Opportunities Map CMM Cash Flow Model	Coal mine methane (among the world's ko mixed gas in the atm the world are import emissions.	CMM) emissions are globally ey coal-producing countries osphere and emissions redu ant to reducing the total glo	r distributed . Methane is a well- ctions anywhere in bal burden of CMM	 China Colombia India Kazakhstan Mexico
Events	. For many years, the	Coalbed Methane Outreach P	Program (CMOP)	Mongolia
Industry Contacts	has been actively en	gaged in helping to promote	CMM recovery and	Poland Portion Enderation
International Activities	utilization in many k Colombia, India, Kaz	ey coat-producing countries, akhstan, Mexico, Mongolia, I	nctuding <u>china</u> , Poland, the	<u>Turkey</u>
China	Russian Federation,	Furkey, and Ukraine. Today,	CMOP conducts its	Ukraine
Colombia	international activiti Initiative (GMI)	es under the auspices of the Visit the <u>GMI Coal Subcor</u>	Global Methane	 United Nations
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epa.gov/cmop/international-activities

EPA-supported prefeasibility studies prepared on behalf of the GMI Coal Mines Subcommittee



What Were Some Lessons Learned?

- Gained valuable experience and insight by working with mine owner/operators and project developers to prepare prefeasibility study reports, but also in reviewing prefeasibility studies prepared by others
- Have found that preparers' definition of a prefeasibility study is exceptionally broad and sometimes does not meet general criteria for such studies
- Inadequate analysis and poor preparation may result in rejection of potentially feasible CMM projects



Developing Two Online Training Courses for Prefeasibility Studies

Course 1

Prefeasibility Study Training for Methane Drainage and Use at Working Mines

Course 2

Prefeasibility Study Training for Methane Recovery and Use at Abandoned Mines

- Assist project developers, mining company management, and others with understanding:
 - process to initiate, complete and deliver a thorough and defensible prefeasibility study
 - technical, market and financial data and analyses appropriate for a prefeasibility study
- Self-directed, interactive, web-based training courses, freely available to the public on the GMI website
- Developed in English, but open to offers to translate into other languages, starting with Chinese



Prefeasibility Study Training for Methane Drainage and Use at Working Mines

- Covers all aspects of a prefeasibility study: from CMM resource assessment to financial analysis
- Originated from a course delivered to the China International Center of Excellent in 2018
- Incorporates principles from UNECE Best Practice Guidance

Will feature a case study

as the 8th module

Module	Торіс		Global Methane Initiative	Conducting Pre-Feasibili					
1	Introduction and Objectives		Course Introduction CMM Project Development Welcome Who Can Benefit from this Tr DataBenefit from this Tr	Со					
2	Mine Background Information and Evaluation		Single Construction Single Company Personnel Government Officials Conducting Pre-Feasibility St Module 1	fc					
3	Resource Assessment		Introduction and Objectives What You Will Learn Methane Hazards and Clima CMM Capture CMM Use Ontions						
4	Improvements to Gas Drainage		Uses of CMM Globally Pre-freasibility Study as a Tool What Does Project Financing Is a Pre-feasibility Study "Ba • Are You Ready to Initiate a P						
5	Identifying Benefits of Improvements		Clarify study objectives a Confirm commitment of Verify project type Steps in a Pro-feasibility Study						
6	Gas Production Forecast		Fu	ıll cou					
7	Market Analysis, Risk Analysis, and Financial Analysis								
8	GMI Pre-feasibility Study: Case ₆ Study – Liulong Mine	ne, China							

First 3 modules are available on GMI's website globalmethane.org/training



Irse to be available this spring!

Prefeasibility Study Training for Methane Recovery and Use at Abandoned Mines

- Covers all aspects of a prefeasibility study: from Abandoned Mine Methane (AMM) resource assessment to financial analysis
- Incorporates principles from UNECE AMM Best Practice Guidance
- Complete course expected this summer

7

Module Topic

- 1 Introduction and Objectives
- 2 Information and Data Acquisition
- 3 Resource Assessment
- 4 Gas Production Forecasts
- 5 Mine Closure Design
- 6 Market, Financial, and Risk Analysis
 - GMI Pre-feasibility Study

First modules expected to be posted to GMI website this spring

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Will feature case studies in the 7th module



- The goal of the GMI training courses is to introduce users to the principles for completing a thorough and technically sound study
- Students will identify:
 - data needs for technical and financial analyses
 - methods to assess methane resources
 - criteria to evaluate effectiveness of methane drainage and benefits to improvements to drainage (for working mines)
 - options and benefits of forecasting gas drainage from working and abandoned mines
 - considerations for evaluating markets and project risks
 - standard **metrics** for financial analyses

Please access existing training modules at: <u>https://www.globalmethane.org</u> /training/coalminetraining.aspx

Global Methane Initiative (GMI) f Image: Comparison of the sector o

Conducting Pre-Feasibility Studies for Coal Mine Methane Projects Training



he U.S. EPA is developing this training course in support of the GMI and in onjunction with the United Nations Economic Commission for Europe (UNECE). This ourse introduces principles for assessing the potential of developing projects to apture and/or use CoAl Mine Methane (CMM). The introduced general approach hould be underpinned by mine-specific data and analyses, allowing the principles to be tailored to the unique conditions at each mine. Ideally, such an assessment will ead to project development and implementation.

CMM project developers, third parties, mining company personnel and government officials can all benefit from this training. The course is under development and is divided into eights teparate modules. The first three modules are available below, the remaining modules will be posted here as they are finalized.



Thank You

Presentation supported by U.S. EPA under the auspices of GMI Contact Information:

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