COAL MINE METHANE PROJECT OPPORTUNITY

CMM Utilization in Generating Plant at Alardinskaya Mine

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Kemerovo Region, Kemerovo Oblast, Russia

OVERVIEW OF COAL MINE METHANE PROJECT:

The methane utilization project at the Alardinskaya mine will reduce methane emissions to the atmosphere through combustion in a CMM fired 5 MW capacity generating plant. Thermal energy will also be captured for beneficial use.

To implement the project it is necessary to increase the efficiency of coal seam gas drainage by introducing modern techniques of drilling methane drainage wells. Financing is also required to acquire internal combustion engine driven power generators by the coal company on a co-financed basis.

ESTIMATED ANNUAL EMISSION REDUCTIONS: 135,000 TCO_2E

PROJECT DETAILS

- Name of Project: CMM Utilization in Generating Plant at Alardinskaya Mine
- Name of Mine: Alardinskaya Mine
- Type of Ownership: Private
- Type(s) of assessments performed: Pre-feasibility
  - When performed: 2012
  - By whom: Ruby Canyon Engineering, with GMI funding

MINE INFORMATION

- Mine owner: EVRAZ Group
- Percent ownership: 100%
- Status and type of mine: Active underground mine
- Mining Method: Longwall
- Service Life of Mine: 10 years

PROJECT FINANCES

- Assumptions : US$70/MWhr, 10 year life, no CER value
- Estimated revenue : 12% NPV 2.7 MUS$
- Projected capital costs: US$ 7.0 MUS$
- Projected operation and maintenance (O&M) costs for fully implemented project : 0.65 MUS$/year
- Estimated Return on Investment (ROI): 21.6%

Map of Russia showing Kemerovo Oblast

Map of Kemerovo Oblast showing Mine

HISTORICAL AND PROJECTED MINE DATA

HISTORICAL COAL PRODUCTION AND METHANE EMISSIONS

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Coal (million tonnes/yr)							2.76	2.76	2.76	2.76	2.76	2.50
Methane (Mm^3/yr)												
Emitted from ventilation system(s)							90.7	101.9	82.2	83.1	60.7	60.7
Liberated from drainage systems							13.8	12.5	7.9	7.7	19.6	19.6
Vented to atmosphere							74.5	114.4	90.0	90.9	80.3	80.3
Total Methane Emissions							74.5	114.4	90.0	90.9	80.3	80.3

PROJECTED COAL PRODUCTION AND METHANE EMISSIONS

YEAR	2013	2014	2015	2016	2017	2018	2019	2020
Coal (tonnes/yr)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Methane (Mm^3/yr)								
Emitted from ventilation system(s)	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7
Liberated from drainage systems	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Vented to atmosphere	80.3	67.7	67.7	67.7	67.7	67.7	67.7	67.7
Total Methane Emissions	80.3	80.3	67.7	67.7	67.7	67.7	67.7	67.7

GREENHOUSE GAS EMISSION REDUCTIONS

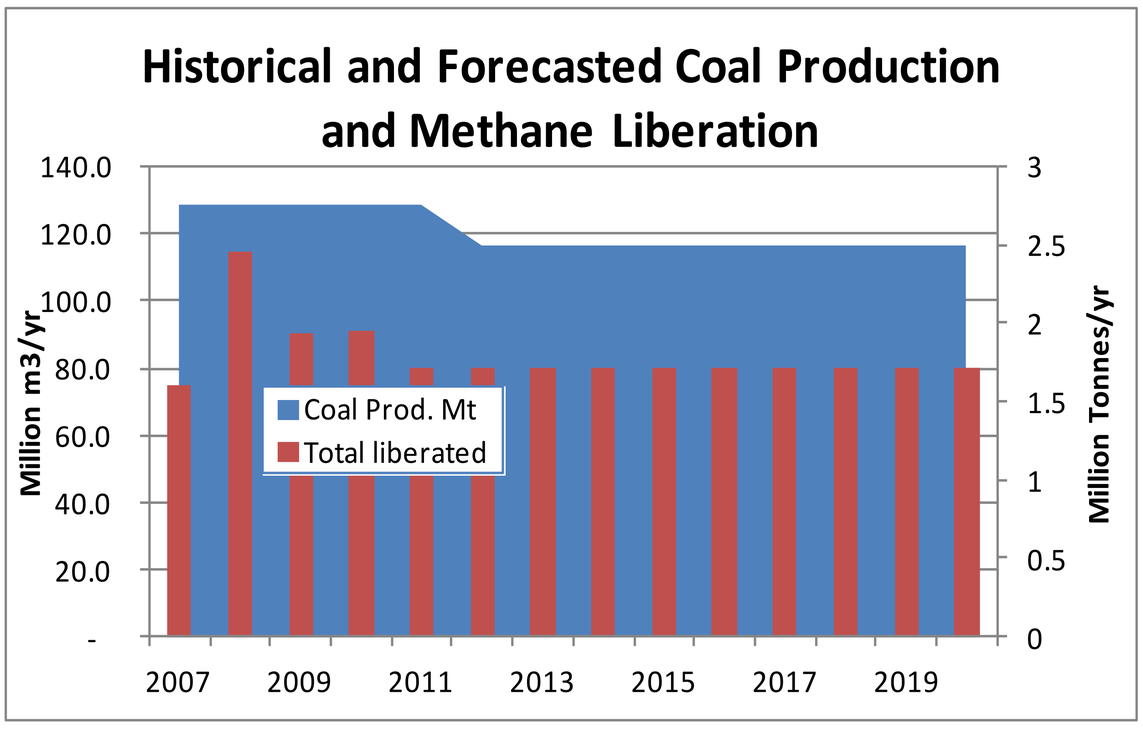
ESTIMATED GHG EMISSION REDUCTIONS AND TOTAL VOLUME OF METHANE ALREADY RECOVERED/UTILIZED

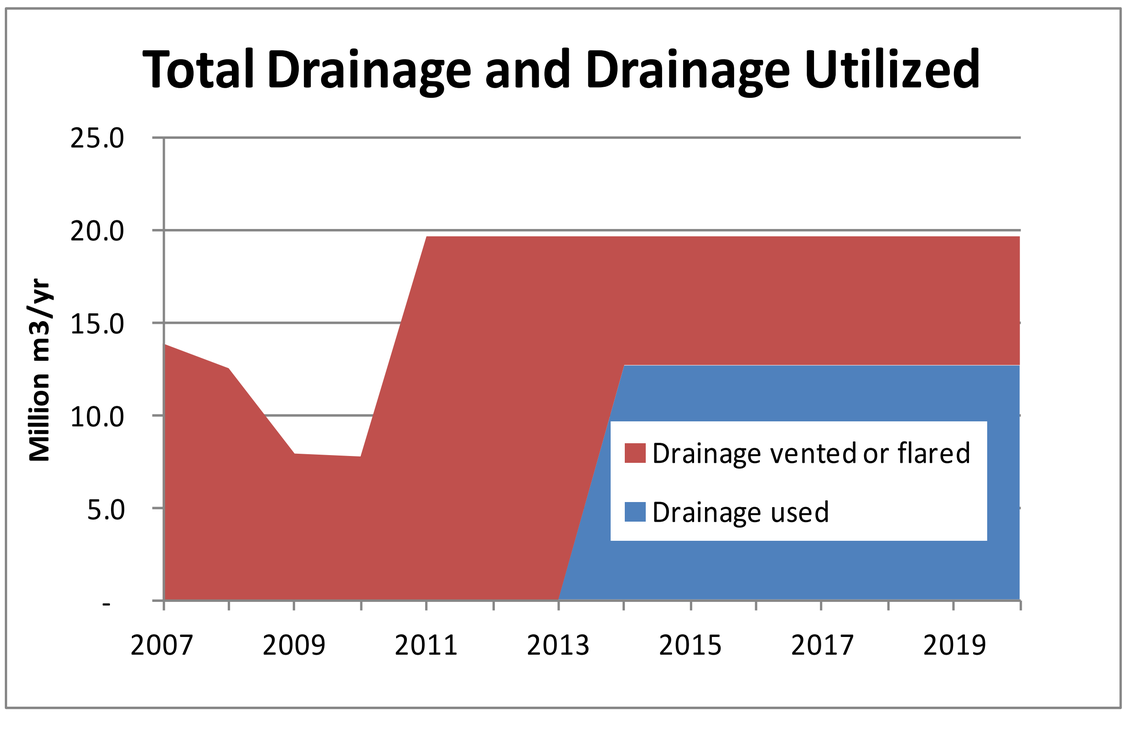
YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total CH_4 vented (ave. m^3/min)												
Average CH_4 concentration	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%
Total CH_4 recovered and utilized ($Mm^3/year$)	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL VOLUME OF METHANE EXPECTED TO BE RECOVERED/UTILIZED

YEAR	2013	2014	2015	2016	2017	2018	2019	2020
Total CH_4 recovered and utilized ($Mm^3/year$)	0	0	12.7	12.7	12.7	12.7	12.7	12.7

COAL PRODUCTION AND METHANE EMISSION CHARTS





MARKET ANALYSIS / DEMAND ANALYSIS

The power produced by the CMM-powered generation sets will displace a portion of the power required to operate the mine. Additionally the use of combined heat and power systems can produce heat for use at the mine building and for mine shaft heating. Possible use of the gas in boilers could also improve the air quality of the area significantly because less low-quality coal would be burned.

TYPE(S) OF ASSISTANCE SOUGHT

- Financial assistance: The mining company is seeking a grant to cover 30% of the project cost.
- Technical assistance: The mining company is requesting technical assistance to improve the quality of the drained gas and to investigate the feasibility of draining gas from the gob area.

PROPOSED TECHNOLOGIES

Coal Mine Methane Utilization in Gas Generating Plant with flare for excess gas

Methane Monitoring Equipment Inside the 1 MW Power Station

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