COAL MINE METHANE PROJECT OPPORTUNITY
Guizhou Qinglong Coal Mine CMM Comprehensive Utilization Project
Qianxi County, Guizhou Province, China

OVERVIEW OF COAL MINE METHANE PROJECT:

Qinglong Coal Mine is located at Qianxi County, Guizhou Province, China. The geological reserve of coal in this mine is 190 million tonnes and the minable reserve is 89 million tonnes. Qinglong Coal Mine is designed to produce 1.2 million tonnes of coal per year. The mine is classified as a gassy coal mine. It has 2.85 billion m³ of methane reserve, of which 1.34 billion m³ methane is drainable. In 2012, 31.95 M m³ CMM was drained underground and 6.25 M m³ was utilized to feed six low-concentration CMM gas engines (3.2 MW total). Electricity was used internally within the mine and the rest of the CMM was vented to the atmosphere.

Starting from 2013, Qinglong coal mine will produce 1.2 million tonnes of coal and drain 40 million m³ methane annually. There will be more than 30 million m³ of CMM to be utilized. Qinglong Mine plans to add six 600 kw gas engines to the power station and is evaluating the technical feasibility of purifying CMM to compressed natural gas (CNG). The scale of the CMM-to-CNG project is likely between 12 -15 million m³ methane per year and the investment is up to 50 million RMB (US $8.2 million). Qinglong Coal Mine looks for technical partners in gas drainage (underground and surface) and utilization, as well as investors.

ESTIMATED ANNUAL EMISSION REDUCTIONS: 171,360 MTCO₂E

PROJECT DETAILS
- Name of Project: Guizhou Qinglong Coal Mine CMM Comprehensive Utilization Project
- Name of Mine: Guizhou Qinglong Coal Mine
- Type of Ownership: Public
- Type(s) of assessments performed: Pre-feasibility
  - When performed: Dec. 2011
  - By whom: Guizhou International Cooperation Centre for Environmental Protection

MINE INFORMATION
- Mine owner: Guizhou Qianxi Energy Development Co., Ltd
- Percent ownership: 100 %
- Parent company: Yankuang Guizhou Energy and Chemical Industry Co., Ltd
- Status and type of mine: Active / Underground
- Mining Method: Longwall
- Service Life of Mine: 53 years

PROJECT FINANCES
- Assumptions: CNG12 M m³ /a
- Estimated revenue: US$ 4.92 Million/a
- Projected capital costs: US$ 6.61 Million (not including land)
- Projected operation and maintenance (O&M) costs for fully implemented project: US$ 2.52 Million/a
- Estimated Return on Investment (ROI): 4.38 years
HISTORICAL AND PROJECTED MINE DATA

HISTORICAL COAL PRODUCTION AND METHANE EMISSIONS

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<tbody>
<tr>
<td>Coal (tonnes/yr)</td>
<td>2,542</td>
<td>251,656</td>
<td>140,876</td>
<td>553,066</td>
<td>807,800</td>
<td>805,318</td>
<td>1,041,425</td>
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Methane (Mm$^3$/yr)

- Emitted from ventilation system(s): 21.78, 21.54, 20.87, 20.88, 18.10, 20.73
- Liberated from drainage systems: 0.16, 4.46, 4.37, 6.47, 7.65, 11.28, 16.21, 21.6, 31.95
- Vented to atmosphere: 0.16, 4.46, 2.67, 5.73, 4.28, 7.85, 11.1, 16.39, 25.7

Total Methane Emissions: 27.51, 25.82, 28.72, 31.98, 34.49, 46.43

PROJECTED COAL PRODUCTION AND METHANE EMISSIONS

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<tr>
<td>Coal (tonnes/yr)</td>
<td>1,200,000</td>
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Methane (Mm$^3$/yr)

- Emitted from ventilation system(s): 21.6, 21.6, 21.6, 21.6, 21.6, 21.6, 21.6, 21.6, 21.6
- Liberated from drainage systems: 40, 40, 40, 40, 40, 40, 40, 40
- Vented to atmosphere: 30, 27, 27, 27, 27, 27, 27

Total Methane Emissions: 51.6, 48.6, 48.6, 48.6, 48.6, 48.6, 48.6

GREENHOUSE GAS EMISSION REDUCTIONS

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

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<tr>
<td>Total CH$_4$ vented (ave. m$^3$/min)</td>
<td>54</td>
<td>56</td>
<td>61</td>
<td>71</td>
<td>76</td>
<td>100</td>
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<td>Average CH$_4$ concentration</td>
<td>20%</td>
<td>21%</td>
<td>23%</td>
<td>24%</td>
<td>26%</td>
<td>27%</td>
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<td>Total CH$_4$ recovered and utilized (Mm$^3$/year)</td>
<td>1.71</td>
<td>0.74</td>
<td>3.37</td>
<td>3.43</td>
<td>5.11</td>
<td>5.21</td>
<td>6.25</td>
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TOTAL VOLUME OF METHANE EXPECTED TO BE RECOVERED/UTILIZED

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<td>Total CH$_4$ recovered and utilized (Mm$^3$/year)</td>
<td>13.00</td>
<td>25.00</td>
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COAL PRODUCTION AND METHANE EMISSION CHARTS
MARKET ANALYSIS / DEMAND ANALYSIS

Gas Market: It is expected that in 2015, total gas supply for Guizhou will be only 2.137 billion cubic meters, while gas demand of Guizhou is expected to increase to 6.538 billion cubic meters, resulting in a huge gap between supply and demand. Once CMM-based CNG is produced, it is expected to be sold to Guizhou Natural Gas Company, which could use CNG as a supplementary gas source locally, for town gas, industrial fuel, or even as fuel for vehicles in other cities of Guizhou.

TYPE(S) OF ASSISTANCE SOUGHT

- Financial Assistance: $6 million for equipment and construction costs.
- Technical Assistance: Underground/surface drainage practices to improve methane concentration and mature CMM purification technologies.

PROPOSED TECHNOLOGIES

FOR MORE INFORMATION, CONTACT:

Guizhou International Cooperation Centre for Environmental Protection / ZHENG Mingjie

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