OVERVIEW OF COAL MINE PROJECT OPPORTUNITY:

Minera del Norte, S.A. de C.V. (Minosa) is the largest coal producer in Mexico. The company’s mining area is situated in Coahuila state, mainly over the Sabinas basin, with a coal in-situ gas content of 10-14 cubic meters per tonne of coal. The project involves three underground coal mines operated by Minosa. The company’s coal production in 2008 was 3.5 million tonnes and 4.95 million tonnes in 2009. The coal mined is used entirely by Altos Hornos de Mexico for the production of steel.

Since methane gas is being vented to the atmosphere due to security issues, Minosa is determined to speed the implementation of its coal mine methane (CMM) project. The estimated reduction of greenhouse gas emissions is projected to be up to 4.18 million metric tons of CO₂ equivalent per year and 29.31 million metric tons of CO₂ equivalent for the life of the project. Based on Minosa’s 27MW/year consumption, an estimated CMM power generation of 7MW will be utilized directly on site. The project will involve the installation of necessary pipe-work, monitoring, safety, gas destruction, power generation and internal connection to ensure the combustion and/or destruction of a high proportion of ventilation air methane (VAM) and degassed methane.

ESTIMATED ANNUAL EMISSION REDUCTIONS: 4.18 MMTCO₂E

METHANE DETAILS

- The company’s mining area in the Sabinas basin has a coal in-situ gas range of 10-14 cubic meters.
- Typical methane gas emissions for the three mines in the project range from 30-35 cubic meters per ton of coal mined.
- Only 30% of the average gas released is captured from the underground mining operations.

TYPES OF ASSISTANCE SOUGHT

- Financial Assistance
- Technical Assistance
PROJECTED COAL PRODUCTION AND METHANE EMISSIONS

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</thead>
<tbody>
<tr>
<td>Coal (tonnes/yr)</td>
<td>3991.73</td>
<td>3641.32</td>
<td>4008.32</td>
<td>5654.28</td>
<td>4603.21</td>
<td>5444.34</td>
<td>5490.78</td>
<td>5581.65</td>
</tr>
</tbody>
</table>

**Methane (Mm³/yr)**

<table>
<thead>
<tr>
<th>Emitted from ventilation system(s)</th>
<th>136.62</th>
<th>111.30</th>
<th>111.30</th>
<th>111.30</th>
<th>111.30</th>
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</thead>
<tbody>
<tr>
<td>Liberated from drainage systems</td>
<td>8.22</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
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<tr>
<td>Vented to atmosphere (drainage)</td>
<td>8.22</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
<td>22.13</td>
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<tr>
<td>Total Methane Emissions</td>
<td>144.84</td>
<td>133.43</td>
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**PROPOSED OR PLANNED PROJECT**

- The project will involve installing the necessary pipeline-work, monitoring, safety, gas destruction, generation and internal connection to ensure the combustion and/or destruction of a high proportion of VAM.
- Possible technologies involved may include:
  - Pipe work and flame arrestors for gas extraction to flares
  - Condensate extraction systems
  - Monitoring equipment and procedures for proper collection of measurements and data storage
  - One or more enclosed flares
  - State-of-the-art methane fuelled gas-engines and electricity generating sets
  - Electricity infrastructure to provide power for onsite mine operation needs

**COAL MINE INFORMATION**

- Year of initial operation:
  - Mine 5: 1982
  - Mine 6: 2001
  - Mine 7: 2001
- Mine status: Active
- Mine Area: 30 km²
- Mining method: Longwall
- Proven reserves:
  - Mine 5: 12 million tonnes
  - Mine 6: 10 million tonnes
  - Mine 7: 50 million tonnes
- Number Mines: 3

**MARKET/DEMAND ANALYSIS**

Combined power generated from the three mines is projected to be around 7MW. Minosa currently has a contract with CFE for the supply of 27MW per year. Therefore, the electricity will be used directly on site, displacing the purchase of grid power. The delivery of VAM to the Mexican Oil Company (PEMEX) has become an option for the utilization of recovered methane.

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