MEGTEC VAM Processing

GMI-Coal Status Update Report

Sydney September 2012
Commissioned in 1st Quarter 2007.

By 1st Q 2012 WestVAMP had generated:

- > 165,000 MWh of electricity
- > 1 million carbon credits (CO$_{2e}$ as NGAC’s).
Investor is a joint venture owned by:

- SongZao Coal & Electricity Co Ltd
- AES Corp (US-based global power generation company)
- Shenzhen Dongjiang Environmental Renewable Energy Co Ltd
World’s largest VAM abatement plant in operation in the ChongQing Province of China since mid 2011.
6 Vocsidizer units mounted on two levels
Processing capacity is 375,000 Nm3/h of ventilation air
Includes hot water generation for local use
MEGTEC VAM in China 2011
Duerping mine, Shanxi Province, with Sindicatum

One Megtec 2-Can Regenerative Thermal Oxidizer ("RTO") units with a capacity of 2,100 Nm3/min
One 1,200 Nm3/min capacity CH4MIN Regenerative Catalytic Oxidizer ("RCO") built by Megtec.

- The first commercial deployment of the CH4MIN catalytic technology.
- The project is expected to generate 2 million CERs over its life.
- Completion planned for 2nd half 2012.
MEGTEC VAM demo installations
Summary by September 2012

• Demos

(Description of installations and locations shown on the map.)
MEGTEC Commercial VAM installations Summary by September 2012

- Demos
- Commercial

- **DUERPING**
  - 2 units 2012, RTO + CTO (catalytic)

- **AES-SONGZAO**
  - 6 units 2011

- **ZHENGZHOU**
  - 2008

- **British Coal Demo**
  - 1994

- **BHP Billiton**
  - 4 units 2007

- **BHP, Appin Colliery Demo**
  - 2001 - 2002

- **VAM Pilot Unit**
  - 2009
### MEGTEC VAM Status Achieved by 2012

<table>
<thead>
<tr>
<th>Type of Installations</th>
<th>Number of Plants</th>
<th>Number of RTO Units</th>
<th>Approx Total Processing Capacity in Nm³/h</th>
<th>Year of Installation (Locations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demo / Pilot</td>
<td>4</td>
<td>4</td>
<td>80,000</td>
<td>1994, 2001, 2007, 2009 (UK, Australia, USA)</td>
</tr>
<tr>
<td>Commercial:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Completed</td>
<td>3</td>
<td>11</td>
<td>700,000</td>
<td>2007, 2008, 2011 (Australia, China)</td>
</tr>
<tr>
<td>- Under Completion</td>
<td>1</td>
<td>2</td>
<td>200,000</td>
<td>2012 (China)</td>
</tr>
</tbody>
</table>

**Total of MEGTEC VAM Plant Operation Experience** ~14 years

**Total of MEGTEC VAM RTO Unit Operation Experience** > 30 years
MEGTEC VAM processing concept is modular, based on VOCSIDIZERs, stacked in arrangements of VAM Cubes, each Cube processing 250,000 Nm3/h.
### Electricity from VAM Power Plant

**For each 250 000 Nm3/h of ventilation air**

<table>
<thead>
<tr>
<th>Heat straight from bed. Water at 70 - 150°C</th>
<th>0.3%</th>
<th>0.6%</th>
<th>0.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$3 \text{ MW}_{th}$</td>
<td>$11 \text{ MW}_{th}$</td>
<td>$18 \text{ MW}_{th}$</td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{2} \text{ MW}_{el}$</td>
<td>$3 - 4 \text{ MW}_{el}$</td>
<td>$5 - 6 \text{ MW}_{el}$</td>
</tr>
</tbody>
</table>

For large size plants, conversion from thermal to electrical energy can be expected to be around 30%, and lower for smaller plants.

MEGTEC is also exploring other types of VAM energy recovery and utilization.
Pilot VAM VOCSIDIZER
- available in Australia for VAM processing demonstration

Thank you!
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