Business Models for CMM
Utilization after the Kyoto Protocol

Boni Jiang
Guizhou International Cooperation Center for Environmental Protection
Vancouver, March 2012
Success during Kyoto Protocol Period (2006-2012)

CMM/VAM Projects in China (2007-2012)

Source: UNFCCC and NDRC
What Contributed to the Success

• Technology development
  – Low concentration CMM power generation
  – VAM destruction or utilization

• Policy and regulation changes
  – Government pressure on emission reduction
  – Other incentives: subsidies, tax credit etc.

• Carbon credit incentive
Business without Carbon Credit

• What has been observed?
  – 127 NDRC approved CMM/VAM utilization projects, only 29 got CERs issuance.
  – Unknown number of projects did not even go through NDRC and CDM.
  – CMM gas engine companies continue to sell more units.
  – Several CMM to natural gas projects are under development without considering CDM.

• What does it mean?
  – Most CMM utilization projects can survive without carbon credit.
Business Model Matters

Key Partnerships
- Who are key partners?
  - What they do?

Key Activities
- What are the important activities?

Value Proposition
- What value do we deliver to the customer?
  - Solve customer’s problem, or meet the needs?

Customer Relationships
- Customer expectation?

Channels
- How do we reach our customer?

Customer Segments
- For whom are we creating value?

Key Resources
- To create value and reach customers.

$ Cost Structure
- What are the important cost and expensive resources?

$ Revenue Streams
- For what value are the customers really willing to pay?

Ref: Osterwalder & Pigneur, 2010
## Previous Success Analysis: CMM to Power as an Example

<table>
<thead>
<tr>
<th>Key Partnerships</th>
<th>Key Activities</th>
<th>Value Proposition</th>
<th>Customer Relationships</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Power grid (permit for connection)</td>
<td>• Power generation</td>
<td>• Cheaper electricity</td>
<td>Supplier-buyer</td>
<td>• Coal mine internal user</td>
</tr>
<tr>
<td>• CDM consultant and CERs buyer</td>
<td>• CDM process</td>
<td>• Environmental commodity: CERs</td>
<td></td>
<td>• Power grid</td>
</tr>
<tr>
<td></td>
<td>Key Resources</td>
<td></td>
<td>Channels</td>
<td>• Carbon credit buyer</td>
</tr>
<tr>
<td></td>
<td>CMM</td>
<td></td>
<td>• Power grid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• CDM</td>
<td></td>
</tr>
</tbody>
</table>

### Key Resources
- CMM

### Channels
- Power grid
- CDM

### Customer Segments
- Coal mine internal user
- Power grid
- Carbon credit buyer

### $ Cost Structure
- Power plant investment and operational cost
- CMM is free

### $ Revenue Streams
- $0 from internal use, Mining cost is reduced though.
- Electricity sales to grid (rare)
- CERs sales
The Core of Success: CMM to Power Example

Key Partnerships
• Power grid (permit for connection)

Key Activities
• Power generation

Key Resources
• CMM

Value Proposition
• Cheaper electricity

Customer Relationships
Supplier-buyer

Channels
• Power grid

Customer Segments
• Coal mine internal user

$ Cost Structure
• Power plant investment and operational cost
• CMM is free

$ Revenue Streams
• A penny saved is a penny earned.
• Coal mine can save 60-70% of their electricity bill.

CMM to power for coal mine internal use is the cornerstone of success.
Coal mine does not create any value for the only customer: power grid.
BUSINESS MODELS POST KYOTO PROTOCOL
### Model 1: CMM-to-Gas Markets

<table>
<thead>
<tr>
<th>Key Partnerships</th>
<th>Key Activities</th>
<th>Value Proposition</th>
<th>Customer Relationships</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMM purification tech. provider</td>
<td>High quality CMM drainage • CMM purification</td>
<td>Cheaper natural gas for pipeline. • Transportable gas products: CNG/LNG</td>
<td>Supplier-buyer</td>
<td>Natural gas company or distributor</td>
</tr>
<tr>
<td>Key Resources</td>
<td></td>
<td></td>
<td>Channels</td>
<td></td>
</tr>
<tr>
<td>CMM</td>
<td>Drainage technologies</td>
<td></td>
<td>CNG-LNG</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pipeline network</td>
<td></td>
</tr>
<tr>
<td>$ Cost Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage and gas purification investment and operational cost • CMM</td>
<td></td>
<td></td>
<td>$ Revenue Streams</td>
<td>Gas sales • Government subsidies</td>
</tr>
</tbody>
</table>

- **Key Activities**
  - High quality CMM drainage
  - CMM purification

- **Value Proposition**
  - Cheaper natural gas for pipeline.
  - Transportable gas products: CNG/LNG

- **Customer Relationships**
  - Supplier-buyer

- **Customer Segments**
  - Natural gas company or distributor

- **Key Resources**
  - CMM
  - Drainage technologies

- **$ Cost Structure**
  - Drainage and gas purification investment and operational cost
  - CMM

- **$ Revenue Streams**
  - Gas sales
  - Government subsidies
Why CMM-to-Gas Model Will Work?

- Transportable and cheaper CMM-based natural gas creates value for its customers, thus creates value for coal mines.
- Gas markets are much more open than the power market.
- Infrastructure (pipeline network) is improving rapidly and the market keeps growing.
- CMM reaches its maximum value as natural gas: this model is financially self sustaining.
Zhongliangshan: A Great Example

- Coal production: 500,000 t/a
- CMM production: 50 million m$^3$/a
- CMM supplies more than 40,000 households and commercial users
- CMM sales becomes significant revenue source for coal mine

Zhongliangshan slogan: “Mining coal preserves our rice bowls, pumping gas makes us well-off”.
CMM-to-Gas Market Model: Barriers and Recommendations

• CMM quality and quantity need to be improved.

• Gas purification technology should focus on CMM above 30%.
Model 2: CMM-to-Power (Internal Use)

• CMM to power for internal use model will continue to succeed in China.
  – There is not any barrier for this model.
  – Low concentration CMM power generation has become mainstream in China.
  – This model does not encourage high quality CMM drainage practice and can only utilize limited amount of available CMM.
Model 3: CMM Power to Grid

- How to create value for power grid in order to get the access:
  - Cheaper electricity seems to be the only choice.
  - Coal mines need to be ready to share profit with the power grid.
  - Grid related companies are positioned to become CMM-to-power project developer.
Model 3: CMM Power to Grid

• What can government do:
  – Subsidy of 0.25 RMB/KWh goes straight to the CMM power plant owner instead of going through the grid.
  – Electricity sales price shall be negotiated between the power plant and the grid, leaving profit margin for the grid company.
Summary

• CMM-to-gas markets model shows great potential for post-Kyoto time.
• CMM to power for coal mine internal use will continue to be the core of CMM utilization in China.
• CMM based power to grid is possible, but changes need to happen.
Acknowledgement

• Organizations:
  – UK China Prosperity SPF grant (2012-2013)

• Individuals:
  – Mingjie Zheng, Anly Liu, Wenwen Gong
  – Ray Pilcher

Thank You!

Contact: boni@cenergy.cn