West Michigan Regional Liquid Livestock Manure Processing Center

Feasibility Study Presentation

April 19, 2005
Product Market Factor Analysis – Methane Gas

Introduction

1. Overview of existing private gas transportation infrastructure
2. Potential end users of digester methane gas
3. Methane gas value at the proposed site
4. Gas sales contract / agreement arrangements
5. Federal and Michigan tax credits
1. Overview of Existing Gas Transportation Infrastructure

- 6 mile long private gas pipeline from Adams Street & 56th Avenue to the east side of Zeeland

- Allows the Manure Processing Center to locate in a rural, low density area AND have access to end users of gas
1. Overview of Existing Gas Transportation Infrastructure
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- Who are the infrastructure participants?
  - Waste Management of Michigan, Inc.
    - Provides landfill gas from its Autumn Hills Recycling & Disposal Facility
  - North American Natural Resources, Inc.
    - Receives the landfill gas, then cleans, dries, and compresses it into the pipeline
1. Overview of Existing Gas Transportation Infrastructure

- Who are the infrastructure participants? (Continued)
  - Zeeland Farm Services, Inc. / Zeeland Farm Soya
    - Owns and operates the 6 mile pipeline to transfer the gas to its facilities
    - Currently uses the gas for steam production
    - Adding electricity generation in 2005
  - Local community – land owners & government
2. Potential end users of digester methane gas

<table>
<thead>
<tr>
<th>Company</th>
<th>Level of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herman Miller</td>
<td>Low</td>
</tr>
<tr>
<td>Mead Johnson</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Zeeland Board of Public Works</td>
<td>Low</td>
</tr>
<tr>
<td>Zeeland Community Hospital</td>
<td>Low</td>
</tr>
<tr>
<td>Zeeland Farm Services (ZFS)</td>
<td>High</td>
</tr>
</tbody>
</table>
3. Methane gas value at the proposed site

- Challenges for end users buying digester gas
  - Unfamiliar & less consistent source of energy
  - Supply less reliable than public utilities
  - Contains Hydrogen Sulfide – toxicity
  - Lower & varying BTU content per SCF
  - Capital required to convert / add equipment
3. Methane gas value at the proposed site

- Challenges for end users buying digester gas (Continued)
  - Long-term commitment required
  - Hosts with high electric load factors buy reasonably priced electric
  - Perception of using solid waste or manure sourced gas can be misconstrued
3. Methane gas value at the proposed site

- Two scenarios lead to a value of approximately $2.80 per MMBTU to the Manure Processing Center based on current competing energy markets
  - Scenario #1 – Generate green power at Zeeland Farm Service’s location to utilize established electric connection infrastructure
  - Scenario #2 – Sold to another end user for self-generation of steam or electricity
3. Methane gas value at the proposed site

Scenario #1 – Generate Green Power at ZFS

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Green Power Price / KWH</td>
<td>$0.0600</td>
</tr>
<tr>
<td>Federal income tax credit</td>
<td>0.0037</td>
</tr>
<tr>
<td>Less gas cleaning, drying, transport</td>
<td>(0.0080)</td>
</tr>
<tr>
<td>Less Generator maintenance</td>
<td>(0.0117)</td>
</tr>
<tr>
<td>Less operations &amp; administration</td>
<td>(0.0035)</td>
</tr>
<tr>
<td>Less capital cost</td>
<td>(0.0135)</td>
</tr>
<tr>
<td>Margin per KWH</td>
<td>$0.0270</td>
</tr>
</tbody>
</table>
3. Methane gas value at the proposed site

Scenario #1 – Generate Green Power at ZFS (Cont.)

- $0.027 per KWH = $2.81 per MMBTU at 9,600 BTU heat rate per KWH
- Equal to approximately $380,000 per year in revenue for a 50,000 gallon per day digester
- Figures are based on running one CAT 3520C 1,600 KW/Hour reciprocating engine
3. Methane gas value at the proposed site

Caterpillar 3520C 1,600 KW/H Low-BTU Gas Genset
3. Methane gas value at the proposed site

Scenario #2 - Another end user produces its own steam and / or electricity

Price paid by end user per MMBTU $3.80

* Less gas cleaning, drying, transport (1.00)

Net price to Manure Center per MMBTU $2.80

* Note that Cleaning, drying, & transport is higher due to assuming a pipeline extension is necessary
4. Gas sales contract / agreement arrangements

- Agreement terms may vary widely due to their private nature
- Determined on a case-by-case basis by the parties involved
- Time periods usually 15 to 30 years long due to capital commitments
- Priced on MMBTUs (energy) not SCF (air quantity)
4. Gas sales contract / agreement arrangements

- Pricing methods
  - Fixed for entire term
  - Or derived from other energy markets
    - Natural gas, electricity, etc.
- Delivery and measurement methods well defined
- Seller commits to gas quality characteristics
4. Gas sales contract / agreement arrangements

- Strength and dependability of the agreement is determined by the strength of the parties that sign.
- Use of bank financing can complicate terms required in the agreement.
5. Federal and Michigan tax credits

- Jobs Creation Act of 2004
  - Currently offers a federal income tax credit of $0.0095 per KW produced from digester gas
  - Rate adjusts annually for inflation
  - The credit is received for 5 consecutive years
  - Current legislation requires equipment in-service by 12/31/05
  - Congress may extend the in-service date
5. Federal and Michigan tax credits

- Michigan Economic Development Corporation’s NextEnergy Authority
  - Promotes research, development, and commercialization of alternative energy through state tax credits and exemptions
  - 100% personal property tax exemption through 2012
  - Relief from Single Business Tax
5. Federal and Michigan tax credits

- Farm Bill Section 9006 – Renewable Energy Systems and Energy Efficiency Improvements Program
  - $11,400,000 for grants
  - Plus $11,400,000 for guaranteed loans
  - Up to $500,000 per project for renewable energy systems
  - May pay up to 25% of total project costs
5. Federal and Michigan tax credits

- Farm Bill Section 9006 (Continued)
  - 277 grants last year in 26 states
  - Past recipients include anaerobic digesters, wind generation, and waste heat recovery
  - Applicants must have less than 500 employees and less than $20,000,000 in annual sales
  - Annual application deadline of June 28
Works Cited


