BioEnergy Farm II

Project meeting: Expert training 1, Schwäbisch Hall

Micro-scale digestion in the Netherlands
by Jan Willem Bij nag te

This project is supported by Intelligent Energy - Europe
Why MSD

- Two types of animal farming
  - Soil-bound
  - Non soil-bound
- Two ways of looking at manure
  - Source of minerals
  - Waste
- Two ways of interest in digestion
  - Optimizing manure use
  - Manure treatment
Why MSD

For Soil-bound farmers:

Why digestion?

• Earning extra money from manure
• Reducing GHG emissions
• Reducing Nitrogen emissions

Why not co-digestion?

• Self sufficiency for energy
• Keep track on mineral cycle
• No risk of incursion of diseases
• No risk of polluted digestate (heavy metals)
Why MSD

For Non Soil-bound farmers:
Why digestion?
• Earning extra money from manure
• Reducing GHG emissions
• Reducing Nitrogen emissions

Why not co-digestion?
• Self sufficiency for energy
• Manure treatment (mandatory since 2014)
Benefits of MSD

General benefits

- Using the energy potential of manure
- Avoiding public resistance against co-digestion
- No food/feed competition
- Decentralised energy production

Schwäbisch Hall, 1 July 2014

Jan Willem Bijnagte, CCS
Benefits of MSD

For Soil-bound farmers:

• Higher efficiency of mineral use
• Less need of chemical fertilizer
• Retrieving remaining energy from manure
• Energy production
• Reduction of Nitrogen emission (in some cases)
**Benefits of MSD**

For Non Soil-bound farmers:

- Avoided costs of manure offset
- Revenues from fertilizer
- Energy production
- Reduction of Nitrogen emission (in some cases)
MS Digester on the market

- Relative new market
- Very low tech bag-digesters
  - Self made, low budget
- High tech digesters (MicroFerm, Bebra)
  - High end, pre-fab, plug-and-play, expensive (durable)
- In between digesters
  - Mid price, custom made
BioEnergy Farm II
Manure, the sustainable fuel for the farm

Schwäbisch Hall, 1 July 2014
MSD in the Netherlands
Jan Willem Bijnagte, CCS
Best case scenario

For a soil-bound farm

- Mid-price digester
- Daily fresh manure
- Own energy production
- Own fertilizer production
  - N-stripper | Struvite reactor
- Closed mineral cycle
- Lowered N-emission | Lowered Methane emission
- Delivery of heat/electricity or green gas, depending on location/surrounding
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Manure, the sustainable fuel for the farm

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Jan Willem Bijnagte, CCS, CCS
Best case scenario

Figure 2: Overview of the manure flow at biorefinery on De Marke

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Best case scenario

Solved issues:

• Energy supply
• Mandatory manure treatment
• Application limits for N and $P_2O_5$
  – Adjustable digestate for specific needs
• Ammoniac ceiling
MSD Economics

SDE+ exploitation subsidy

- Special category for >95% manure digestion
- Up to €0.10/kWh
- Up to €0.78/Nm³ Green gas

Other instruments like bio tickets not relevant for MSD
### MSD Economics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>250</td>
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<tr>
<td>Biogas</td>
<td>150,000 m³. 55% CH4</td>
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<tr>
<td>Investment</td>
<td>€200,000</td>
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<tr>
<td>Oper. Costs</td>
<td>€15,000</td>
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<tr>
<td>Production</td>
<td>290,000 kWhe</td>
</tr>
<tr>
<td>Elektr. Price</td>
<td>€0,08 → €23,200</td>
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<tr>
<td>Subsidy</td>
<td>€0,10 → €29,000</td>
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<tr>
<td>Revenues</td>
<td>€52,200</td>
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<tr>
<td>Pay back time</td>
<td>€200,000/(52,200-15,000)=5,5 yr</td>
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</table>
MSD Economics

- Revenues €52,200
- Heat for free for digestate treatment
- Maximum use of own minerals
- Off-set of phosphate surplus