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> **BioEnergy Farm II** <  
Manure, the sustainable fuel for the farm

# BioEnergy Farm II

Project meeting: Expert training 1,  
Schwäbisch Hall

***Micro-scale digestion in the Netherlands***  
*by Jan Willem Bijnagte*

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



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## 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)



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## 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)



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## Benefits of MSD

### General benefits

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



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## 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)



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## 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 Digesters 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





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Schwäbisch Hall, 1 July 2014

MSD in the Netherlands

Jan Willem Bijmolt, CCS



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## 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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## Best case scenario

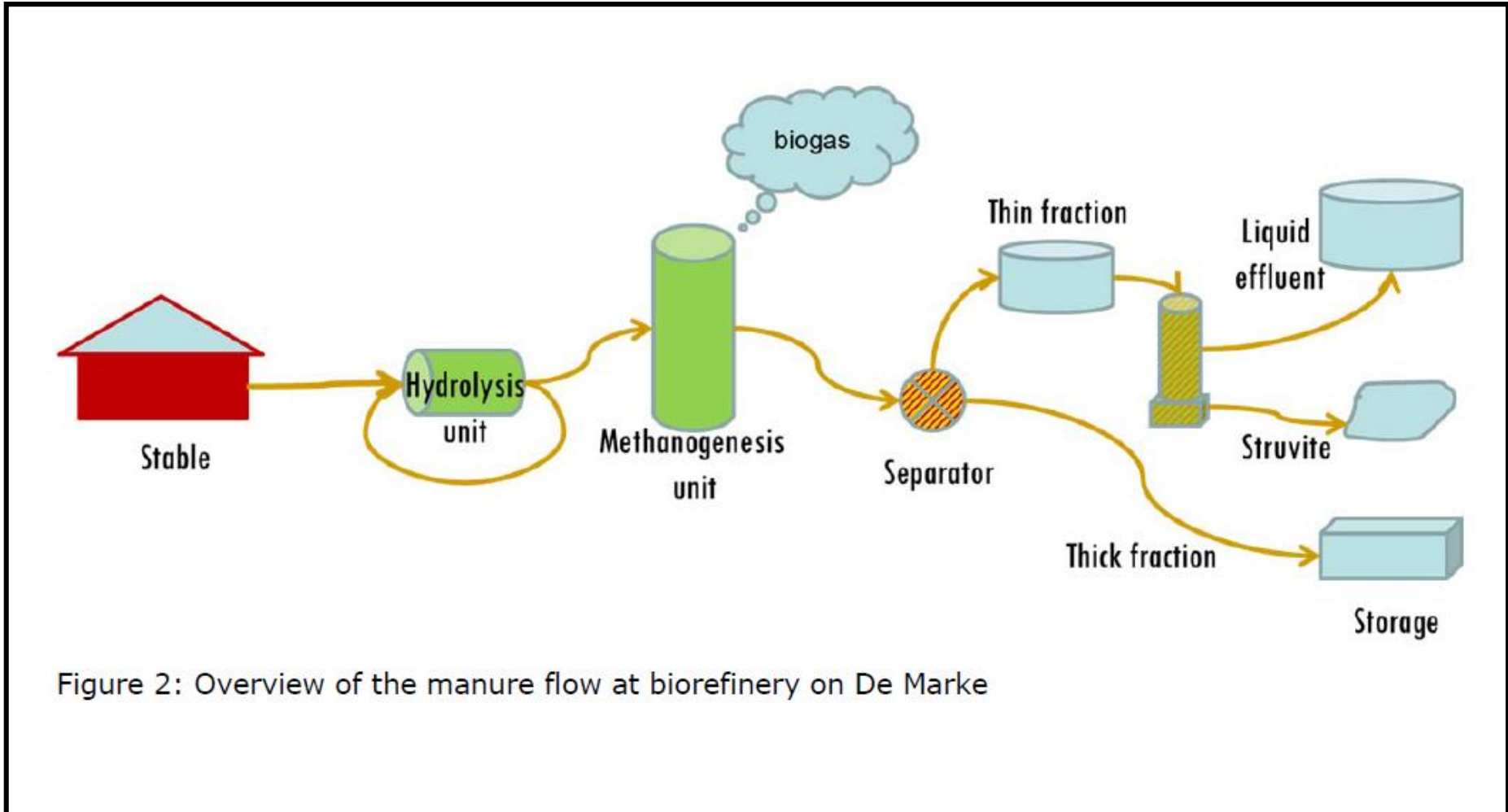


Figure 2: Overview of the manure flow at biorefinery on De Marke



## 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





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## MSD Economics

### SDE+ exploitation subsidy

- Special category for >95% manure digestion
- Up to €0,10/kWh
- Up to €0,78/Nm<sup>3</sup> Green gas

Other instruments like bio tickets not relevant for  
MSD



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## MSD Economics

Cows	250		
Biogas	150,000 m <sup>3</sup> . 55% CH <sub>4</sub>		
Investment	€200,000		
Oper. Costs	€15,000		
Production	290,000 kWhe		
Elektr. Price	€0,08	→	€23,200
Subsidy	€0,10	→	<u>€29,000</u>
Revenues			€52,200
Pay back time	$€200,000 / (52,200 - 15,000) = 5,5 \text{ yr}$		



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## MSD Economics

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