Manure based biogas in BSR – brief overview

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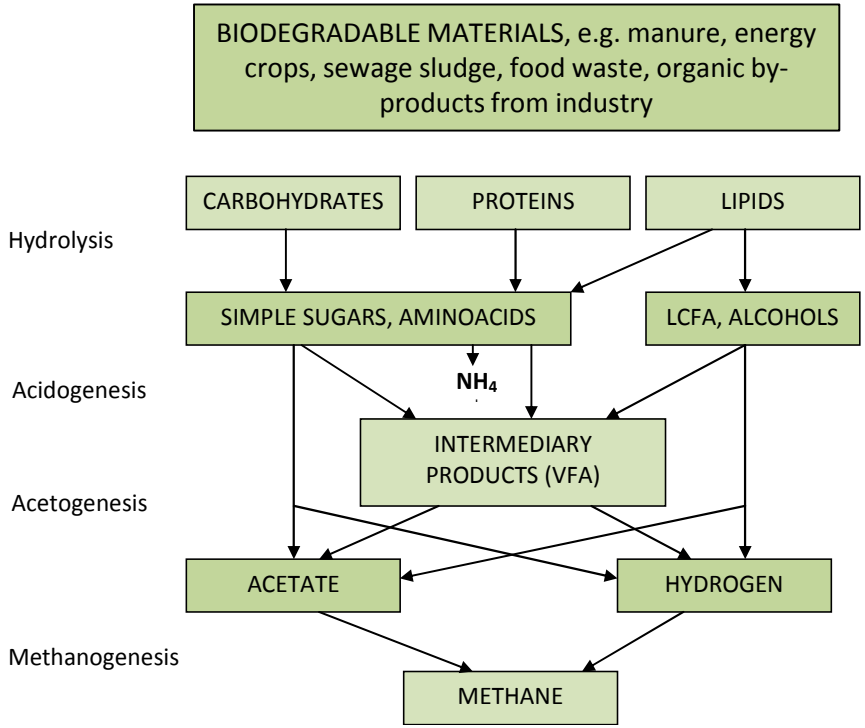
Biogas technology – the basics

- A microbiological, anaerobic process, which
  - Converts organic material into methane-rich biogas
  - Recycles valuable nutrients
    - Retains phosphorus and trace elements
    - Increases the amount of readily-plant-available nitrogen
  - Decreases foul odours
  - Improves hygiene
  - Decreases emissions into atmosphere, soil and water



Manure into energy and fertiliser products via biogas process

- Manure is a good base material for a biogas process
  - Steadily available, high nutrient content
  - Methane production potential differs for different manure types (see Table below)
  - Energy yield can be increased with suitable co-substrates, if desired

Photos: S. Luostarinen

Manure / Methane potential	Cow, liquid	Cow, solid	Pig, liquid	Pig, solid	Poultry, solid
m^3/tVS added	120-300	126-250	180-490	162-270	150-300
m^3/tFM added	10-20	24-55	12-24	33-39	42-156

Baltic MANURE WP6: Manure energy potential

- Evaluation of energy potentials of selected manure types
- Main focus on biogas technology
  - Also, incineration and thermal gasification
- Goals:
  - Calculation of BSR manure energy potential
  - Best practices for energy recovery from manure
  - Tools for implementing manure energy recovery

Manure based biogas in Germany

- 5905 agricultural biogas plants (2011)
  - Energy crops widely used
  - Manure often more of a co-substrate
    - 12.6% of cow slurry ,9.3% of pig slurry and 47% of poultry manure currently directed to biogas plants
  - Installed electric power 2291 MW (3% of German energy consumption)
  - 54 plants upgrading the biogas for injection to natural gas network
- Amendment to the Renewable Energy Sources Act (EEG 2012) driving towards increasing use of manure
  - E.g. a new category for small plants with >80% of manure as feed (bonus 25 cnt / kWh)

Data compiled by Bernd Linke (ATB) for IEA Bioenergy Task 37

Manure based biogas in Denmark

- 22 co-operative agricultural biogas plants and 60-70 farm-scale plants
  - Several new biogas plants under construction, even more under planning stages
- Most of Danish biogas from manure (~70%)
- Guaranteed price for biogas electricity (0.772 DKK/kWh)
- National strategy includes increased biogas production
  - Aim: 50-60% of manure directed to biogas plants (2010: 5-6%, increasing)

Manure based biogas in Sweden

- Biogas plants treating agricultural materials: 36 farm-scale biogas plants + ~5 co-digestion plants utilising manure
  - Number of plants and manure utilisation rapidly increasing
- Agricultural biogas production supported:
  - Investment grants
  - Suggestion for manure bonus (2010 Biogas Strategy), but no decisions
    - 2 €-cnt / kWh
    - Given due to avoidance of GHG emissions

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Manure based biogas in Finland

- ~10 farm-scale biogas plants utilising mostly manure, also some other waste materials or energy crops (grass silage)
- A co-operative agricultural plant under start-up
  - Co-digesting cow slurry, poultry manure and vegetable waste (19500 t/a)
  - Electricity and heat utilised in a greenhouse next to the plant
  - A new operational mode for Finland
- Two large co-digestion plants utilising manure
- High interest for agricultural biogas production, but little incentives
  - Feed-in tariff excludes small biogas plants
  - Investment grants available

Manure based biogas in the Baltic countries

- Estonia
  - One biogas plant using pig manure (38 000 t/a, CHP)
  - Four new agricultural biogas plants under planning with state support
- Latvia
  - Eight agricultural biogas plants, several under planning / construction
  - Increasing interest in directing manure to biogas plants and in co-digestion of manure with by-products from food industry and energy crops
  - Support and development programmes from the state
    - Feed-in tariff, investment grants, support for energy crop production
- Lithuania
  - The only biogas plant using pig manure closed down in summer 2011

Manure based biogas in Poland

- At least seven agricultural biogas plants
  - Co-digestion of manure and maize silage (also some waste materials)
- Interest in especially agricultural biogas rapidly growing
- Support for agricultural biogas production available
  - Green certificates
  - Purchase obligation for renewable electricity and heat
  - Implementation programme for agricultural biogas

In conclusion…

- Interest in agricultural biogas, including manure, is rapidly growing in all BSR countries
- Support mechanisms are being developed
- Targets for manure biogas use being set or under consideration

- Much of the energy potential in manure is currently not used, and the capacity available is significant

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Thank you for your attention!

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