ENERGY CROPS & BIOGAS

Topic 4: Potential of Integrated Biogas systems

Short Summary of Presentations

Prof. Dr. Johan Sanders, WUR, The Netherlands
" Possibilities of integrating bio-energy (biogas) generation into other biomass based production systems"

- As estimated there will be enough biomass for substituting 15 % of total energy demand in the Netherlands (in 2050).
- The total energy potential of the biomass energy is 645 EJ/y.
- Energy produced will comprise heat, electricity, and transport fuel.
- Further on, many (functionalised) chemicals can be produced of the biomass as well.
- As regards the farmers income potential the following estimate was presented:

	Income (€/hectare)
Biomass used for the production of heat and electricity	640
Biomass used for the production of transport fuel	1 360
Biomass used for the production of bulk chemicals	6 400

- Bio-refinery increases the value of individual biomass. For instance, by refining of grass protein, fibre and grass juice are produced.
- Economical bio-refinery presumes pre-processing in small scale (near farms) and optimised energy production/ energy saving.

Prof. Dr. Paul Struik, WUR, The Netherlands
" Bio-cascading – Towards efficient biomass chains"

- The crops cultivated for aiming efficient biomass chain should have:
  - High potential yield
  - Adequate yield security and stability
  - High and stable quality (high energy content, low content of contaminants)
- Efficient biomass chains - farmers' perspective
  - Fit to existing production system
  - Contribution to biodiversity
  - Potential acreage
  - Farmer friendly transport
  - Low production costs
- Efficient biomass chains – production perspective
  - Adequate area for the production of biomass
  - Economic feasibility
    - Technical infrastructure
    - Logistic infrastructure
    - Market acceptability
    - Adequate knowledge
- Alternative strategies
  1. Bulk production of one crop for one purpose
  2. Bulk production of most effective crops in large area (e.g. sugar beet)
  3. Bio-cascading of multi-use crops
     a. Utilization of whole crop
     b. Processing flexibility
     c. Economic flexibility
     d. Material from different origin
     e. No special breeding and production of crops for one purpose only
  4. High value special crops

- Crop examples
  - Modified sugar beet
  - Grass
  - Hemp
- Problems
  - Complicate technology
  - Flexible systems
  - Markets

Jens Bo Holm-Nielsen, Aalborg University, Denmark
" Predicted energy crop potentials for biogas – worldwide-, regions EU 25"

- In general land is abundantly available for biomass production
- Climate change may restrict the production in some regions and improve production possibilities in the other regions
- A long term vision: **Biomass will be the major energy source in next century.**

Scientific panel topic 4

Q1: What are the reasons leading to the adoption of bio-refinery ?
A1: Rise of oil price. Chemical industry is interested. Big countries like China, India, and Brazil are interested. Many chemicals can be produced by means of bio-refinery. Biomass may become competitive within a short time. Flexibility of crops produced is important (sugar beet, potato).

Q2: One-crop/bio-cascading strategy may be a threat to biodiversity, isn't it?
A2: OK, but there are also other options to maintain biodiversity.

Q3: Can the purity of bio-refinery products be secured?
A3: Good separation on molecule level. Heat exchange ??

Q4: Where lies the AD added value – fibres/chemicals/biogas?
V4: Production of biogas is the "key technology".

Q5: What the fibres are good for?
A5: High nutrient utilization efficiency (NUE) is made possible by fibres. Nutrient cycle is to be maintained as optimum