IEA Bioenergy

Task 42 Biorefining

Country Report
Denmark

May 2017

Maabjerg Energy Concept, biogas plant, Måbjerg, Denmark

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Country Report Denmark

UNIVERSITY OF COPENHAGEN

Biofuel policy issues

Recap of news since autumn 2016:

- A national blending mandate of 0.9% advanced biofuels by 2020 was adopted ⇒ 70 mio litre of advanced ethanol needed by 2020 in Denmark
- Danish Oil Industry Association has agreed on a volunteer blending of 2.5% advanced ethanol from 2019 (but it requires it is available!)
- EU Commission's proposal for new renewable energy directive for 2030 mandates 3.6% advance biofuels ⇒ 280 mio litre of advanced ethanol needed by 2030 in Denmark

Regulatory environment to support development of advance biorefineries and production of advance biofuels is getting in place

- A new funding scheme for government guaranteed energy infrastructure loans to cover 2G biofuels was not passed in Danish Parliament ⇒ The large scale 2G project Maabjerg Bioenergy Concept (MEC) was abandoned (more later!)
- Copenhagen Municipality decided not to support a full scale REnescience plant in Copenhagen

Biorefinery demonstration and pilot plants overview

steeper ENERGY

Estibio

BIOFUEL technology a/s

Aarhus University thermal platform

MAABJERG ENERGY CONCEPT

REneScience
Value from waste

Inbicon

Biorefinery demonstration and pilot plants overview

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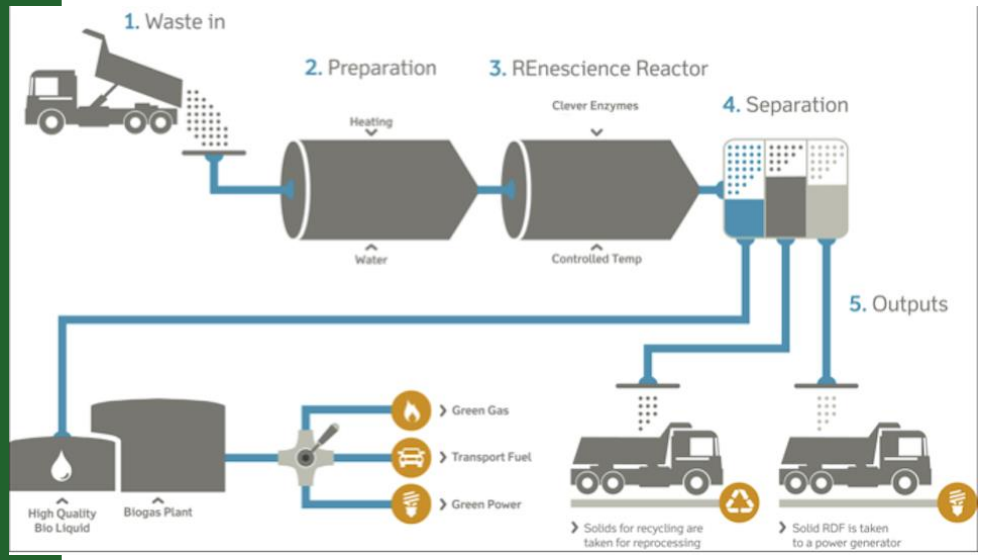
Renescience going full scale in UK

Renescience (part of DONG Energy A/S) is constructing full scale plant in Northwich (close to Manchester).



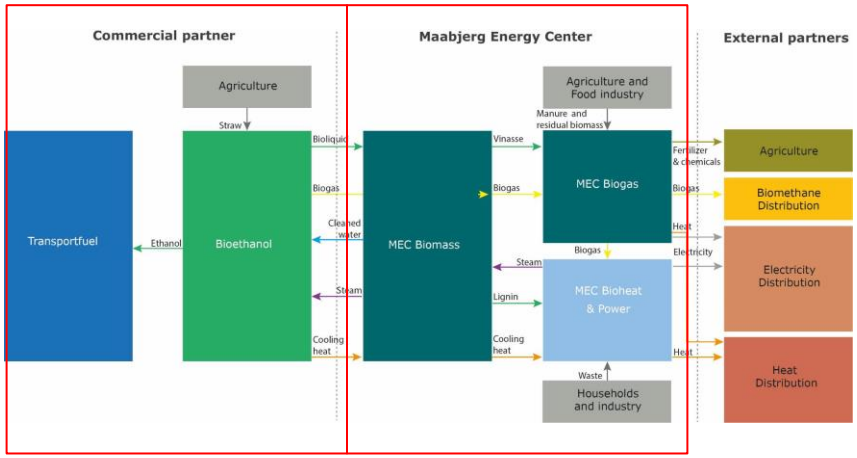
http://www.dongenergy.co.uk/uk-business-activities/renescience-northwich-bioresource-project

Construction progressing according to planned and is expected to be operational early 2017 and inauguration autumn 2017.
Capacity up to 144,000 tonnes of waste per year, and the biogas produced from the organic fraction will generate 5 MW electricity

A pilot plant has been running in Copenhagen since 2009, but Copenhagen Municipality has withdrawn from large scale project.

MEC project for sale!

- MEC project – expand current power plant and biogas plant with advance ethanol plant
- In planning and preparation since 2011
- Project stopped in 2016 due to legislation not allowing for public loan guarantees
- Now looking for commercial partner(s) to built and operate the ethanol plant – 150 mio € investment
  - Fully developed project with feasibility study.
  - Local partners owns the land required for the project.
  - Adopted municipal plan for implementation and approved environment plan (VVM) of the facilities.
  - CHP and Biogas plant with strong synergies to ethanol production are already in place.
  - Commitment from local partners to participate in partnership and to invest up to € 120 mio. To expand existing facilities to meet requirement from the ethanol production plant.
  - 30 years experience in DK with sourcing straw for the energy sector and accessibility to 2.1 million tonnes in DK.



Production of 77 mio litre of ethanol per year

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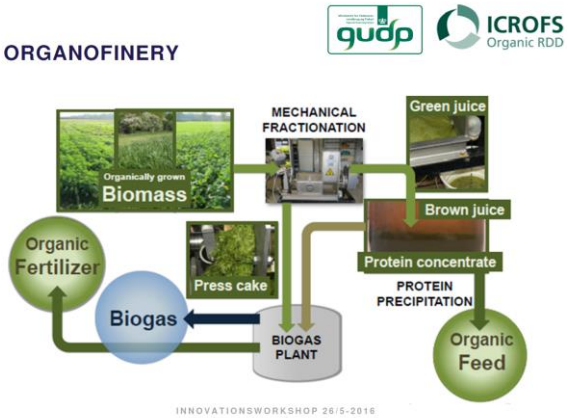
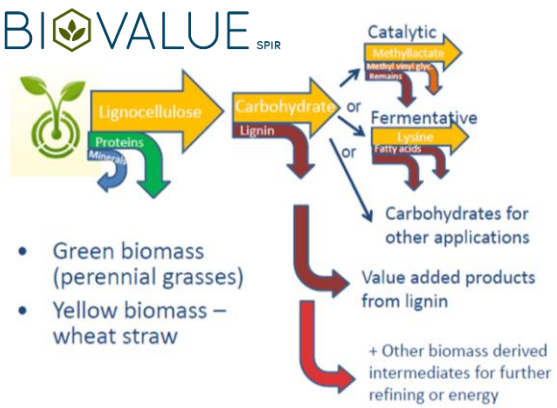
Green biomass for protein

- Large interest in protein from green biomass
- Currently two large projects
  - Organofinery
  - BioValue-SPIR
- Organofinery
  - Coordinator Mette Lübeck, Aalborg University
  - Project periode 01-02-2014 to 31-12-2017
  - Production of organic protein for feed
- BioValue-SPIR
  - Coordinator Jan K. Schjoerring, University of Copenhagen
  - Project periode 1-7-2013 to 31-6-2018
  - Production of protein from green biomass for broilers and pigs, pulp for cattle feed
  - Pilot scale facility at Aarhus University (600-1000 kg/h)
- Joint large-scale pilot experiment 2016
  - To produce material for animal feeding trails
  - 400 tons fresh clover grass processed to 177 tons pulp and 7 tons protein paste (part of it dried to 1 tons protein concentrate)





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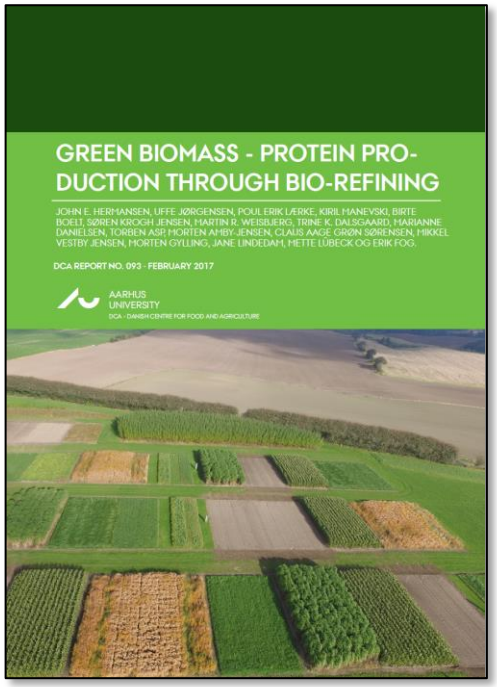
Green biomass report

http://web.agrsci.dk/djfpublikation/djfpdf/DCArapport093.pdf

The report summarizes the current knowledge on the bio-technical as well as economic issues in relation to value creation of green biomass in Denmark.

- Green biomass shows huge potential to deliver high yields of biomass as well as protein
- Use of perennial crops (grass and clover) has positive environmental effects, e.g. reduced N-leaching
- With present technology, 45% of protein in green biomass can be recovered in a protein concentrate (feed supplement for monogastrics) and pulp can be used for cattle feed
- Potential to cover 25% of Danish need for feed protein. For the organic sector, potential to cover three times the Danish need.
- Still major uncertainties in the economic assessment. Production of organic protein likely best business case



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