

Country Report Denmark

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Maabjerg Energy Concept, biogas plant, Måbjerg, Denmark

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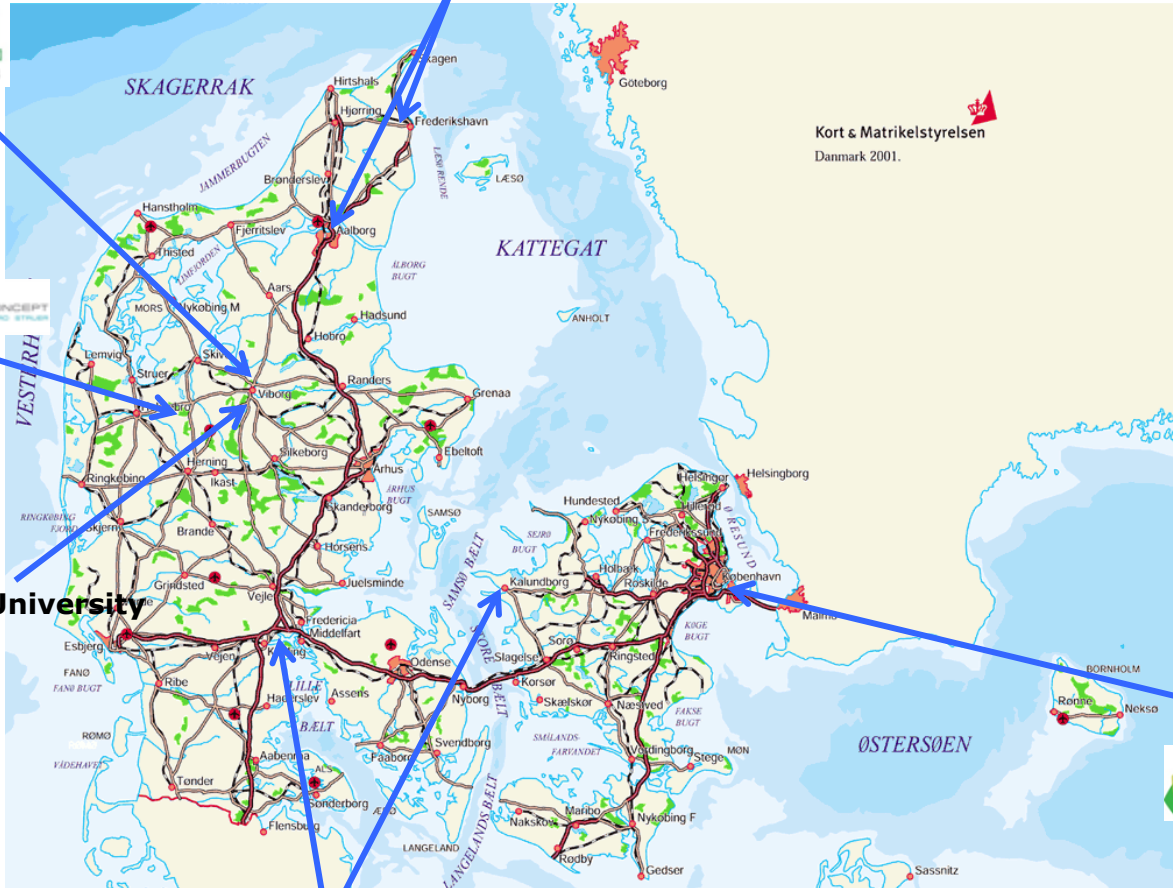
Energy plan 2012 (Accelerating green energy towards 2020):

- Long term target 100% renewable energy by 2050.
- Renewables to cover 35% of total energy consumption, 50% electricity from wind by 2020.
- All heat and power renewable by 2035
- Focus on wind and biomass –biomass to replace coal in CHP plants
- Increased use of manure for biogas; subsidy for biogas to natural gas grid and subsidy for biogas used for transport.
- No current support for traditional biofuels (e.g. 1st generation bioethanol) and 2nd generation bioethanol.



- Political goodwill towards 2G biofuels
- National 2.5% 2G blend mandate in the making
- Still in preparation: funding scheme for government guaranteed energy infrastructure loans to cover 2G biofuels
- A number of projects on protein and 1G bioethanol based on wheat are stalled by lack of political support & investments. E.g. www.hveiti.dk
- Large scale 2G project(s) are ready...

Biorefinery demonstration and pilot plants overview



Kort & Matrikelstyrelsen
Danmark 2001.

**Aarhus University
thermal
platform**



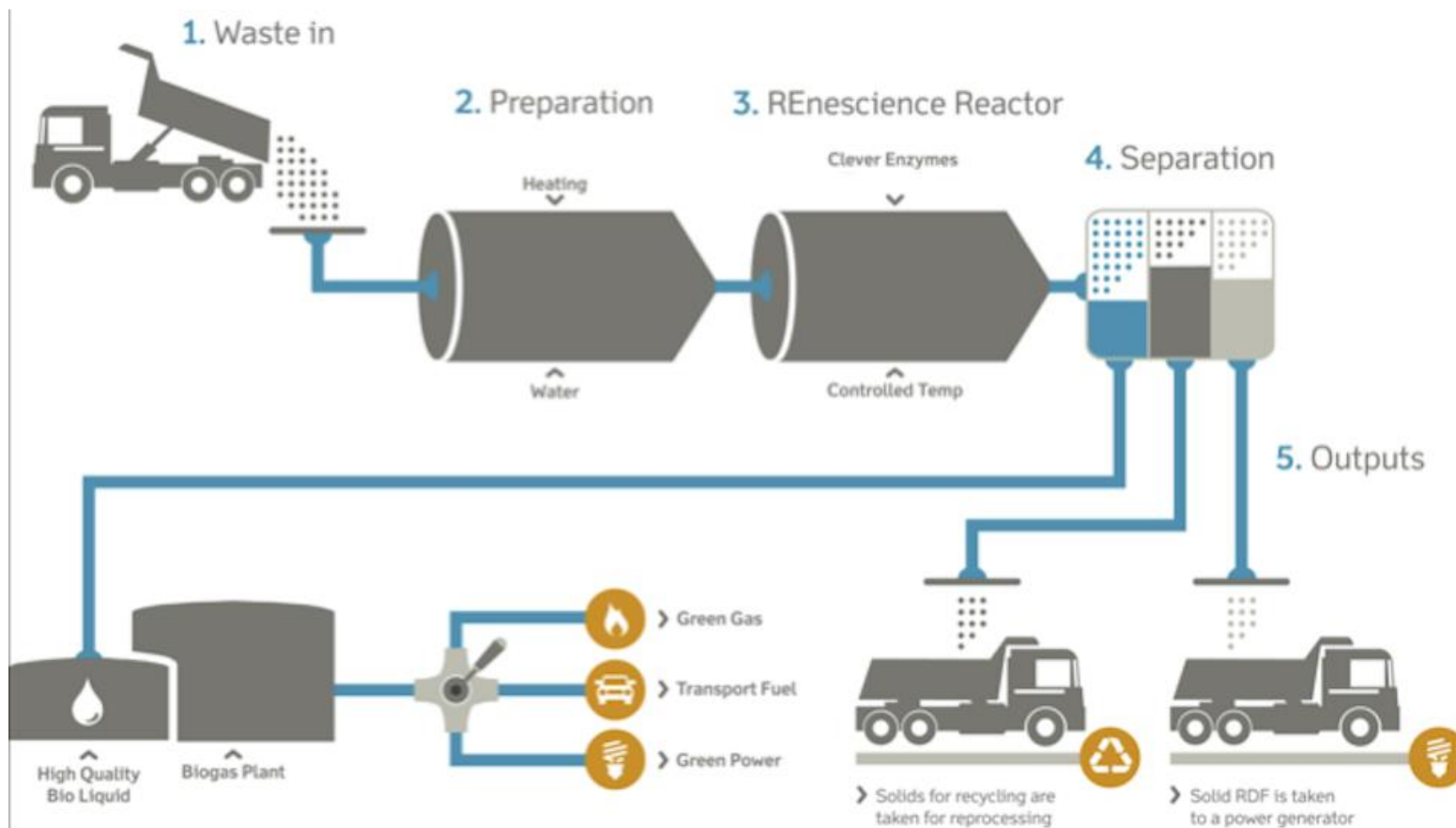
- Consortia of local power companies (50%), DONG and Novozymes (50%).
 - 80 mio l ethanol
 - 50 mio m³ CH₄
 - Heat and Power for 25000 households
- NER300 funding of 39 mio Euro in 2014.
- Waiting for possible national 2.5% 2G-bioethanol blending target - close to be decided by Danish Parliament

Maabjerg large-scale biorefinery



Renescience going full scale

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



- Catalytic upgrading of CO₂ to CH₄
- Running at Århus University combined with biogas plant
- World's largest high temperature SOEC
- High efficiency
- December 2015

Biogas to SNG



Name	Type	Description	National coordinator	Duration and total budget
MycoFuelChem	National	The core of the present project is development of fungal cell factories where biomass is degraded and compounds are produced in the same tank using low cost biomass (primarily garden/park refuse and household waste). The project will work with development of a consolidated fungal cell factory that directly converts biomass into either hydrocarbons or organic acids.	Aalborg University	4/2012 - 6/2016 30.57 mio. DKK
B21st	National	The vision is to expand our knowledge and development of biomass resources and technologies to go beyond their current use for heat, power and ethanol towards future areas of chemicals and maritime fuels.	University of Copenhagen	2011-2016 113 mio. DKK
MAB3	National	The MacroAlgaeBiorefinery – sustainable production of 3G bioenergy carriers and high value aquatic fish feed from macroalgae	Danish Technological Institute	3/2012 - 2/2016 23.67 mio. DKK

Task 42 Biorefining

Name	Type	Description	National coordinator	Duration and total budget
C3BO	National	Center for BioOil. The aim is to bring research and development in this field to the very front through setting new standards for hydrothermal liquefaction in the context of continuous processes.	Aalborg University	1/2014 - 12/2017 30.09 mio. DKK
Kalundborg Next	National	This project aims at developing a sustainable and competitive lignocellulose based microbial oil technology for production of renewable biofuels. The project will demonstrate the production of microbial oil from lignocellulosic sugars produced from straw and will provide the necessary techno-economic data for scale-up to commercial scale.	DONG Energy	2/2014 - 8/2017 124.47 mio. DKK
Bio-Value	National	Bio-Value targets the entire value chain from sustainable biomass production to separation and conversion of all components of biomass into value-added products.	University of Copenhagen	7/2013 – 6/2018 160 mio. DKK
Demonstration of 2G bioethanol in industrial scale	National	This projects aims at reducing the running cost by exploiting other local biomasses than wheat straw, by developing improved enzymes and yeast and designing optimal reactor design for enzymes requiring specific oxygen levels. Development of assays to predict enzyme activity and biomass conversion will be developed to improve process control.	DONG Energy	2016-2019 40.53 mio DKK

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