Welcome to all participants!

We are looking forward to two cooperative, integrated and fruitful days

IBBA
INTER BALTIC BIOGAS ARENA
4th Inter Baltic Biogas Arena and IBBA Workshop
Esbjerg, 25 - 26 August 2016

UN - COP 21 World-Wide agreement Paris 12.12.2015, has set the Scene for a big movement!!! Conversion of Energy Systems towards 100% RES, Energy Efficiency and Energy Savings all over the world but how!?!

By Jens Bo Holm-Nielsen Ph.D.
Head of Energy Section Esbjerg
Head of Center for Bioenergy and Green Engineering
Department of Energy, AAU
AAU- Esbjerg Campus

INSTITUT FOR ENERGITEKNIK
AALBORG UNIVERSITET

syddansk vækstforum

DEN EUROPÆISKE UNION
Den Europæiske Socialfond
Vi investerer i din fremtid

AALBORG UNIVERSITET
ESBJERG

A NETWORK UNIVERSITY

CAMPUSES IN AALBORG, ESBJERG AND COPENHAGEN

STUDENT POPULATION:
(ordinary students, without continuing education)

Aalborg: 15,849

Esbjerg: 607

Copenhagen: 3,685

WE STRONGLY BELIEVE IN..

THE AALBORG MODEL

- Problem and project based learning
- Interdisciplinarity
- Innovations & industrial relations
- Applied research and excellence

AALBORG UNIVERSITY
DENMARK

United Nations

Framework Convention on Climate Change

FCCC/CP/2015/L.9/Rev.1

Distr.: Limited
12 December 2015

Original: English

Conference of the Parties
Twenty-first session
Paris, 30 November to 11 December 2015

Agenda item 4(b)
Durban Platform for Enhanced Action (decision 1/CP.17)
Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties

ADOPTION OF THE PARIS AGREEMENT

Proposal by the President

Draft decision -/CP.21

The *Conference of the Parties*,

Recalling decision 1/CP.17 on the establishment of the Ad Hoc Working Group on the Durban Platform for Enhanced Action,

Also recalling Articles 2, 3 and 4 of the Convention,

Further recalling relevant decisions of the Conference of the Parties, including decisions 1/CP.16, 2/CP.18, 1/CP.19 and 1/CP.20,

Welcoming the adoption of United Nations General Assembly resolution A/RES/70/1, "Transforming our world: the 2030 Agenda for Sustainable Development", in particular its goal 13, and the adoption of the Addis Ababa Action Agenda of the third International Conference on Financing for Development and the adoption of the Sendai Framework for Disaster Risk Reduction,

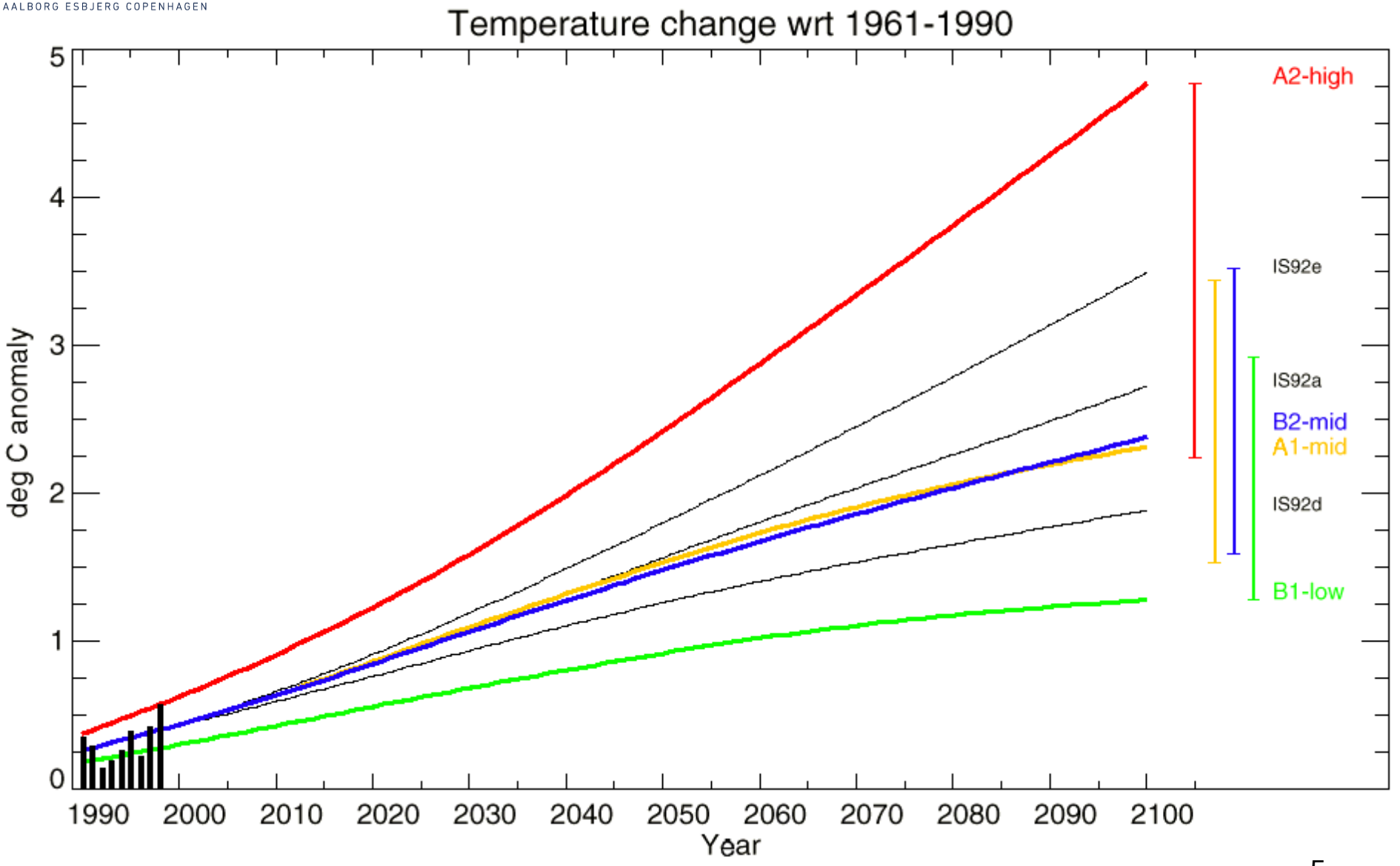
Recognizing that climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions,

Also recognizing that deep reductions in global emissions will be required in order to achieve the ultimate objective of the Convention and emphasizing the need for urgency in addressing climate change,

Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples,

GE.15-21932(E)

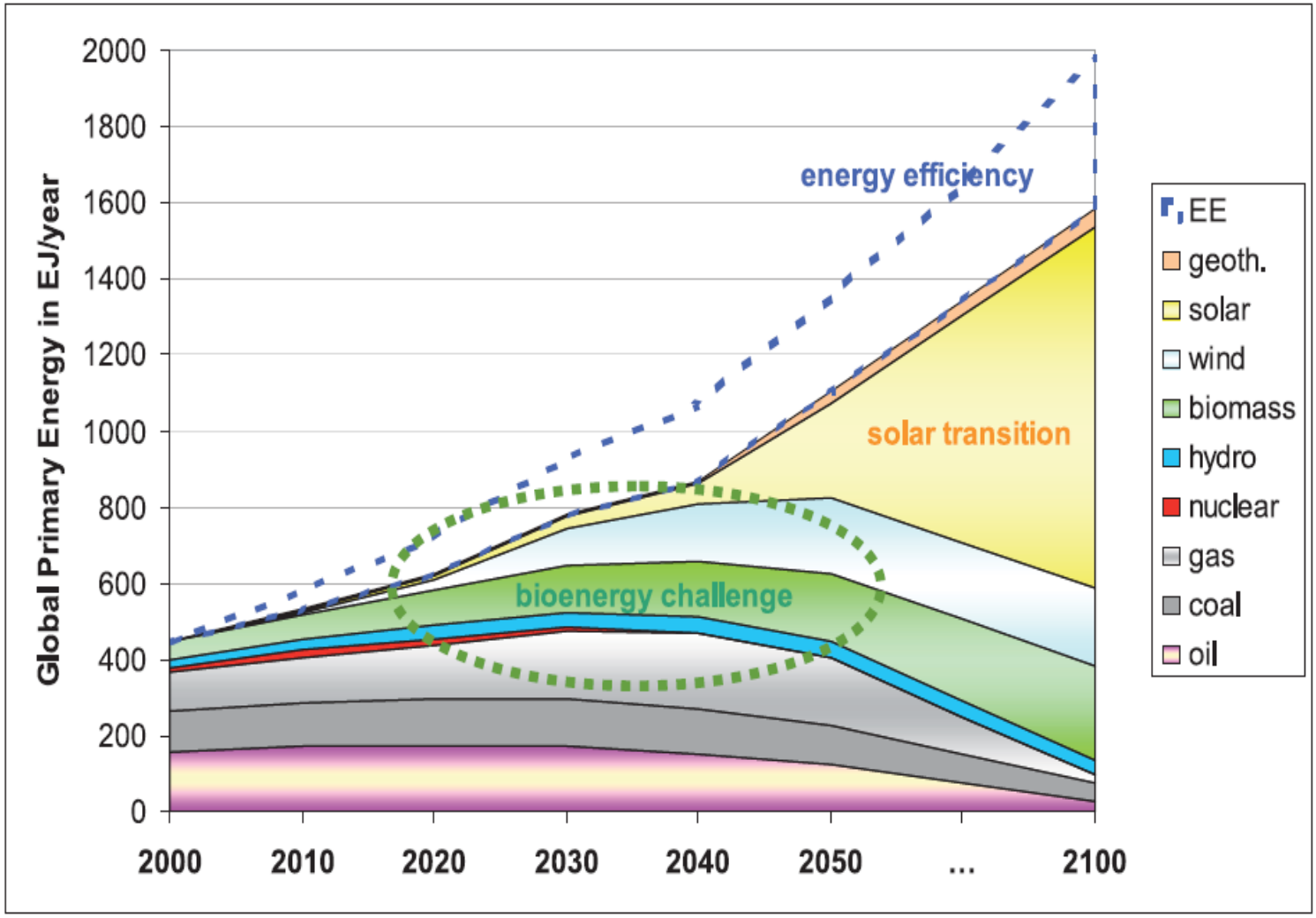
Scenarios for the global mean temperature



Source: IPCC

Sustainable Global Energy

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology



Source: IEA (2007), IPCC (2007), UNPD (2004) and WBGU (2003)

→ Bioenergy will be here to stay, and grow!

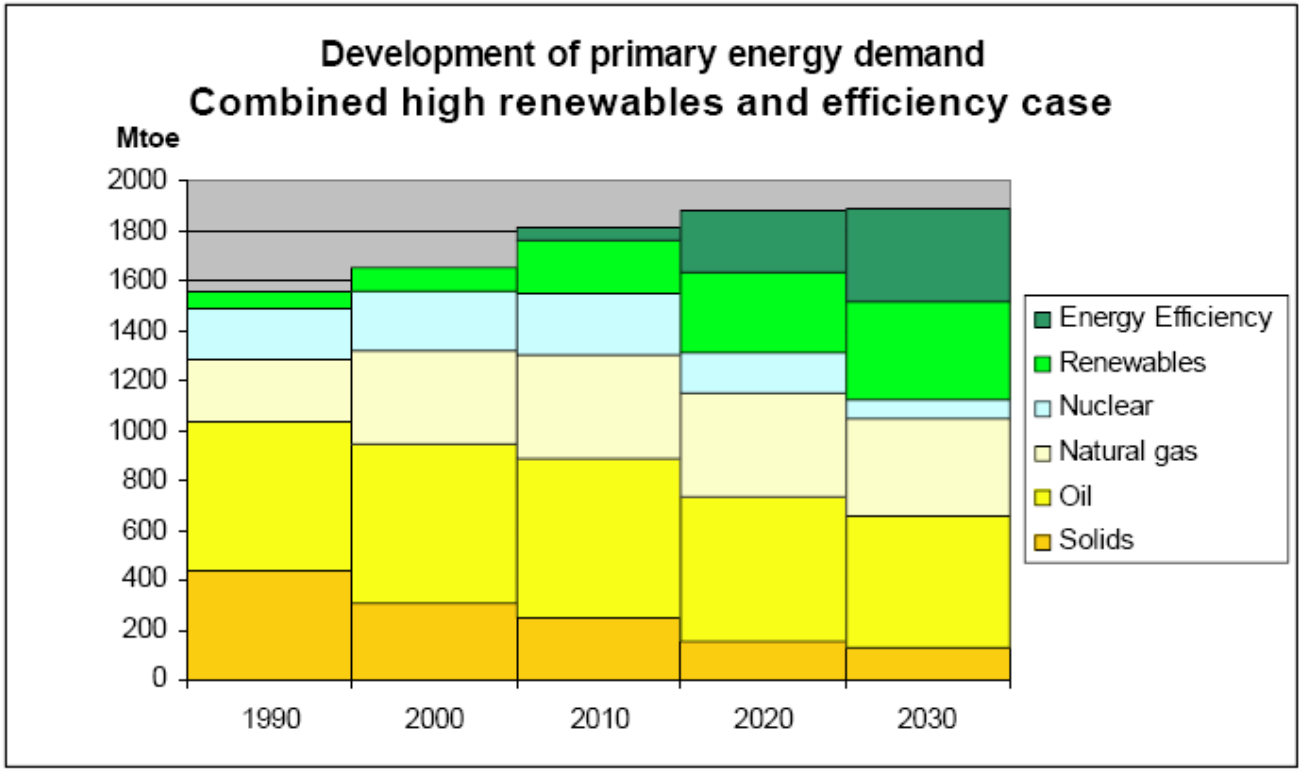


Figure 9: Impact of the strong renewable energy and energy efficiency penetration on the EU's primary energy demand (PRIMES modelling results)

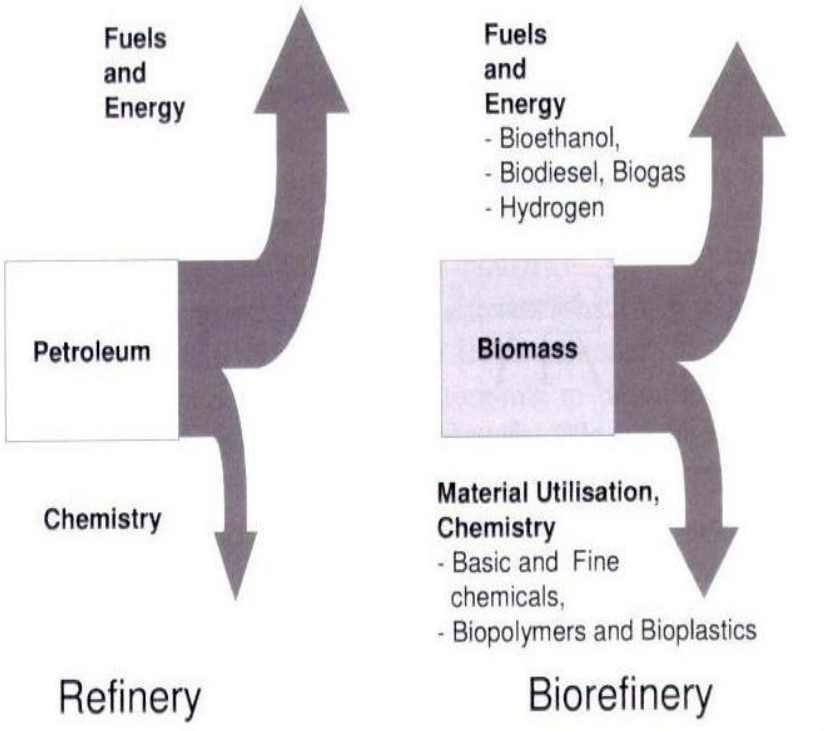
Source: European Commission

182 Mtoe can be achieved from biomass cultivated on 20% of arable land in EU-27.

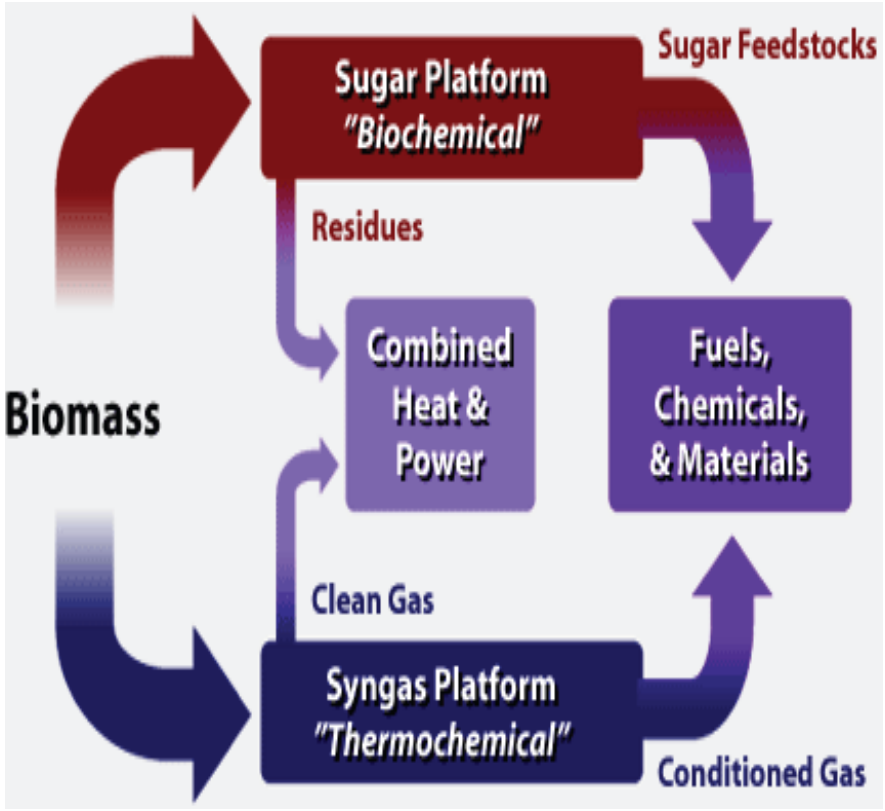
This corresponds to more than 10% of primary energy demand in 2020, equals 50-60% of the RES share.

Energy unit: PJ	**2007**	**2009**	**2010**	**2012**	**2014**	**2025**
Biomass + Waste	101	112	127	135	151	200
Windpower	30	30	35	39	47	90
Solarpower	~0			~5	~10	75-100?
-photovoltaic	~0			~1	~4	
-passive	~0			~4	~6	
Hydropower	~0			~0	~0	
-Wave	~0			~0	~0	
Geothermal	~0			0,5	0,5	
Fossil fuels	650	666	678	576	524	200
Total consumption	+/-825	809	846	756	720	600
VE pct.	15,2%	17,6%	19,4%	23,8%	27.9%	66%

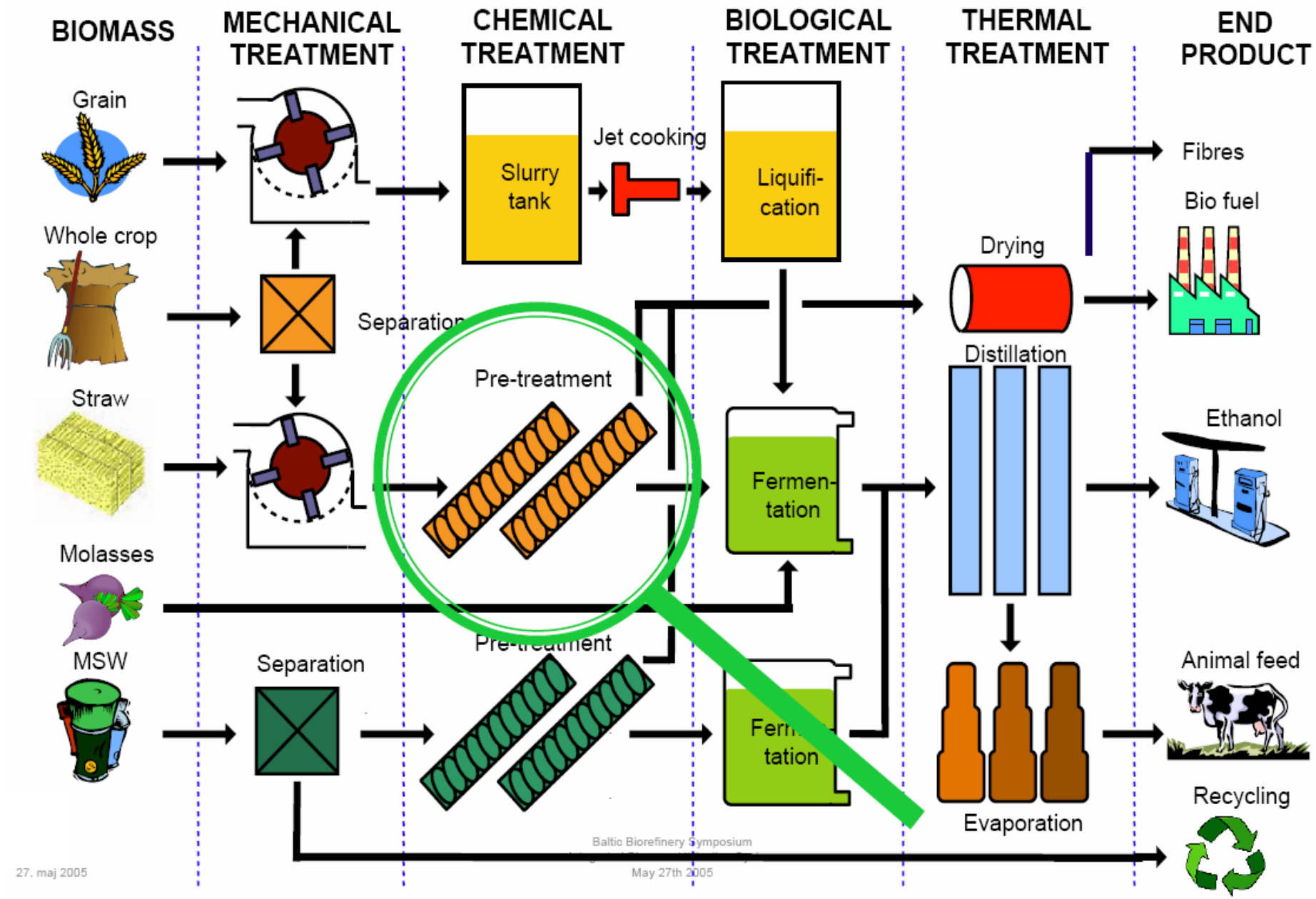
Source; JBHN – Centre for Bioenergy, AAU, Esbjerg 2011-16 , & Energistyrelsen, Årlig Energistatistik ENS.



Comparison of the basic principles of the petroleum refinery and the biorefinery, Source: Kamm et al. 2006

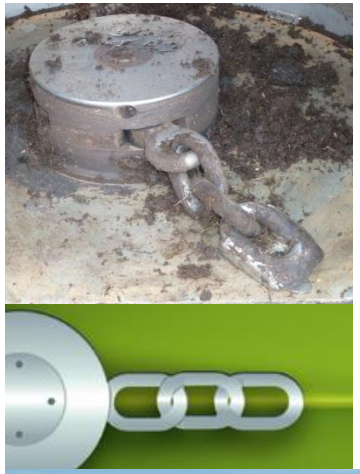


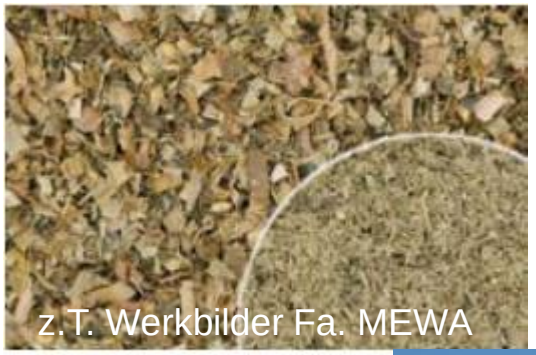
Two-platform biorefinery concept
Source: NREL 2006, Biomass Programm, DOE/US]


BIOMASS
MECHANICAL TREATMENT
CHEMICAL TREATMENT
BIOLOGICAL TREATMENT
THERMAL TREATMENT
END PRODUCT
Grain
Whole crop
Straw
Molasses
MSW
Separation
Separation
Pre-treatment
Pre-treatment
Slurry tank
Jet cooking
Liquifi-cation
Fermen-tation
Fermen-tation
Drying
Distillation
Evaporation
Fibres
Bio fuel
Ethanol
Animal feed
Recycling

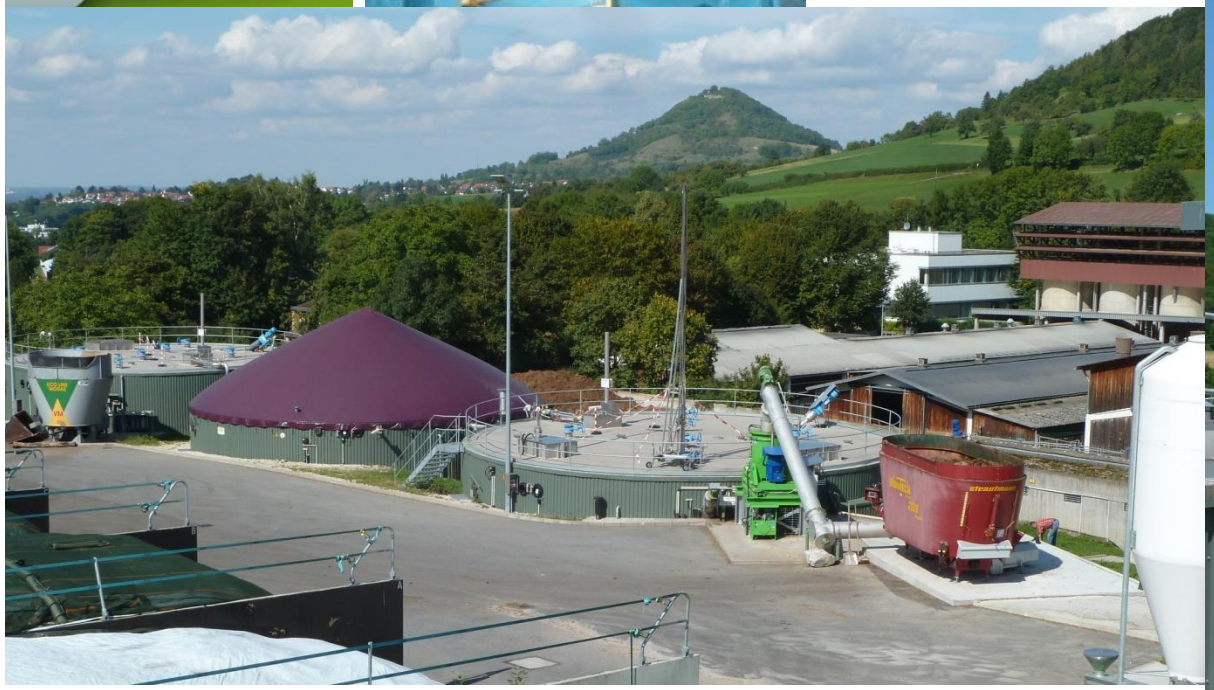
AALBORG UNIVERSITY
AALBORG ESBJERG COPENHAGEN

Querstromzerspanungstechnik Fa. MEWA





Maissilage.

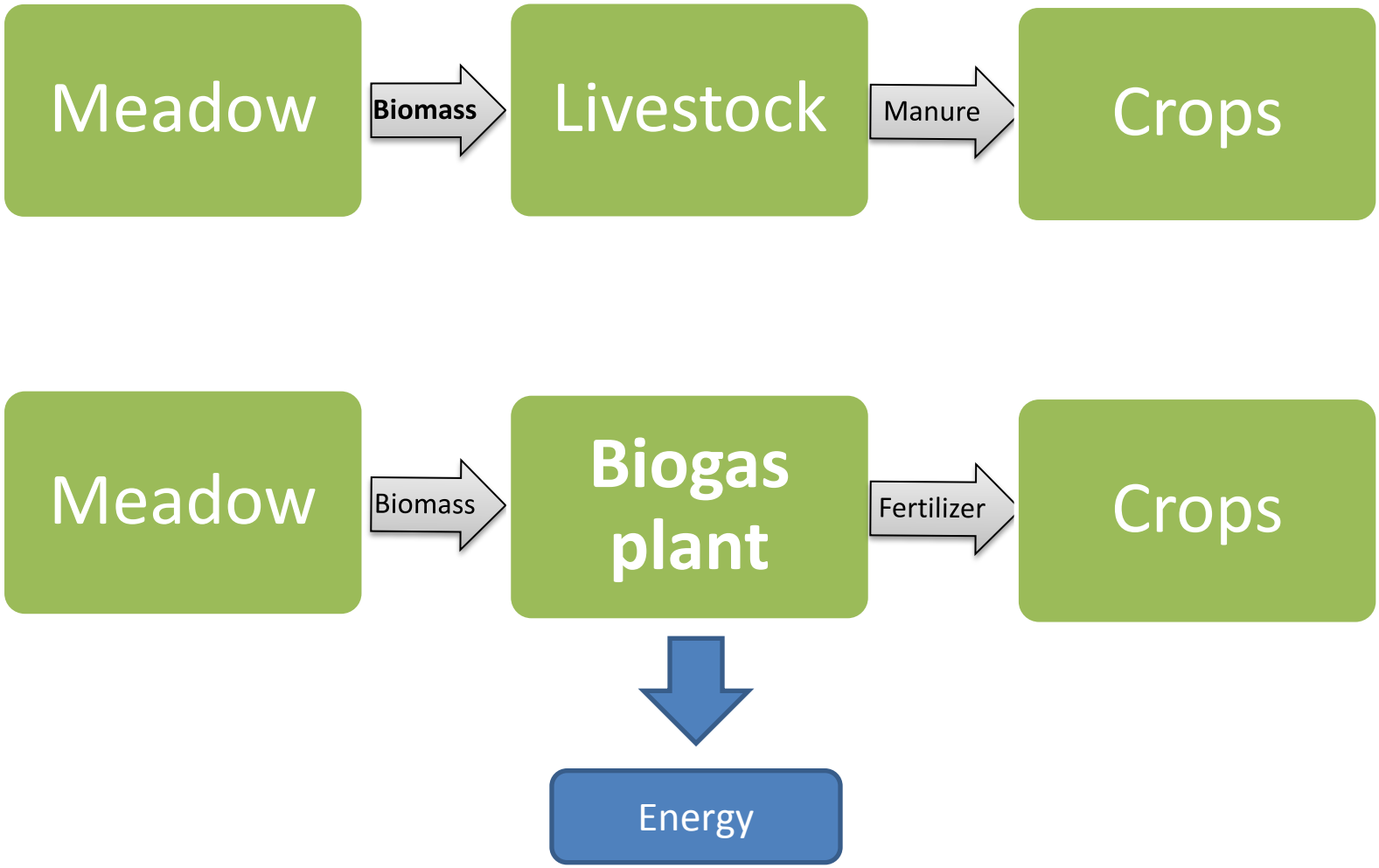


Biogas and biogas + separation, upgrading facilities

AALBORG UNIVERSITY
AALBORG ESBJERG COPENHAGEN

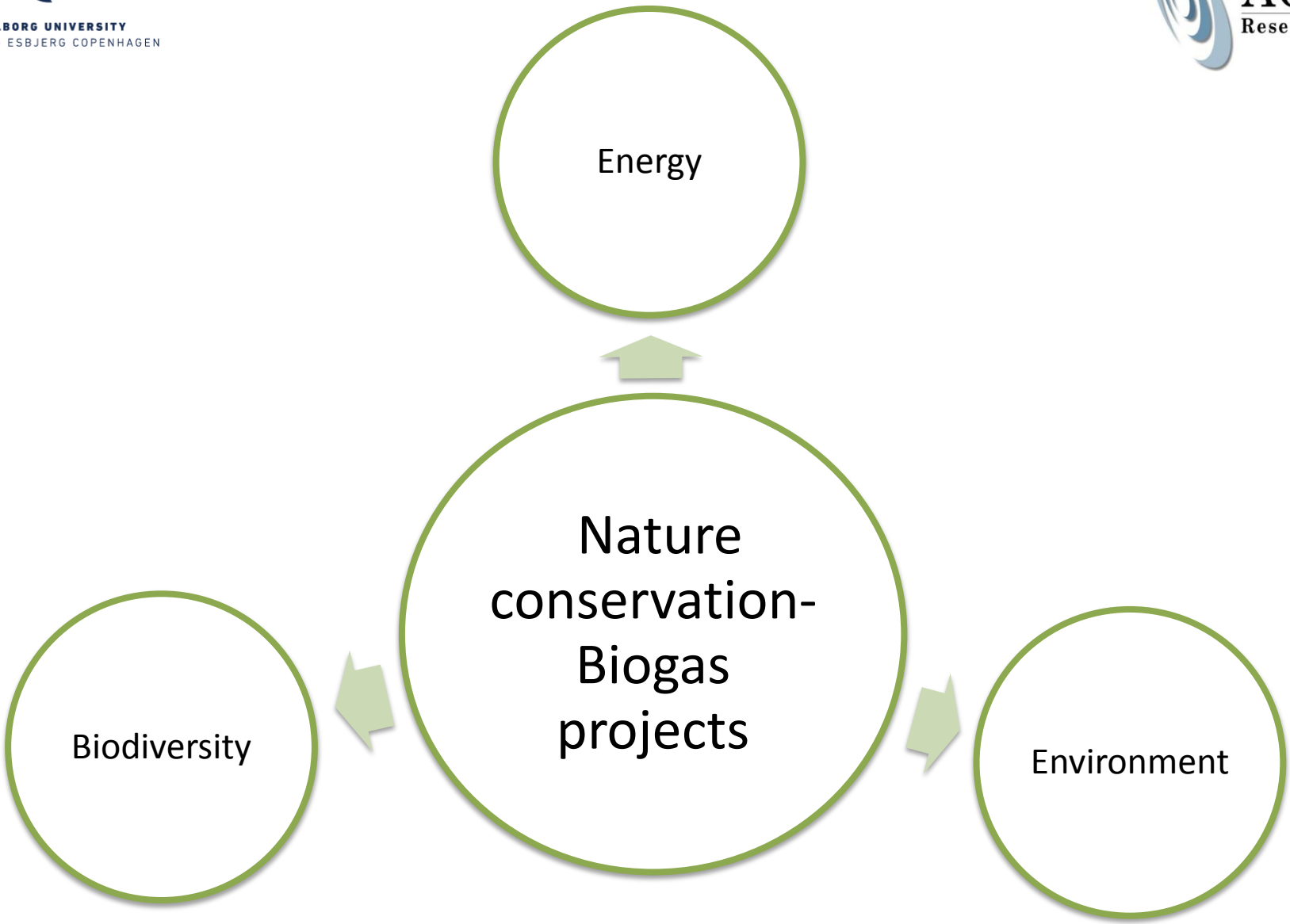
ACABS Research Group

”Engen er agerens moder”
(Meadows - the ”mother” of arable land)


Meadow
Biomass
Livestock
Manure
Crops
Meadow
Biomass
Biogas plant
Fertilizer
Crops
Energy

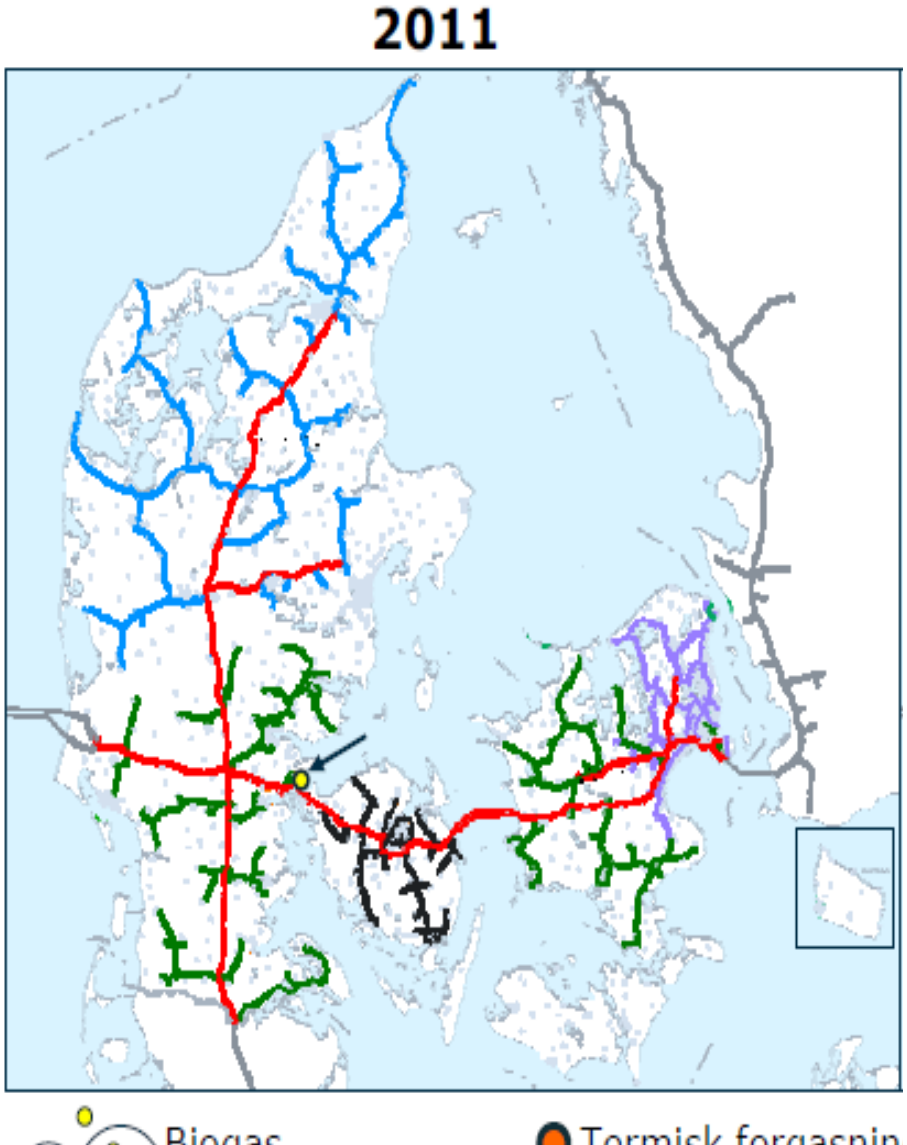
Benefits

- Production of Renewable Energy
- Alternative to fossil fuel
- Prevents leaching of nutrients
- Recycling of nutrients to croplands
- Potential for organic/ecological fertilizer
- Preserves the open landscape
- Increase in biodiversity
- Recreational value will increase


Energy
Nature conservation-Biogas projects
Biodiversity
Environment

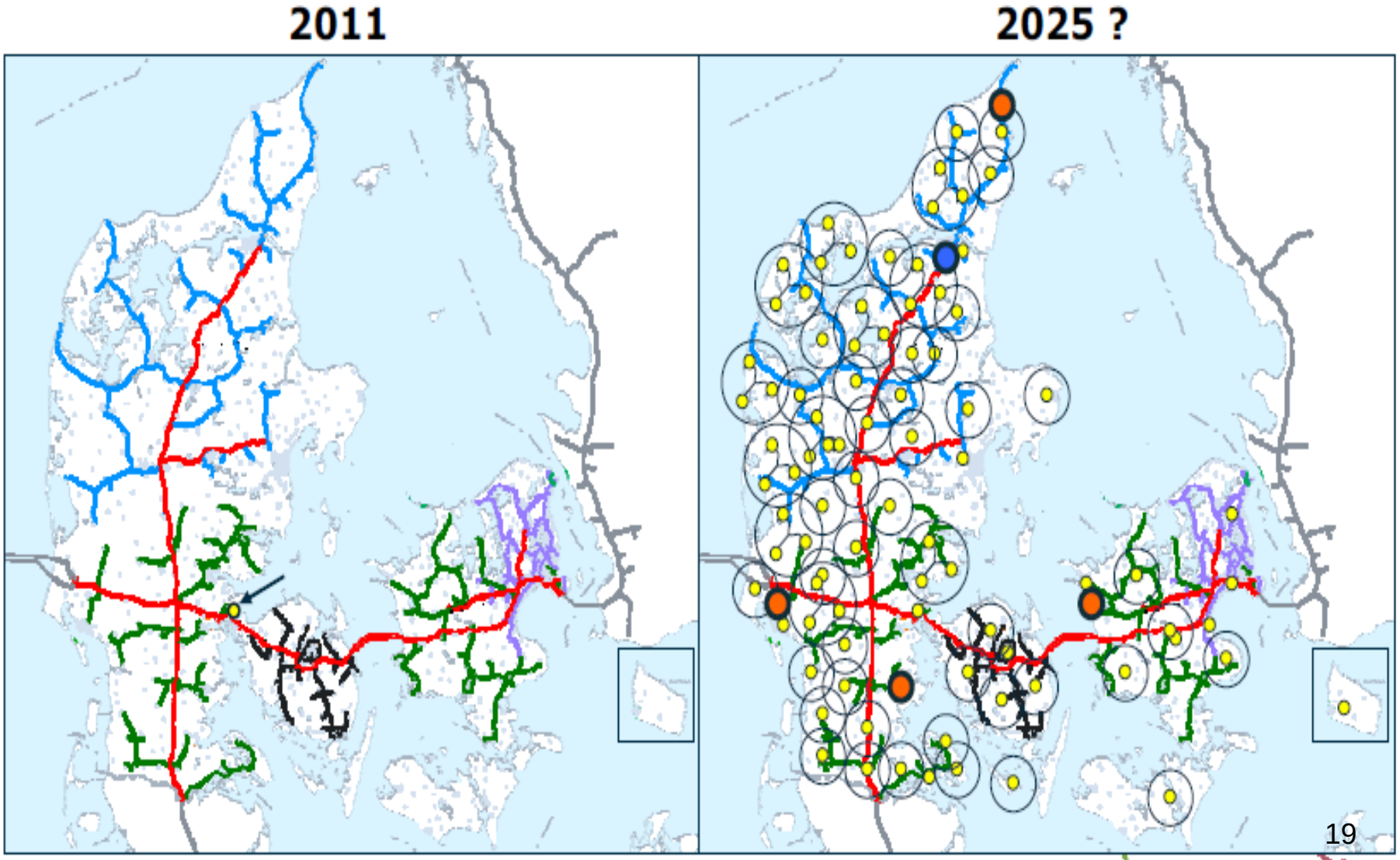
AALBORG UNIVERSITY
AALBORG ESBJERG COPENHAGEN

Current gassector



AALBORG UNIVERSITY
AALBORG ESBJERG COPENHAGEN

Future gassector?



Vast Areas of the Globe Are Not Suitable for High Levels of Terrestrial Agriculture

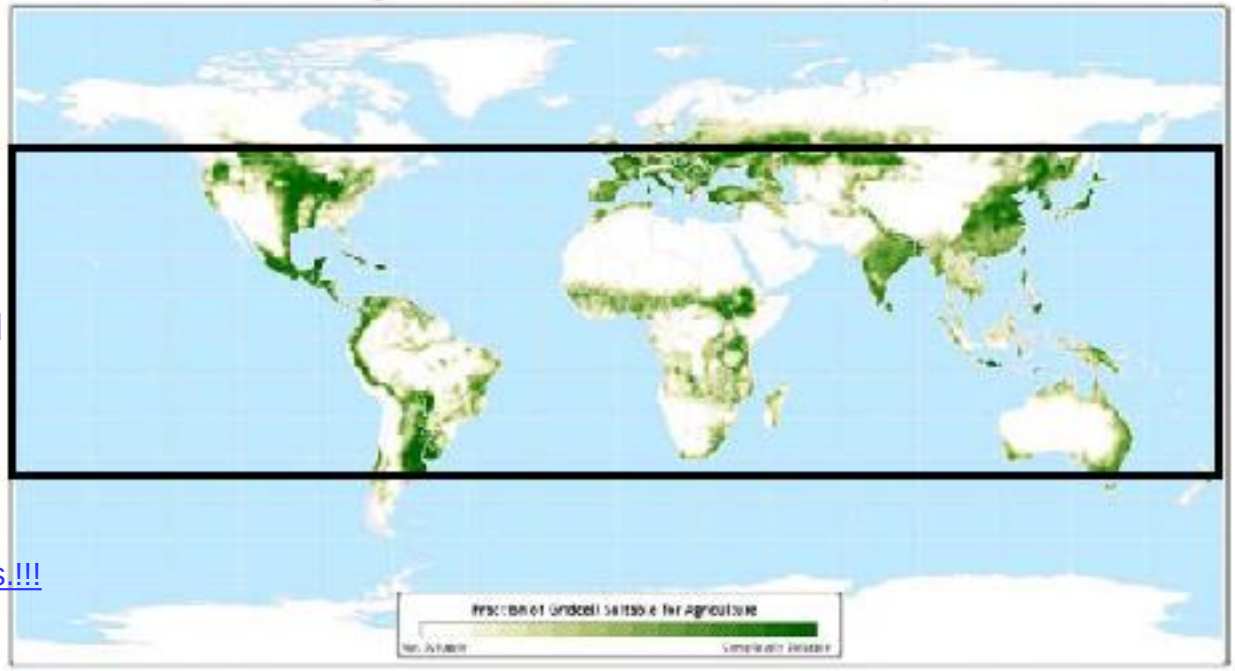
a. Crop lands
-green area

b. Pasturelands
- partly green areas

c. Rain forests and natural forests
- no go!!!

d. Deserts areas
algal productions
Solar-biofuels refineries.!!!

e. More actions now -
What are we waiting fore?



But could be used for algal culture.

Thank you for your attention!

Have a fruitful workshop ☺




Jens Bo Holm-Nielsen, M.Sc., Ph.D.
Head of Esbjerg Energy Section
Department of Energy Technology,
Head of Center for Bioenergy and Green Engineering

Aalborg University – Esbjerg Campus
Niels Bohrsvej 8, DK-6700 Esbjerg
Denmark. www.et.aau.dk
Phone: +45 21 66 25 11
e-mail: jhn@et.aau.dk

AALBORG UNIVERSITY
AALBORG ESBJERG COPENHAGEN