



**Task 37: Energy from Biogas**

**Joint IEA – Turkey Biogas Workshop  
Biogas Production and Utilisation  
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*Setting up biogas on a national level*  
**Challenges and successes**

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## Content of the presentation

Introduction: Why is biogas important for the Danish economy

The kick start: biogas “pioneer” and favourable frameworks

The present: “biogas country”

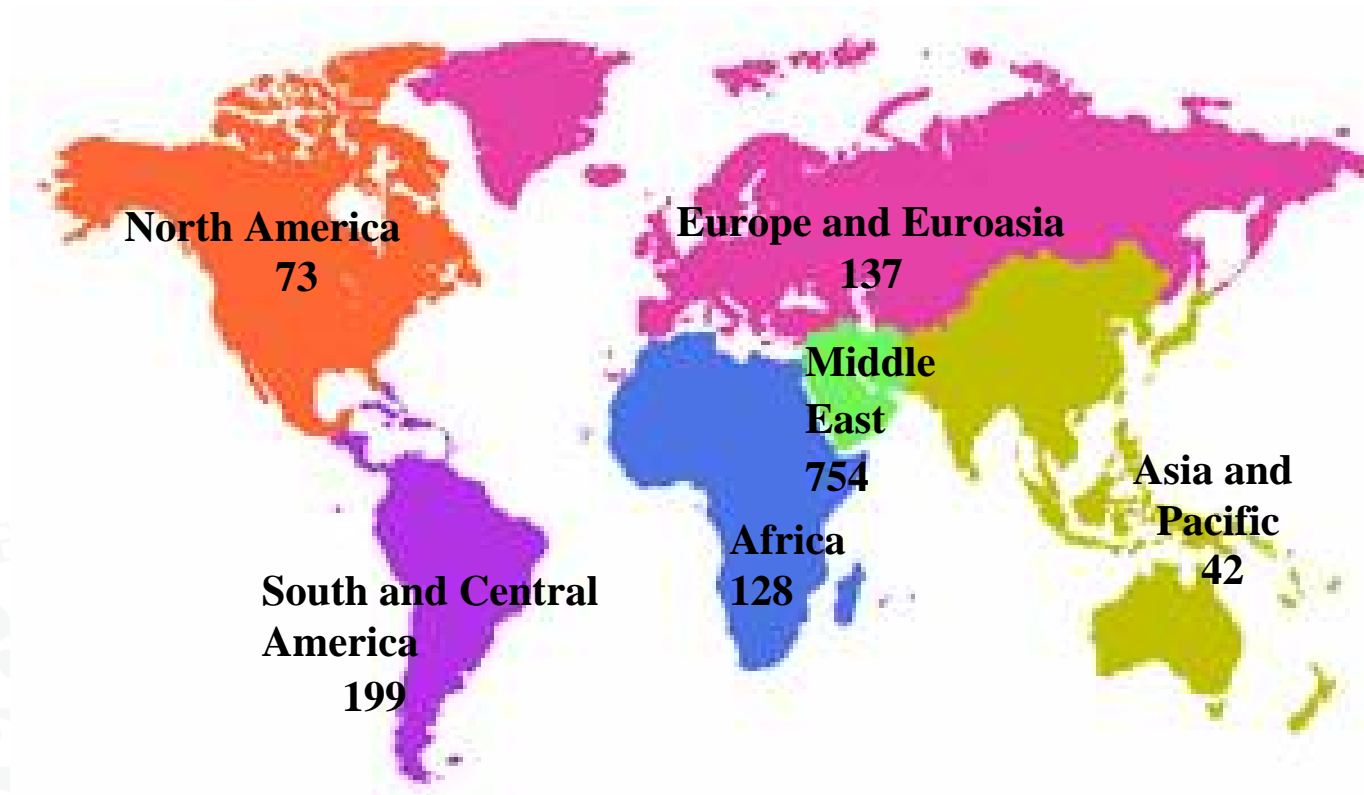
The future : a fossil free economy

Conclusions





# Proven Oil Reserves End of 2009 Billion Barrels

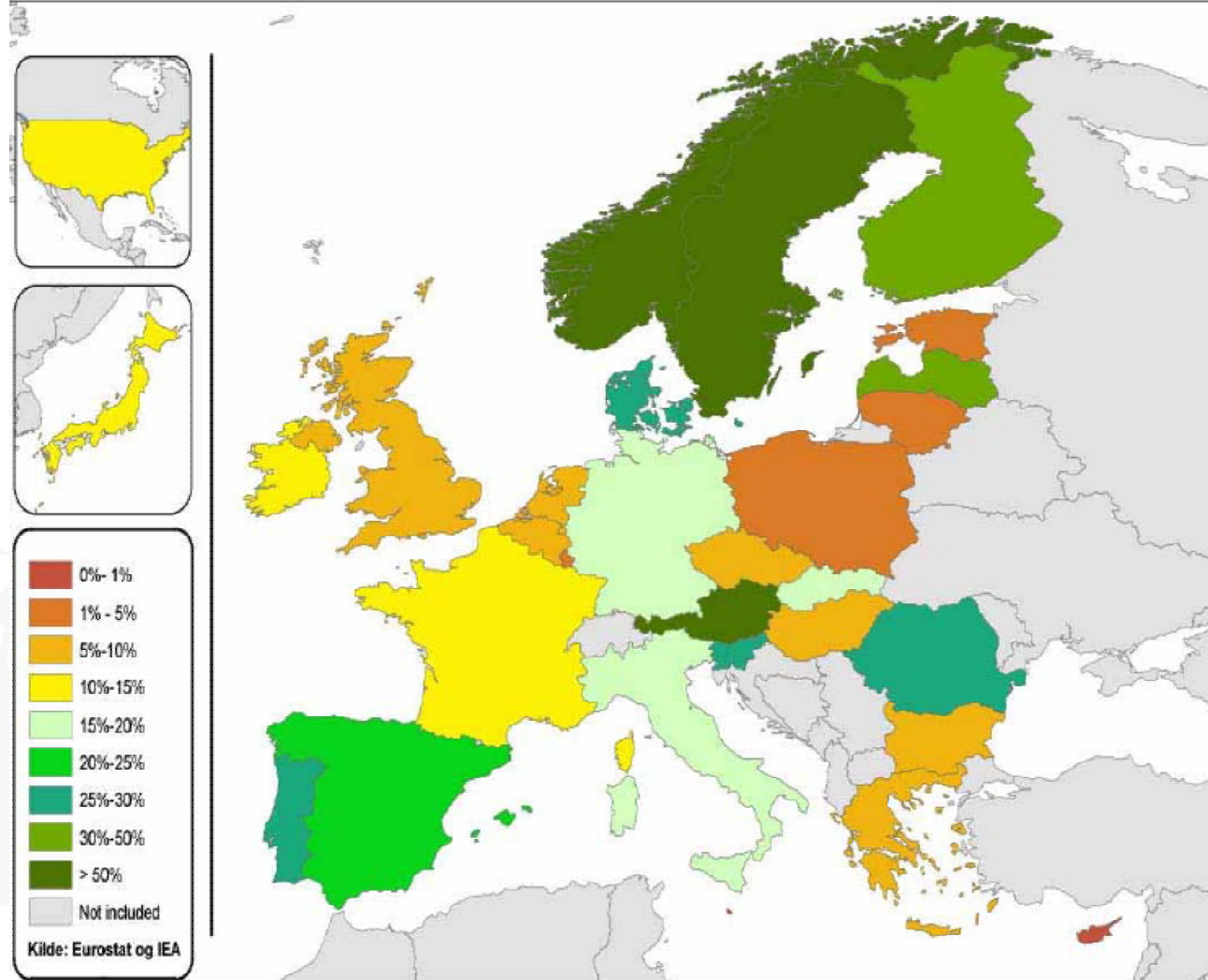


Source: BP Statistical Review of World Energy

Anno 2011- The security of supply issue, more actual than ever before



### Renewable Energy, 2008 Share of Total Energy Consumption (TPES)





## Setting up biogas in Denmark

### Society

- **Decrease dependency on imported fossil fuel**
- **Decrease emission of greenhouse gases**
- **Protection of drinking and surface waters**

### Agriculture

- **Improved utilisation and storage capacity for slurry**
- **Relations to neighbours**
- **Redistribution of manure**
- **Extraction of surplus of nutrients**

### Biogas development was promoted by:

- Legislation regarding handling of manure
- Energy and waste treatment legislation
- Subsidies for construction, research, documentation, etc.
- Other economic frames: premium price for electricity, cheap loans



## Favourable frameworks and pre-conditions kick-started the Danish biogas industry

### THE AGRO-ENVIRONMENTAL REGULATIONS

- 9 months slurry storage capacity requirement
- Restricting the seasons for slurry application
- The harmony rules, restricting the amount of manure applied per hectare
- Increased requirements of up to 65% N-efficiency from manure application

### WASTE MANAGEMENT LEGISLATION

- The application of waste products for agricultural purposes is controlled and regulated
- Organic wastes can not be landfilled
- Waste incineration is submitted to taxation, but recycling is exempted

### ENERGY LEGISLATION

- Power companies obliged to purchase electricity produced on biogas at prices according to the law
- Biogas and heat from biogas are exempted from energy taxes

### ECONOMIC FRAMES

- The government pays a 0.27 DKK/ kW production subsidy for electricity produced on biogas\*
- The establishment of a biogas plant is supported by the government with 20-40% investment grants\*\*
- Advantageous financing schemes ( long-term, low interest, indexed loans) for construction of biogas plants

\* The subsidy is replaced today by priceguaranty of euro/kwh el produced on biogas

\*\* Investment grants were temporarily stopped, but are re-introduced today



# Existing framework / incentives

- Price guaranty of 10 euro cents/kwh for electricity from biogas
- Heat production by CHP attractive due increasing energy prices
- Increasingly restrictive regulation concerning handling and application of manure





# New political priorities

## From coal, oil and gas to green energy

### Climate change

- Reduction of GHG emission from agriculture

### Security of energy supply

- The oil and gas reserves from North Sea will be exhausted within the next 10 years

### Green energy:

- New business opportunities

**=> Increasing political interest in biogas**



## New vision of the role of biogas

**Biogas will play a central role in the future energy, waste and agri-foodstuff sector:**

- Promoting sustainable food production
- Recycling nutrients from manure and wastes
- Reducing GHG emissions from agriculture
- Stabilizing the wind power-dominated energy system of the future
- Creating the integration and synergy necessary in the future fossil free society

### How?

- Interaction between different sectors and individual actors with the political frameworks
- Key words of the development: Innovation, integration and detection of potential synergies



## New political initiatives

**2009 Green Growth agreement: by 2020 at least 50 % of animal slurry must be processed, mainly through AD in biogas plants**

**2011 Energy Strategy 2050: by 2050 Denmark can achieve independence from coal, oil and natural gas through shift to wind and biomass**

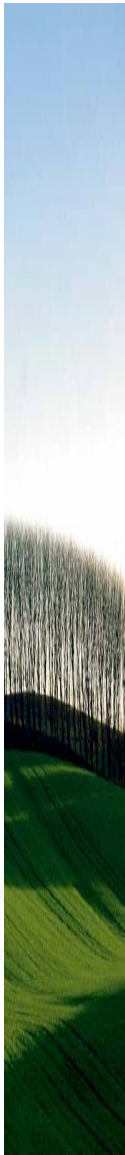
**⇒33 pct. fall in consumption of fossil fuels by 2020**

**⇒Fossil free economy by 2050**

**⇒New vision of the role of biogas**

### How?

- Make it more financially attractive to establish biogas plants:
  - granting subsidies for biogas production , biogas infrastructure, use of biogas in industrial processes, etc.
- Replace coal with biomass by allowing producers and consumers of district heat freedom of contract
- Small power plants ( up to 20 MW ) can convert from natural gas to biomass by freely choosing their fuel source
- Mandatory share of 10 percent biofuels by 2020





## THE FUTURE

# Denmark towards the fossil free economy

### How much biogas? When?

- 4 PJ biogas; 0,5 % of brute energy consumption in Denmark
- 20 PJ by 2020, if 50 % of animal manure and slurries will be processed by AD.  
**Funding: 1.8 bill. Euro until to 2015**
- 40 PJ currently estimated biogas potential in Denmark (hereof 26 PJ from manure)
- 20 PJ extra after 2020, from maize and grass cuttings (*Agriculture and Food Ministry 2008: "Agriculture and climate" report*)
- On long term: Aquatic biomass ("sea salad" and other sea algae)



# Incentives, subsidies and legislation

## Back to subsidies

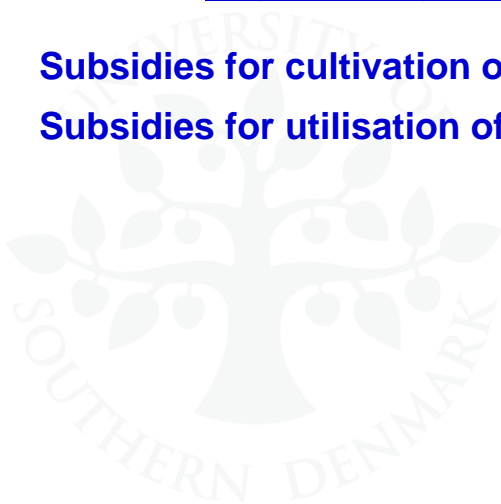
### 2010-2012

Further development of biogas with up to 20 % subsidies

- Joint biogas plants => 85 bill. DKK per year
- Organic biogas plants => 15 bill. DKK per year

Subsidies for cultivation of multi annual energy crops

Subsidies for utilisation of biogas for district heating or grid injection





# Incentives, subsidies and legislation

## New initiatives and legislative changes

- **Adjustment of the planning legislation => Municipalities must include biogas sites in their planning**
- **Adjustment of heat supply legislation, aiming equal priorities for both the biogas and the natural gas suppliers**
- **Assistance to municipalities regarding location of new biogas plants**
- **Concrete strategy of effective integration of biogas in the national energy supply**
- **Coordination between biogas development and nutrient redistribution plans in high manure density areas**



## Involved actors:

**Danish Biogas Association**  
**Biogas Business Association**  
**Ministry of Agriculture**  
**Ministry of Energy**  
**Ministry of Environment**  
**Municipalities and Regions**  
**Farmers associations**  
**Heat Supply Companies**  
**Natural Gas Companies**  
**Energinet.dk**  
**Researchers and universities**  
**Heat consumers**  
**Other actors**





## Setting up biogas at national level – Lessons learned

### Conclusion

#### 1. Political will

- Political visions and objectives (climate, environment, energy strategy )
- Political will to undertake necessary changes in legislation
- Collaboration between politicians, officials and investors

#### 2. Creation of the organisational structure

- Cross-ministerial action: planning, promotion, organisation and implementation
- NGO groups, associations, organisational platforms for project generation etc
- Coordination between cross-disciplinary project groups
- Staff support in problem solving

#### 3. Promoting initiatives

- Action plans, Biogas programmes etc
- Concrete actions: Project generation



#### 4. Favourable economic framework for the future plants

- **Government investment grants to build biogas plants, storage tanks, purchase slurry vehicle etc**
- **Cheap bank loans (long term, low interest annuity loans)**
- **Sustainable prices for the produced biogas/electricity**
- **Development of the internal market for biogas**

#### 5. Continuously consolidating public acceptance

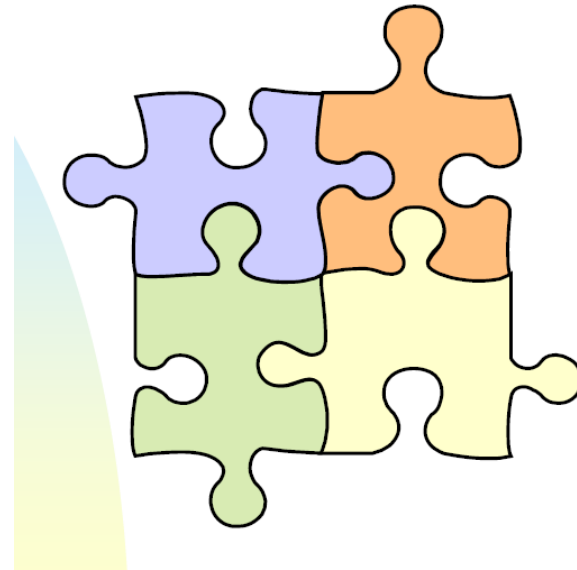
- **Awareness about biogas**
- **Involvement of the public in developmental work (a "must")**
  - **Acceptance of decision to build the biogas plant**
  - **Agreement on location of the plant**
  - **Acceptance of having the biogas plant in the neighborhood**

#### 6. Governmental funding for R,D&D programmes

- **Support for training, research ,D&D**
- **Financial assistance to the programme and the networks of actors involved**



## 7. Integrate biogas in the national energy supply



**Cookbook** on how to establish a biogas plant

[http://www.inbiom.dk/download/viden\\_oevrige\\_emner/kogebogweb\\_m\\_omslag.pdf](http://www.inbiom.dk/download/viden_oevrige_emner/kogebogweb_m_omslag.pdf)

**Best of luck!**



## ACNOWLEDGMENT

Thanks to

Danish Biogas Association [www.biogasbranchen.dk](http://www.biogasbranchen.dk)

Danish Energy Authority [www.ens.dk](http://www.ens.dk)

for the information in this presentation

**Thank you  
for your attention!**

