



**NORTH SEA
SUSTAINABLE
ENERGY
PLANNING**

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Investing in the future by working together
for a sustainable and competitive region



European Community
European Regional
Development Fund

Director
Egon Dall



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1 Danish policy for more renewable energi.

After four decades, Denmark today is among the leaders in energy savings and renewable energy. These fields have been afforded high priority, results have been impressive and there has been a consistently stable economic growth throughout the period. It began with the oil crises of the 1970s

Denmark's energy policy took shape after the oil crises of the 1970s. When oil prices accelerated in 1973 Denmark was among the OECD countries which were most dependent on oil in its energy supply. More than 90% of all energy supply was imported oil. As a consequence Denmark launched an active energy policy to ensure the security of supply and enable Denmark to reduce its dependency on imported oil.

Since 1980, the Danish economy has grown by 78%, while energy consumption has remained almost unchanged

Focus on energy savings and renewable energy

Denmark chose early on to priorities energy savings and a diversified energy supply that concentrate on increased use of renewable energy. A broad array of notable energy-policy initiatives were launched, including a focus on combined electricity and heat production, municipal heat planning and on establishing a more or less nation-wide natural gas grid. Furthermore, Denmark extensively improved efficiency of the building mass, and launched support for renewable energy, research and development of new environmentally friendly energy technologies as well as ambitious use of green taxes.

In combination with oil and gas production from the North Sea the policy concerned meant that Denmark went from being a huge importer of oil in 1973 to being more than self-sufficient in energy, from 1997.

Decoupling of energy consumption and economic growth

The consistent prioritization of an active and ambitious energy policy with changing governments has made it possible to reduce dependency on fossil fuels and protect the environment while maintaining high economic growth.

The active energy policy enjoys considerable public backing and there is a will to save on energy. This continuity has created the basis for long-term investments in efficient energy supply and significant development of new energy technologies on the basis of Danish research, development and know-how.

Along with a gradual reorganization of the energy supply for increased use of renewable energy, the energy policy has thereby created the foundation for



Denmark being able to set ambitious targets for reduction of climate-gas emissions.

Expansion of combined heat and power and decentralized heating supply

Denmark has seen substantial developments in terms of district heating. In 2007, 61% of all Danish homes were supplied with district heating. The expansion of the district-heating network it became possible to utilize excess heat from power plants, but it also ensured the establishment of a large number of decentralized combined heat and power plants and minor industrial combined heat and power plants throughout the 1990s.

The share of district heating produced by combined heat and power plants has thus more than doubled, from 39% in 1980 to 80% today. The share of electricity from co-production went up from 18% to 53% during the same period. Overall, the expansion of combined heat and power has led to heavy improvements of energy efficiency and is thus much of the explanation of why gross energy consumption has been stable for a longer period of time with solid economic growth.

Renewable energy

Over the years there has been a regular expansion of the domestic electricity-transmission network and not least exchange connections to neighboring countries. Initially the Nordic electricity grid was interconnected in order to mutually exploit different production forms. Today the transmission network and connections to other countries are also important to the adaptation of large volumes of wind power into the electricity grid.

Converting to different types of biomass fuel (wood, waste, straw) in the combined heat and power production also has great importance to renewable energy production. The share of renewable energy in final energy consumption has increased steadily since 1980 and today amounts to about 19%.

Looking at electricity supply alone, renewable energy accounts for about 28%, which is chiefly due to the incorporation of wind energy in electricity production both in the form of large offshore wind farms and onshore wind turbines. The developments in Danish energy supply (1985-2009) are clearly showed on the map of Denmark (below).

Energy savings

Together with the expansion of more efficient energy production a number of initiatives have been carried out to improve efficiency in final energy consumption



of households and trade and industry. Buildings are e.g. subject to high energy standards. A house built in 2008 only uses half as much energy per square meter than a house built before 1977. When a private house is sold in Denmark it must include an energy certificate with information about the energy-related state of the house and with recommendations on energy-improving investments.

A number of other initiatives have been carried out, e.g. the labeling schemes for electrical appliances, public campaigns for energy savings in households, energy savings agreements with the industry as well as a wide number of subsidy schemes for renewable energy and energy efficiency.

Development of new technologies

The persistent political and commercial focus on energy efficiency, along with the introduction of new technologies, have meant that Danish enterprises throughout several years have developed and gained valuable experience from new energy-technology solutions. And these solutions have been converted into increased exports.

For example, Danish exports of energy technology came to around DKK 64 billion in 2008. Exports of Danish energy technology more than tripled from 1998 to 2008 and today make up around 11% of total Danish goods exports.

Extensive changes to the energy system

Through a persistent and active energy policy, Denmark has drastically changed the energy system towards greater efficiency and focus on renewable energy. The changes have satisfied concerns for security of supply, the environment and climate, and created the basis for growing exports of energy technology and job creation.

Denmark's EU membership has increasing significance in relation to its energy policy, including efforts to liberalize and integrate electricity and gas markets in Europe. At the spring summit from 8 to 9 March 2007 EU heads of state and government adopted the action plan "An Energy Policy for Europe" which outlines the path for a joint European energy strategy.

The aim is to counteract global climate change, ensure EU's energy supply and strengthen competition in EU's internal market for energy. Most recently EU has agreed on a very ambitious climate and energy package.

Despite the notable results it is still a long way to go before Denmark will be entirely independent of fossil fuels. The Government's long-term targets and



visions for the energy policy are shown in the right-hand box. The targets are actively monitored and are regularly followed up with new instruments.

The vision

- 100% independence of fossil fuels •
- Internationally committing targets •
- 30% renewable energy in final energy consumption in 2020 •
- 10% renewable energy in transport •
- 20% reduction in 2020 for greenhouse gas emissions not covered • by allowances compared with 2005 •
- 21% reduction of greenhouse gas emissions on average in the period 2008-2012 compared with 1990 (Kyoto)

National targets

- 20% renewable energy in gross energy consumption in 2011 •
- Annual energy savings of 1.5% of final energy consumption in 2006 •
- Reduction in gross energy consumption of 4% in 2020 compared • with 2006
- Danish



2 EU's climate and energy policy

The EU has strengthened its climate and energy policy and committed itself to ambitious targets to reduce greenhouse gas emissions and boost the share of renewable energy.

In recent years the EU has strengthened its climate and energy policy. Focus has been put on the need for combating climate change by decreasing greenhouse gas emissions and relying increasingly on renewable energy sources rather than fossil fuels. At the same time work is being started on ensuring an integrated European energy market to benefit companies and consumers.

The EU has committed itself to a "20-20-20-plan" – a 20% reduction in greenhouse gas emissions – rising to 30% as part of a binding international agreement; a 20% increase in renewable energy's share of overall energy consumption compared with 8.5% today; and a 20% reduction of energy consumption through energy efficiency by the year 2020.

In 2007 the European Council adopted a visionary action plan for energy: An Energy Policy for Europe. The action plan is designed above all to lead to increased security of supply, keep European economies competitive, promote environmental sustainability and combat climate change.

The Minister for Climate and Energy Lykke Friis represents Denmark in the Council of the European Union in negotiations over climate and energy issues on the EU's political agenda. At the moment the main issues include transposition of the climate and energy package, ongoing liberalisation of the EU energy markets and enhanced energy security. Negotiations are also in progress regarding a large number of legislative acts aimed at better energy efficiency, strengthening energy technologies and adapting to climate change.



Template for analysis of energy context

<p>Energy Infrastruktur</p>	<p>The energy supply in Denmark is composed of several forms of energy</p> <p>Oil, gas, coal and various renewable energy technologies help to ensure the continuation of Denmark's energy supply. Energy administration is governed by legislation covering electricity, gas, heating and the Renewable Energy Law, which covers the production of energy, its transportation and delivery.</p> <p>The Climate and Energy Ministry is responsible for administering the energy supply legislation in Denmark, while the day-to-day application of the legislation is mostly delegated to the Danish Energy Agency.</p> <p>2009 – Denmark Fossil energy 71 % Vind 19 % Biomasse 10 %</p> <p>Heating in private is by individual power plants, district heating and electricity</p> <p>The district heating is mainly a result of combined power and heating stations. Electricity is from combined heating stations, wind turbines, import from neighbor countries. Import - eksport fordeling bade national og regional. Fordeling af vedvarende energi national og regional.</p>
<p>Organisations and markedes (ejerforhold og organisering af energisektoren)</p>	<p>Energy saving and the efficient use of energy are important components in the fulfilment of the twin objectives of reducing greenhouse gas emissions and increasing the use of renewable energy</p> <p>Energy saving and the efficient use of energy represent a major element of Denmark's ambitions to reduce greenhouse gas emissions and increase the amount of renewable energy in our energy supply. It is also important in terms of reduced costs for households and enhanced</p>





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	<p>competitiveness for industry. Last but not least, the efficient use of energy and energy conservation is also important in reducing energy costs for consumers and businesses .</p> <p>Over 30% of Denmark's energy consumption is attributable to private households, and there is great potential for saving energy in many households. This could include for example more energy-efficient electrical equipment, insulation and the replacement or conversion of heating systems. Deciding which measures to take will vary from household to household.</p> <p>Low energy costs are essential for companies' competitiveness, and many companies could reduce their energy costs by simply saving energy. Companies with high energy consumption can also receive subsidies to cover their CO2 tax if energy efficiency is improved via an agreement between the company and the Energy Agency.</p> <p>At the state level too work is underway to reduce energy consumption. A circular has been issued which obliges state institutions for example to make energy-efficient purchases and to disclose their energy consumption. Moreover, in every ministry an energy management officer has been appointed. The aim is to work out a combined objective for the development of energy and water consumption in both the short and long term for the entire governmental sector.</p> <p>The energy companies are owned by the consumers and there is a board which takes care of the investment. Energinet www.energinet.dk The energysavings is possible to sell on the energy kvote market Se www. Energi.</p>
<p>Built environment (Demand concerning new buildings)</p>	<p>Housing in Denmark:</p> <p>Number of houses: 2.749.328 (2010) People who lives is rental houses: 34,6 %(2010) People who lives in owned houses: 61,1%(2010) See</p>





	<p>http://www.dst.dk/pukora/epub/Nyt/2010/NR319.pdf</p> <p>Region The pattern of settlement for the municipalities is typically larger cities, villages and landside. The heating system in the cities is mainly district heating. Villages is mainly gas heating, oil and individual heating's. Landside is based on individual oil, gas and renewable energy. <u>The district heating</u> is de vided into 2. Different systems. Surplus heating from power plant, large companies and waste . Small heating plant producing heat from gas og biomass. The individual heating is mainly based on oil, gas, wood, straw, geothermic and solar-pholtic. The buildings legislation demands max energy consumption in new buildings of 40 kwh/m2. Some of the municipalities are more restrictive and demand a max of 50 kwh/m2.</p> <p>The government subsidies for more renewable energy. With in the next years, there will be new models for more biogass. The municipalities is making the local planning for ex. vindfarms</p>
<p>Government</p>	<p>National the goal is to be 100 % fossil free by 2050. And 42 % wind energy, 20 % of biomass energy by 2020. The government is responsible for planning for wind turbines on the sea.</p> <p>Municipalities are responsible for energy planning. Each Municipality are responsible for making their own plan for renewable energy. First the goal is to make a Wind turbines plan for land turbines.</p>





Governance instruments (How does the national and the local policy influence the planning for more renewable energy)	The Governance make the overall frame and the municipalities are during the planning.
Economic, financial and fiscal conditions	The danisch Governance has a large influence oft he danish energy companies. The companies is owned by the shareholder and they are cooperating for the goal for 2020 and for 2050 for independing.
Industry capacity, innovation, skilles	<u>Regional</u> Grønerhvervs vækst –(Green business developing). Goal for 300 new "green" jobs – primarily for builders and occupations related energy improvement. <u>National</u> Different subsidies for more renewable energy.
Energy issues and debates	At the moment, the danish goverment and the farmerorganisations are looking for a better economic model for biogass production in DK.