INFORMATION NOTE

Wind Farms in Denmark

1. Overview

1.1 Denmark is one of the world leaders in the use of wind power. The country began to exploit wind power as a replacement for fuels in the mid-1970s when the first energy crisis occurred. In 2004, renewable energy production accounted for 28% of domestic electricity supply in Denmark, of which 18.5% was generated by wind power.[1]

1.2 Wind farms in Denmark are established by private companies. Since 1980, more than 6 000 wind turbines have been established.[2] With the introduction of two re-powering programmes by the Danish government in 2001 and 2004 respectively, the total number of wind turbines has been reduced, as older and inconveniently positioned wind turbines are replaced by larger and powerful ones. In 2005, there were about 5 300 wind turbines operating in the country, with a total installed capacity of 3 100 MW.[3]

1.3 According to the Danish Wind Industry Association[4], the unit cost of energy generated by wind power has been reduced by more than 80% within the last 20 years and this trend is expected to continue. At present, wind farms on good wind sites are competitive to new combined-heat-and-power plants.[5]

1.4 Wind power produces no emission, warming or health problems. However, wind turbines have adverse visual and sound effect on their surroundings, especially with the development of larger wind turbines. It is also difficult to find appropriate sites in a densely built-up country.

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1 *Danish Energy Authority*. (2006) Available from: http://www.ens.dk/sw14294.asp [Accessed April 2006].

2 Ibid.

3 MW is megawatt, the unit of measurement of electrical power. Source: *Danish Energy Authority*. (2006) Available from: http://www.ens.dk/sw14294.asp [Accessed April 2006].

4 The Danish Wind Industry Association is a non-profit-making association promoting the use of wind power in both Denmark and abroad.

5 A combined-heat-and-power plant is an installation where there is simultaneous generation of usable heat and power (usually electricity) in a single process.

2. Responsible authority

2.1 Established in 1976, the Danish Energy Authority is the executive arm of the Ministry of Transport and Energy and is responsible for overseeing the production, supply and consumption of energy in Denmark. In particular, it ensures a stable supply of energy within the policy framework. It also administers the Danish energy legislation as well as implementing renewable energy policy.

3. Policy for wind power

3.1 The policy on renewable energy, including wind power, encompasses a wide range of government supporting measures for the industry. These measures include subsidization, priority access to grids, identification of suitable sites and formulation of research and development strategy.

Subsidization

3.2 Between 1980 and 1990, government subsidies were provided for the installation of wind turbines. The amount subsidized was set to be equal to 30% of the installation costs. The government also introduced a fixed feed-in tariff for wind power generation. These arrangements applied across the country, irrespective of wind conditions.

3.3 In 1999, the electricity market was liberalized and the fixed feed-in tariff was replaced by a feed-in tariff paid by consumers. The amount of subsidy depends on when the turbine is connected to the grid and the age of the turbine. The period of subsidization is 20 years.

Priority access to grids

3.4 The Danish legislation gives renewable energy priority access to grids, and wind power has the highest priority of access to grid capacity over power generated by other means.

3.5 Nevertheless, there is a special arrangement for the two large-scale offshore wind farms at Horns Rev and Rødsand. In the event that there is grid limitation, wind power generated by these two wind farms may have to reduce. In return, the wind farms concerned will receive monetary compensation.

Identification of suitable sites

3.6 A pre-condition for the establishment of a wind farm is the existence of a viable site. The Minister of Transport and Energy has requested the Danish Energy Authority to provide an overview of possible sites for investors to plan for new wind power projects.

Formulation of research and development strategy

3.7 A focused initiative in research, development, demonstration and training is fundamental to the establishment of an appropriate framework for innovation and growth. The Danish Energy Authority and the Advisory Council for Energy Research [6] have jointly proposed the drafting of an all-encompassing, cross-disciplinary energy research strategy. Particular weight will be given to the relationship between research and development efforts and enterprises in the energy sector and related financial institutions.

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[6] The Advisory Council for Energy Research is appointed by the Minister of Transport and Energy and is responsible for advising the Danish Energy Authority on the administration of the Energy Research Programme. It also advises on energy research priorities. Members of the Advisory Council for Energy Research come from the industry, research institutions and universities.

References

1. Bo Persson. (2003) *Working paper 2003·26 - Typifying Scientific Advisory Structures and Scientific Advice Production Methodologies (The Cases of Denmark, Finland, and Sweden).*

2. Danish Energy Authority. (2005) *Offshore Wind Power - Danish Experiences and Solutions*.

3. *Danish Energy Authority*. (2006) Available from: http://www.ens.dk/sw14294.asp [Accessed April 2006].

4. *Danish Wind Industry Association*. (2006) Available from: http://www.windpower.org/en/core.htm [Accessed April 2006].