

## **Past and present - successful developments followed by stalemate**

Historically speaking, Denmark has a centuries-old tradition of using wind energy. Smock mills were built on high hills in the countryside and for generations were used for milling grain into flour. In the late 19th and early 20th century, the classic multi-blade windmill was gradually developed for powering agricultural machinery, grinding mills, threshing machines, etc., and also for pumping water. Around 1920, there were about 16,000 such windmills in Denmark, but only 300 were generating electricity.

The development of electricity-producing windmills is largely based on the experiments of the Danish physician Poul la Cour, who was a teacher at Askov Folk High School in south Jutland. He started a series of experiments in 1891 for the purpose of carrying out a rational utilization of wind power for generating electricity.

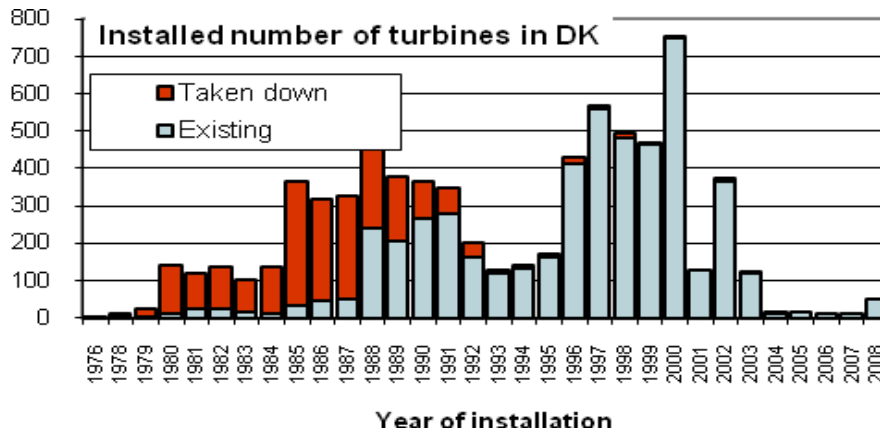
Small wind turbines were developed in Denmark to provide electricity for small villages, but after the 1930s and 1940s these were outnumbered by more efficient power plants fired by cheap oil or coal.

The oil crisis in 1973 and a growing awareness of reliable supplies and renewable energy sparked renewed interest in wind power. After this, increasing political focus on environmental protection and sustainable development provided the overall framework for the development of the Danish wind-energy sector.

The practical and technical developments were carried out by relatively few entrepreneurs, tradesmen and people with high ideals about renewable energy. The developers included Christian Riisager, a carpenter from west Jutland, who was one of the first to successfully design a turbine to be marketed and connected to the grid. In 1978 the number of electricity-generating wind turbines of the Riisager type installed all over the country had grown to around 30. The Riisager turbine laid the basis for modern wind turbines with high towers and three blades.

The Association of Wind Turbine Owners was formed on 4 May 1978, and the first wind turbine guild or cooperative was established in 1980.

During the 1980s and 1990s the number of wind turbines and the total capacity installed gradually increased, as did the overall height and technical capacity of the turbines themselves. Developments accelerated in the late 1990s, and the percentage of electricity provided by wind power rose from less than 5% in 1995 to almost 20% in 2003.



### No. of turbines installed in Denmark

Danish wind power has stagnated in terms of new capacity since 2003, however. After the change of government in 2001, the premiums for wind-powered electricity fell and the development of a number of off-shore wind farms was stopped by the new conservative-liberal government.

From 2003 to 2008, only a few turbines were erected in Denmark, and from 2006 to 2007, the total wind-power capacity actually fell. By late 2008, the number of wind turbines in Denmark totalled 5,179 and the capacity installed was 3,180 MW. including offshore turbines.

Concern about climate change and reliable supplies spurred renewed political focus on renewable energy, and most of the political parties in the Danish parliament reached an agreement in February 2008 on a national energy policy. The agreement was followed by a new act on renewable energy coming into force from 1 January 2009, that brought new incentives which will probably support the future development of renewable energy, including electricity generated by wind turbines.

Even so, the political agreement from February 2008 has no long-term goals or any robust planning measures. In addition, the new act on renewable energy unfortunately contains an odd kind of compensation to be paid to coming neighbours of new turbines. Needless to say, this will curb new investments.

Summing up, it remains to be seen whether the Danish wind power sector will overcome the stalemate.

