

2) Co-operative ownership.

(See also www.ecd.dk (wind energy).

In Denmark a large amount - 85% - of the wind turbines capacity is owned by private individuals. The history behind is as follows:

In Denmark as well the technical development as the implementation and use of wind power has been dominated by private initiative:

It was private individuals who started the technical development of windmills in the 70ties as a reaction on the energy shortness due to the oil-crisis and as a reaction to the public idea of wanting to solve the energy shortness with nuclear power. Those private persons drove the development to the stage around 1980 where small enterprises took over, and became the later so well known Danish Wind Turbine Manufacturers (Vestas, Bonus (Danregn), Nordtank, Micon (now NEG Micon).

It was also private individuals who bought those first prototypes of 22 kW size no matter that the wind turbines were not safe and not so very efficient - and fights had to be fought with utilities and other authorities in order to get the permissions to erect the turbines. -(the first two were grid-connected in 1976). The private belief in wind energy, environmental anxiousness and resistance against nuclear power made many Danes queue up to buy the next prototypes of wind mills. And those first buyers made it possible for the first wind mill builders to proceed their work and lead the wind mill production to a sales of serial produced wind turbines in 1978. Without those testing persons - who accepted wind mil with low efficiency, accidents, etc. the development might had stopped at that stage because they provided the necessary cash to keep up the living of the wind turbine developers.

In those days the windmills were around 11, 22, 30 or max. 45 kW, the blades 5 - 6 metres and the towers 12 or 18 metres. The price and size of the wind turbines made it possible for private individuals and families to buy their own wind turbine and erect it at their house or farm. The electricity production which the owner could not use in his own house were sold to the local electricity utility.

Wind cooperatives

From the early 80ties the establishment of wind co-operatives started, and from 1984 to 1994 most wind turbines in Denmark were established by wind-co-operatives. The wind turbines were still growing larger, and as the idea was to cover ones own electricity consumption with wind electricity, the wind turbines had now become too large (and expensive) for one person to buy his own wind turbine. Therefore the following owner model became very typical in Denmark. The model is based on the experience and tradition from the co-operative movement in Denmark, where the farmers jointly owned dairies, etc., and in this way they were used to handle large tasks by joining forces.

Local families buy owner-shares in a wind turbine corresponding to its own electricity consumption. For instance, an wind turbine producing 300.000 kWh per year would have 50 families as owner with each a consumption of 6000 kWh.

Also in wind farms it was typical that for instance 2 wind turbines were owned by a co-operative whereas the third was owned by the owner of the land.

The Danish legislation

The Danish wind energy development has from 1980 till 2000 been based on two basic criterias:

1) The criteria for local ownership

2) The criteria for electricity consumption.

The criteria for local ownership was made to ensure that local inhabitants also were the ones who had benefit and credit of the presence of the wind turbines. And in general this idea has worked after its intention as it has ensured that there were not much local resistance against wind energy up through the 80ties to the mid 90ties. The local ownership meant that hundred thousands of Danes are owners - and therefore accepting - wind turbines and many more people are related to wind turbine owners.

The criteria for electricity consumption ensured that nobody made enormous amount of profit on a co-operative wind turbine - and that has ensured that many people had to be owners meaning that there were a broad local relationship. This again ensured the support for wind energy in the local societies.

On the Wind energy Conference on Gotland it was concluded that "islanders" have to be the one who benefit from renewable energy installations, not foreign investments - otherwise the islands might not experience any advance for their society through the introduction of RE. The two Danish criterias mentioned above have in a way ensured the local commitment, acceptance and economical benefit.

This regulation has varied in terms of accepted distance from the wind turbine - but in general the wind-shareholder had to be inhabitant in the municipality where the WT was erected, and the shareowner could hold shares corresponding to his own consumption plus 50% (9.000 kWh - raised to 30.000 kWh in late 90 ties). Those criterias were given up in 2000 in connection with the deregulation of the market.

One-man owner turbines

From 1995 most wind turbines erected were owned by a single person. This was due to the new municipal planning, which concentrated the areas for wind turbines on certain farms, which encouraged the farmers who owned the land to buy a wind turbine. In the late 90ties it also became possible to buy a piece of land and establish a one-man-owned wind turbine here - and that gave a great deal of not-farmers the possibility to own a wind turbine and not only shares.

As mentioned, all those regulations for owner ship are now taken away. But as the economical conditions since 2000 are not so good, hardly any wind turbines have been established on land since then. Future pricing and fysical planning will decide whether more wind turbine will be erected on land - or only old turbines will be substituted with new ones. As we have already reached the target for 2005: 1500 MW in Denmark (we have 2100 MW) there does not seem to be will to do something radical to enlargen the capacity in Denmark. At the moment all development is going on off shore. It is expected that most of the wind turbines on land will be established by private individuals and co-operatives as the utilities are busy with the expansion off shore.

Also the largest off shore wind farm in the world, Middelgrunden is owned half by individuals joined in a co-operative and half of the utility Københavns Energi.

Example of establishing a 1 MW co-operative

WT: 1 MW

Yearly production: 2,000,000 kWh (2 mio. kWh)

200 people own shares corresponding to the production of 10.000 kWh (10 shares)

Investment:

Wind turbine: 6,000,000 DKK

Buy/rent land 500,000 DKK

Total price: 6,500,500 DKK

Price per share of 1000 kWh: $\frac{6,500,000}{2000 \text{ shares}} = 3250 \text{ DKK}$

Price for 10 shares: 32,500 DKK

Lifetime: 20 years

Price paid pr. kWh: 0,51 the first 10 years, thereafter 35 øre.

Operation and administration 180 DKK/ kW

Calculations including pay back of loans, interest etc. shows that the first ten years it costs up to 1200 DKK per year to hold the 10 shares, and thereafter the gain is approx. 2.200 DKK per year, so after 13 year it is profit. This gives an annual yield of 1,2 % after tax.

If the same wind turbine was single owned the annual yield after tax would be approx. 1.2 % depending on the financing method.

See also www.ecd.dk

See attached slides: concerning ownership in Denmark.

(see curve from www.dkvind.dk.)

Sources: www.dkvind.dk (on Danish).

See also: <http://www.windpower.dk/articles/coop.htm>. (about co-operatives.)

See also: <http://www.windpower.dk/articles/wtmindk.htm>