

# Aeroe

## 1.1. GEOGRAPHICAL SITUATION, CONTEXT AND ORIGIN OF THE PROJECT

**Geographical situation** : Ærø is a small island placed south of Funen near the Western end of the Baltic Sea. In 1985 the island had the world's largest wind farm consisting of 11 windturbines each with a capacity of 55 kW. In June 2001 12% of the islands electricity consumption was covered by 22 windturbines.

**Context** : In 1997 the co-operation "VE-Ø Organisation Ærø" (the renewable energy island co-operation Ærø) later renamed to "VE-Organisation Ærø" (renewable energy co-operation Ærø) was established.

The co-operation was formed in connection with the Danish Governments nomination of the renewable energy island of Denmark. The title went to the island of Samsø but the "VE-Organisation Ærø" decided to continue the plans with or without the title of being the Danish renewable energy-island. In Ærø's sustainable island project from 1997 it was essential that 100% of the island's energy consumption should be renewable energy and / or on environmentally benign energy technologies. After the plans were published the island received several public grants to continue the plans.

In 1998 there was made a plan for windturbines on Ærø. Following this plan was prepared plans for two wind farms on each 3 windturbines with a capacity of 12 MW in total. Before these plans were prepared, there had been several other plans and discussions, as described below. It is important to know that there were two groups, which co-operated through the years from 1997 till 2002. The VE-Organisation Ærø was the initiative group. Parallel to this group was established a co-operation of the existing owners of windturbines: Ærø Wind Co-operation ApS. The main plan was that the 22 existing windturbines should be replaced by the new and much bigger windturbines. The tasks of the Co-operation was to establish the new windturbines when the permissions were obtained – and to take down and remove the old windturbines.

**Origin** : The initiative group (VE-Organisation Ærø) was composed of the two mayors of the island's two municipalities and their municipal directors, the chairman for the local electricity supply, two chairmen from two local district heating systems, a member from a local agricultural union, and a member from the board of the local energy- and environment office (affiliated with OVE, The Danish Organisation for Renewable Energy). These 9 persons represented the local peoples energy supply, the energy planning and the agricultural interests on the island. It was a strong group, who had a massive support by the local people.

In the sustainable island project from 1997 they assumed that the windpower capacity should be enlarged by 16.4 MW. In the revised plans from 1998 they reduced the capacity to about 14 MW. The electricity consumption on the island was in 1996 on 40 mill. kWh. With a contribution from energy savings, the consumption required an establishment on 9 big windturbines of at least 1,5 MW pr. turbine to cover the electricity supply<sup>4</sup>. The plan was that all the electricity from start should be produced by windpower. Later the electricity production could be supplied by solar energy, biomass etc.

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<sup>4</sup> The turbines would produce the amount of electricity that will be consumed on the island after energy saving measures are implemented, but not necessarily at the same time. Cables to the mainland will give the necessary balance of the electricity supply and demand.

## 1.2. LEGAL FRAME AND INVESTMENT SCHEMES

### 1.2.1. *Legal Frame*

#### **Forming the cooperative : Ærø Wind co-operation ApS**

An ApS is a company, where the members has no personal economic responsibility. The co-operation was formed by the existing wind cooperatives on the island. The board of the new co-operation was elected from representatives from the boards of the old cooperatives:

Græsvænge Windpower, Højsten Windturbine, Skovby Windpower, The Trousløkke Windmill, Ærøskøbing District Heating, and Ærø Windfarm. The tasks of the new Ærø Windco-operation was to take care of the sale of windpower shares and to install the three windturbines. Thanks to a co-operation with Global Windpower A/S Thisted ([www.gwp.dk](http://www.gwp.dk)) Ærø Windco-operation ApS succeeded to get 0.60 DKK/kWh for all electricity<sup>5</sup> for all shareholders.

In the bylaws of Ærø Windpower ApS it is described that when the three windturbines are established and in production they will be given over to a new co-operative: Ærø Wind I/S.

#### **Ærø Wind I/S**

When all approvals were obtained there was established a new co-operative: Ærø Wind I/S. In the "I/S" structure the members has full liability (see the case of Lynetten). This legal structure has been used by several windpower co-operatives and has never caused any problems. This new co-operative was formed by the shareholders in the new windturbines and the company's task is to take care of the operation and maintenance as well as to sell the electricity. The bylaws for the co-operative describes among other things, that:

- Adults (age over 18) with registered permanent address on Ærø can be partners.
- Adults without permanent address on the island can be partners when they are owners of property on the island.
- Registered companies or institutions with permanent address on Ærø can be partners.
- All partners will be included in a list of partners with name, address, number of shares etc..
- The partnership is divided in ideal shares. One share equals 1000 kWh of annual "guarantee" production)
- There must be no burden of debt in the company

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<sup>5</sup> \* 0.60 DKK/kWh is the feed-in tariff given to owners of new windturbines that replaces old windturbines and that are installed before 2003 (replacement turbines installed in 2003 get a lower tariff based on the electricity exchange price +a premium). The replacement (or re-powering) windturbines can have maximal two-three times the capacity of the old windturbines that they replace, in order to get the high tariff for all electricity produced. The owners of the old windturbines, that are scrapped, get a scrap-proof. These scrap-proofs can be sold if the owner don't want to use them. Replacement windturbines receive a payment of 0.60 DKK/kWh for the first 12,000 full load hours (i.e. the electricity production equal to the capacity of the windturbine multiplied with 12,000). For the windturbines on Aeroe this high tariff is expected to last for the first 4,2 years. Then the payment will be 0.43 DKK pr. kWh for the next 10,000 full-load hours, i.e. the next 3 - 4 years. The price after the first 22.000 full load hours is uncertain, but it is expected to be about 0.33 DKK/ kWh until the turbines become 20 years old. After this date the payment will follow the market price for electricity.

### 1.2.2. Economy

The wind farm's calculated production is 18.863.000 kWh/year. To be absolutely sure, the production used in the budget is 10% less (the so-called guaranteed production): 16.977.000 kWh a year. The price for each share is expected to be 2.970 DKr, (401 €) based on below budgets.

#### Budgets for the project:

Investment budget in DKK

3 Vestas windturbines (V80-2,0MW) incl. All-risk warranty, service, 5 years insurance	35.220.000,-
Foundation	2.200.000,-
Phone connection	60.000,-
Roads	600.000,-
Low tension, connection for the windturbines	120.000,-
Project, design and establishing	1.000.000,-
Consultants	200.000,-
High tension connection, transformer etc.	900.000,-
EIA Analysis	295.000,-
Remove old windturbines	850.000,-
Price for scrap-proofs 845 kW	2.384.507,-
Price for old turbines for scrapping (ca.1155kW)	2.887.500,-
Price for 3 windturbines, 200 kW each, to be kept	1.692.882,-
Price for rent of site (30 years)	1.300.000,-
<u>Interests on loans during construction, misc.</u>	<u>200.000,-</u>
<b>Net investment in total:</b>	<b>49.909.889,- (6 744 579 €)</b>

Income from shares 16 977 shares x 2.970 DKr.	50.421.690,-
<u>Investment</u>	<u>- 49.909.889,-</u>
Initial free capital for Wind cooperative Ærø	511.801,- (69 162 €)

Annual budget, first 12,000 full load hours:

Sale of electricity 16,977,000 kWh x 0.60 DKK	10,186,200,- (1 376 513 €)
Administration costs (office, meetings etc.)	- 184,000,-
Operating costs (service, taxes to the electricity company etc.)	225,000,-
Net income for shareholders, year 1-4	9,777,200,-
Net income per share, year 1-4	575,-

### *Economy for different typical partners:*

Shares paid in cash:

Number of shares	Investment (DKK)	Taxes	Income in DKK			
			1 year	10 year	12 years	Total 1 – 20 years
5	14 850	0	2 874	1 309	1 295	34 389
10	29 700	900	4 817	2 527	2 500	62 483

Shares financed fully with a loan:

Number of shares	Investment (DKK)	Taxes	Income in DKK			
			1-8 year	10 year	12 years	Total 9 – 20 years
5	14 850	0	0	1 309	1 295	16 810
10	29 700	900	0	1 434	2 500	25 925

### **1.2.3. Financing**

#### **Sale of shares for the new wind farm.**

The period for sale was planned to be from August 7 until September 13, 2002. In this period people from Ærø could reserve a number of the shares with a payment of 30 DKK pr. share. In this first subscription each person could book a maximum of 20 shares. If a single person wanted more than 20 shares, they could join a pool of reserves, that would be for sale, when the period was over. The 30 DKK pr. share will later be deducted from the price of the shares. The final payments were made immediately after the permission to build the windturbines were obtained. The cooperative has 500 members. All the members are living on the island, or own a summer houses on the island.

### **1.3. CONSULTATION PROCESS**

**Local dialogue** : the initiative group had the following arguments for establishing windturbines on land:

- contribution to the local economy
- income from sale of electricity
- buying local energy means that the money remains on the island
- being in front with sustainable energy will help the energy-tourism to remain on the island

Off-shore windturbines were not interesting because of the lack of local income. The arguments and the information was given on several meetings with local people. There was a high level of local dialogue and many discussions among between local people and the initiative group.

In February 1999 there was a meeting between the two municipalities on the island, the Danish Energy Agency, the Forest and Nature Agency (Skov og Naturstyrelsen) and the county of Funen (Fyn). The purpose of the meeting was to discuss the contents and the approval in principle of the plans for windpower on the island. The meeting concluded that there was room for two wind farms on the island. This conclusion was based on the government's new planning procedures (introduced in 1999) where the distance between wind farms was a consideration and where increased emphasis was put on the harmony of the landscape. The two areas that were pointed out had good wind conditions and were placed in the south of the island where the population density is low.

The initiative group's plans for windpower were now reduced from a need of about 14 MW and nine windturbines to the possible, which suddenly appeared to be 6 windturbines in two areas. Each windturbine's capacity was assumed to be 2 MW and the possible power 12 MW in total. Each 2 MW windturbine is expected to produce 6,788,000 kWh a year, similar to the consumption of 1.700 households. In spite of the reduction in capacity, the organisation expects that the production from the two parks will cover the electricity consumption nearly 100% when the plans for energy savings are implemented.

**Discussions of Environmental Impacts** : the initiative group (VE-Organisation Ærø) started the planning procedures for the first wind farm with 3 windturbines in the year 2000. When the windturbines are higher than 80 meter the legal planning procedure demands that there must be made:

- a proposal for amendment of the regional (county) plan
- a statement for the project
- an Environmental Impact Assessment (EIA)-analysis

These documents were made by the VE-Organisation Ærø and was read by the authorities in October 2001. The purpose of the EIA-analysis is to describe which essential effects and consequences the project can or will have on further planning, nature, and environment. In additions must be assessed if there are alternatives to the project such as alternative locations, alternative heights of the windturbines.

## 1.4. DIFFICULTIES ENCOUNTERED

An obvious question to ask is: why did it take 5 years to realise the plans? The main reasons were:

- the movement against windturbines in Denmark
- some local opposition against the change from smaller (below 200 kW) to large (2 MW) turbines that have larger impacts on the landscape
- some political opposition against the owners of the windturbines and their income from this activity (for a period it was a good business to own a windturbine in Denmark)
- the procedures for planning
- several changes in regulation of tariffs for windpower. As the rules were changed, the project had to change their budgets, prospects etc.

## 1.5. SOLUTION IDENTIFIED

Only in the summer of 2002 the Windcooperative Ærø was allowed to use scrap-proofs to get the tariff of 0.60 DKK/kWh. The project has several times been in danger because of all the changes and an expected bad economy. **The fact that both local population, local politicians and local authorities really wanted the project, finally made it succeed.**

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Some of the owners inside the top (nacelle) of the windturbine at the "open house", -  
September 2003 -

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