

Lynetten

1.1. GEOGRAPHICAL SITUATION, ORIGIN AND CONTEXT OF THE PROJECT

Geographical situation: The windturbines are placed on a dike beside a waste treatment plant at the Northern end of the outside(Eastern) part of the Copenhagen harbour at an area know as "Lynetten". To the east and North is sea and low islands while about 2.5 km to the west are central parts of Copenhagen. The wind speed is in the medium range for Danish windpower sites. The turbines have a capacity factor about 20.5%.

View of the windturbines and the entrance of the Copenhagen Harbour.



Photo by Hans Christian Sørensen, SPOK Consult, Copenhagen

Context: Most of the windturbines in Denmark are placed in the open land or near small villages, but after the first successes in the open land, several city people also wanted to take part in the development. In the middle of the nineties some of these people formed a wind cooperative in Copenhagen, practically at the same time, when the movement against windturbines in the open land started.

Origin: Lynetten Windmøllelaug I/S (Lynetten Wind Cooperative) represents local people from Copenhagen and neighbouring municipalities. Their plan was to establish 7 windturbines on a dike built near the harbour. It is a so-called "technical landscape"¹, in this case an industrial area. The Lynetten Wind Cooperative is an example from the main period of Large-Scale Development where most of the present Danish windturbines were installed (1995-2001).

¹ A technical landscape is an area, where several industrial activities are gathered. It can be near the harbour, close to power plants or similar facilities. The idea of placing windturbines in these areas is, that the harmonies of the original natural landscape are damaged already.

1.2. LEGAL FRAME AND INVESTMENT SCHEMES

1.2.1. Legal Frame

Most co-operatives, including Lynetten, were formed as an "Interessentskab" (I/S) which was a condition for the income from the shares to be tax free. The conditions for an I/S is that the shareholders has full, joint responsibility for the project. To reduce the risk for each shareholder, the co-operatives make the shareholders usually pay the entire investment so that the cooperatives would be free from debt from the beginning of the project. This way each shareholder only can be held responsible for the windturbines. Danish insurance companies make insurance for the electricity production, which reduces the risk for the shareholders.

The Cooperative was founded at a founding general meeting March 18, 1995. At this meeting also a board was elected to take care of the operation.

Lynetten Wind Cooperative became responsible for establishing 4 of the windturbines (no. 4-7). The last 3 windturbines were established by the local power supply company called "Gas and electricity Services of Copenhagen" (Københavns Belysningsvæsen, now Copenhagen Energy).

Normally a project like this would go through a public hearing, either to develop a local plan for the project or as part of an Environmental Impact Assessment(EIA). This project was in a special situation, which was used in a very intelligent way. Some years before the windpower project the "Lynetten Waste-water Treatment Plant" needed extension and a new dumpsite for sludge. For this project was made a local plan, which included building a dike east of the waste-water plant. This local plan had been in a public hearing already when the windpower project started. In this local plan, The Energy- and Environment Office of Copenhagen succeeded to get in a sentence that contained the possibility of building windturbines on the dike.

This existence of this local plan meant, that the wind Cooperative did not have to go through another public hearing. All assessments of the environment were made by the municipality of Copenhagen and all the approvals for building the dike were obtained already. Of course the wind Cooperative needed a separate building permission for the windturbines. In 1995 there was no law for a special EIA assessment, but they needed to get the authorities' approval for the safety of the project. Therefore was made a hearing of all authorities of relevance (the Energy Agency, the Defence Agency, the Sea- and Shipping Agency etc.) and to organisations with interest in questions about energy and environment. This hearing had the result that they should change the planned pattern of the windturbines. They had to move the windturbines closer together so that the visibility of light from a nearby lighthouse was not disturbed.

1.2.2. Economy

When the 7 windturbines were planned and established the tariff on electricity from windturbines was quite favourable. The electricity company should by regulation pay about 0.648 DKK/ kWh - 87 c€/kWh -, (including 0.10 DKK/ kWh - 13 c€/kWh - for reimbursement of CO₂-tax, 0.17 DKK – 23c€/kWh - for partly reimbursement of other electricity taxes and about 0.38 DKK/kWh – 51 c€/kWh - for the costs of the electricity production in Copenhagen) and the income from the electricity was tax free for the owners of the shares if the annual sale of electricity was below 3 000 DKK per shareholder. Each shareholder could own 9 shares if they had an electricity consumption of 6.000 kWh a year or less. If the consumption was over 6.000 kWh they could buy 1,5 share for each 1.000 kWh of the consumption.

The windpower manufacturer Bonus had assessed that the production would be 4.000.000 kWh a year and therefore guaranteed a production of 3.600.000 kWh a year. This production forecast was essential for the economy of the project. The insurance would cover the losses if the production was less than 95% of the guaranteed production.

In its prospects for potential members, the co-operative use the following budget:

Investment budget, 4 wind turbines:each 600 kW

Price for 4 windturbines (600 kW each)	DKK: 12,200,000,-
Price for foundations	1,200,000,-
Electricity connection and transformers	1,250,000,-
Consultants	200,000,-
Establishing of wind cooperative	200,000,-
5 years total insurance	500,000,-
Remote monitoring and control system	50,000,-
Other expenses	150,000,-
Total²	15,750,000,-

The expected amount of shares were 3.600 (486,5 €), each representing the annual "guarantee" electricity production of 1000 kWh. With a budget 15,750,000 DKK (2 128 378 €), each share would cost 4.372 DKK (591 €).

Annual budget of co-operative after installation (in DKK):

	Income from sale of electricity	Interests earned ³	Expenses
1 share	648,-	16,-	64,-
9 shares	5.832,-	144,-	576,-
3.600 shares	2.332.800,-	57.600,-	230.400,-

The shareholders would have an income of 600 DKr. (81 €) for each share – or DKr. 5.400, (730 €) - for nine shares. When each share would cost 4.500 DKr. the annual income would be about 13,3% of the investment.

The budget was made in 1995 and before the major changes of the Danish electricity regulation in 1998-99. The budgets from 1995 are therefore made without considering a change in the payment for the electricity. The expectation was that the windturbines could have a lifetime of 20 years with same income in all these years.

1.2.3. Financing

The small common savings bank "Sparekassen Fælleskassen" had made a deal with Lynetten Wind Cooperative. Each shareholder could take a loan representing his/her total investment by giving the shareholder-certificates as security in the bank. The interest-payment of the debt is tax deductible.

The economic risk in the project was minimal. The expectations were that the project would give a nice economic input for each shareholder.

As a consequence, the shares from "Lynetten Wind Cooperative I/S" were popular. From march 1995 till summer 1996 the shares was for sale. Early in the project the cooperative grew to be the biggest in the world. With nearly 800 shareholders there was never seen as big a wind power cooperative before. A large part of the shareholders had used the possibilities to reserve

² In some of the calculations the total expences for the establishing was expected to be 16.000.000 DKK, in the final pahse the turbines became 700 kW each and the budget was increased.

³ The interests earned of the free capital of the cooperative is paid to the members.

shares in advance. Some of these dropped out of the project and their shares became for sale again. From 1995 till 1996 several meetings were organised by the board of the cooperative in Cupertino with the Copenhagen Energy and Environment Office. At these meetings came local people from Copenhagen and the neighbouring municipalities. All with the same interest: establishing of wind turbines. Until September 2001 there were still many local people, who were interested in buying shares from Lynetten Wind Cooperative. In the cooperative's newsletter from September 2001 the board mention that there are 40 people on the waiting-list and still in the beginning of 2004 there are still persons on the waiting list to buy shares. In January 2002 there were 909 members of the cooperative.

1.3. CONSULTATION PROCESS

By using existing plans the wind cooperative had few problems to get permissions. In spite of this, the board of the cooperative wanted to get into a dialogue with the local people. They were very active in writing about the project in the newspapers and they participated in local events to give further information. By these activities they got a lot of statements from the local people, but they were all positive. The people in the board does not remember any negative statements or any protests against their project. They find that they did not get protests because they made a good information work and participated in the local debate. Of course, the fact that they could use an existing local plan, that had been in a public hearing, also meant a lot for carrying out this phase.

To public meetings, where the project was presented to potential shareholders, came a few students, older people, and non-academic people. An investigation made by RUC (Roskilde University) concluded that the members of the cooperative represented a much wider part of the population. There were more academic people, people above forty years, and people with an expected good, personal economy in the membership than at the public information meetings. These members did never join the meetings and did not participate in the discussions.

One question about members of windpower co-operatives is if the ownership of windturbines makes the owner more "green" so they would change their environmental behaviour. Some expected that a commitment to e.g. a wind farm would give an increased understanding for environmental issues and for the aspects of the environment that this organisation is dealing with. In an investigation made by some RUC students, some of the members from the co-operative was interviewed. In the rapport they made the conclusion that these expectations only are correct for a certain part of the members. The members that were interviewed had an environmental green attitude, but it is not possible to prove, that it is their commitment to the cooperative that is the reason. On the other hand, the members are responsible for spreading positive information about the project they are committed to. This means that **the higher number of members – the more ambassadors do the project have, and the more people get interested**. This could be one of the reasons why windturbines with only one owner often has a hard time to be accepted.

Finally, when the windturbines were established, the cooperative had several calls from people telling them, that the windturbines were out of work. Each time it was a mistake. It was never the cooperative's windturbines that were out of order – but the three turbines owned by the gas and electricity company.. This story is a **good example of local peoples interest and participating in a common project – even if they are not always personally involved**.

1.4. DIFFICULTIES ENCOUNTERED

1.4.1. Technical problems encountered during the project implementation

Before establishing the windturbines was built the dike that separated a dumpsite for sludge from the sea. The windturbines were to be erected on that dike. The construction of the dike gave several problems of both constructional, economic and scheduling characters. The cooperative should build one part of the dike – and the Gas and electricity Services of Copenhagen should build the other part. They choose the engineering Company “Carl Bro” to be in charge of the construction. In the middle of April 1996 the work on the foundation started. This work was about to break the time schedule of the project, because the underground was more soft than expected. This involved some extra days work and at this time a delay in the schedule could mean several weeks delay at the end of the project. The delay gave problems for the schedule of the of the big crane, that should place the windturbines on the dike. In Denmark there are only a few mobile cranes that can deal with this size of work.

Another problem during the construction was the official opening of the new part of the “Lynetten Waste-water Treatment Plant”. This opening required good roads to the plant, that was nearby to the location where the construction company was working for the wind cooperative. The top of the dike and an area around the plant should be covered with asphalt for the opening. This asphalt could be a problem when the wind cooperative later in the process should transport the windturbines over the area. If the cooperative had to pay for repair of damages in the asphalt it could be very expensive and ruin the budget.

There were several problems like this, that could delay the project and give more expenses than expected. In spite of the problems, the cooperative succeeded in keeping the overall time schedule for the construction.

1.4.2. Problems due to the liberalisation

As a preparation to the electricity liberalisation, the Danish Government has changed the regulations for production of electricity. This preparation resulted in a reform of “Law of electricity” in 1999. In this reform were several changes, and among them were new rules for the payment of electricity produced by windturbines. These rules changed several times. Initially the payment was 648 DKK/ kWh. The starting price for electricity was 0.378 DKK/kWh – with the reform this price was reduced to max. 0.33 DKK/ kWh. Furthermore the 0.17 DKK/kWh that was paid as an electricity tax refund was abolished after some year's production. **For the cooperative the reform meant** that the tariff became 0.60 DKK/ kWh for the first 12,000 full load hours (electricity production = installed capacity * 12,000) – and then reduced to 0.33 + 0.10 DKK /kWh in total -a reduction of 34%. As the cooperative also had larger expenses than expected this meant a 50% reduction of the shareholders income. After the electricity liberalisation is fully implemented, the prices are even lower than expected in 1999 The budget for the project assumed that the shareholder's loans were paid back after ten years. After the new rules, they could expect that it will take three more years. The conditions from the bank were unknown and no-one knew if they were willing to extend the maturity periods of the loan.

1.5. SOLUTION IDENTIFIED

1.5.1. Related to the technical problems :

In order to solve the problem of the delay in the schedule, the construction process was changed so that the overall time schedule could be kept unchanged. The changes required a faster installation of two of the windturbines.

Concerning the possible unexpected supplementary expenses due to eventual repair of damages in the asphalt of the road, the project was fortunate as it was the construction company which worked for the co-operative that also won the tender for putting asphalt in the area around the plant. The result was that they negotiated with the plant and got the final finishing of the asphalt work delayed to avoid extra expenses.

1.5.2. Related to the liberalisation and the decrease of shareholders income :

Finally it turned out that the economy in the cooperative was healthy enough to finance the loan in some extra years, but shareholders had to bear the loss and as a result they only received about 50% of the expected income.

The co-operative is still receiving the payment of 0.60 DKK/kWh. When they have received this payment for 12.000 full-load hours they will be receive 0.43 DKK/ kWh until 2006. After that they can only receive the 0.36 DKK/kWh, or less depending on the electricity market price.

Two of the seven turbines with the waste treatment plant and a part of Copenhagen behind.
Photo by Hans Christian Sørensen, SPOK Consult, Copenhagen

