

SAMSØ - A RENEWABLE ENERGY-ISLAND

Summary of the "10 years of Development and Evaluation" report



In 1997, the Ministry of Energy of Denmark announced a competition : which local area or island could present the most realistic and realizable plan for the 100% transition to self-sufficiency with renewable energy ? The island of Samsø won the competition in October 1997. Since then, ten years have passed. How did the project and all its visionary ideas fare ?

1. SAMSØ

Samsø has an area of 114 km², it is 26 km long, and 7 km wide at its maximum width. It has a population of 4100 inhabitants (2008). Agriculture is the first island's business sector, many of its products are exported. Tourism is the second main business sector and half a million guests stay overnight every year. The renewable energy projects (windmills, district heating plants, renewable energy installations in private buildings) have also been an important source of jobs during the last ten years.

2. HEATING

The share of the total heat production produced by renewable energy (RE) increased from about 25% in 1997-1999 to about 65% in 2005. During this same period, there was a 10% decrease in the heat consumption.

When the project started, the existing homes could join the district heating system on a voluntary basis. Only the new buildings built in areas with existing or planned district heating are compelled to connect to the district heating system. To sign up for district heating before the plant is constructed is very cheap (80 Danish kroner/10 euros).

- Four district heating stations were built, which straw and wood chips are produced by local farmers
- Tranebjerg (opened in 1994, straw-based, owned by NRGi)
 - Nordby-Mårup (opened in 2002, 80% of the heat produced by wood chips, 20% by a 2500m² solar heating system, owned by NRGi)

- Onsbjerg (opened in 2003, straw-based, owned by Kremmer Jensen ApS)
- Ballen-Brundby (opened in 2004, straw-based, owned by the consumers in a limited liability association)

More than 2000 houses are in the open countryside, too far away from the district heating systems. It is up to the owners to decide a change to renewable energy heating. Energy campaigns, exhibitions, and advising from energy organisations helped these houses to progressively adopt RE equipment, such as heat pumps, solar heating systems, wood burners, and biomass boilers.

Campaigns about heat savings and energy appraisals were also made.

From 1997 to 2001, the heat consumption is quite stable (it fluctuates between 67,222 and 75,277 MWh), but from 2001 it decreases by 11,889 MWh. From 2001 to 2005, no major change appeared in the energy consumption, but the share of renewable energy increased notably when at the same time there were less importation of oil.

3. ELECTRICITY

Samsø is connected to the Jutland electricity grid. In 1998, the process of finding wind turbine sites and financings began. The public meetings were an important aspect of this process. The goal was to inform, and above all to have the support of the population, which was necessary for a public ownership scheme. The construction started in 2000, and 11 onshore wind turbines rated at 1 MW were erected in three clusters. The turbines costed 66 million DKK (about 8.8 million EUR).

The offshore wind turbines were to compensate the CO² emissions generated by the transport sector on the island. 10 turbines rated at 2.3 MW were built, south of the island, at a cost of 250 million DKK (about 33.3 million EUR).

Concerning the electricity consumption, it is unchanged during the period 1997 to 2005. The reason is, despite savings and better practices in energy use, homes have more domestic equipment. A more intelligent consumption should be promoted in the future.

4. TRANSPORTATION

A regulation of the sector is difficult, as solutions are few, costly, and demanding.

The initial energy plan from 1997 recommended campaigns for more energy efficient driving habits. A feasibility study of a more flexible bus transportation service was made. A demonstration project showed it was possible to use rapeseed oil for the tractors and rapeseed feed for the cattle. The energy plan was optimistic about the potential of electrical cars, but the market is almost non-existent still, even if the municipality used electrical cars during a short period. The transportation sector on Samsø still relies on oil today. Multiple energy sources (electricity, hydrogen, rapeseed oil), and energy conservation should be promoted and developed.

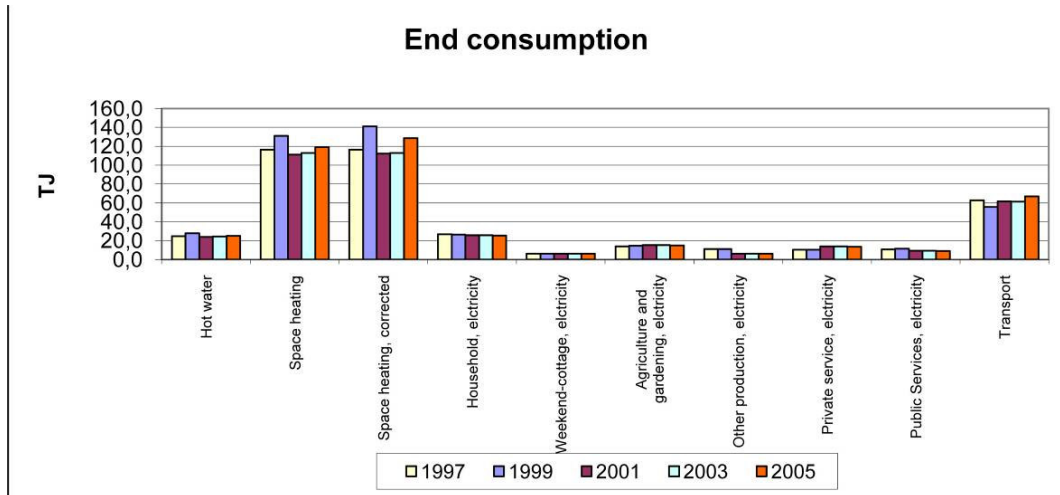
5. TOURISM AND EDUCATION

Samsø is a tourist island. The ecotourism trend is developing, and many guests come to visit the Renewable Energy Island project. There is a broad variety of visitors : political visitors interested in local energy policies, businessmen studying the economic potential, students, planning people, engineers, schools, grassroots ...

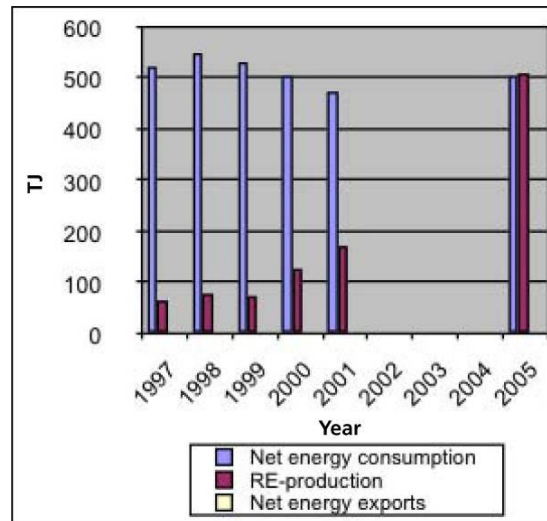
The Samsø Energy Academy plays the role of a showcase for the RE-island socio-economic development project. It houses Samsø Energy Agency, Samsø Energy and Environment Office and Energy Service Denmark.

A special emphasis is put on education. The Energy Academy is a working laboratory for schools, where the children learn by doing. They can acquire a greater knowledge of the renewable energies, and a greater understanding. The Energy Island project is an educational experiment with great development potential.

6. ENVIRONMENT



The energy consumption has not changed to any extent from 1997-2005, as apparent in the above figure. But the energy resources used have changed appreciably, as shown below.



7. ECONOMICS AND EMPLOYMENT

The total investment for the RE island projects (about 425 million DKK – 57 million euros) generated a number of jobs estimated to correspond to 20 years of employment per year in the period 1998-2007. The workers employed were mainly local workers.

SUMMARY AND CONCLUSION OF THE EVALUATION

To sum up, the project must be deemed almost completely successful. The primary objective has been achieved : 100% self-sufficiency with renewable energy attained using local resources, at the same time totally removing the emission of the greenhouse gas CO² and other air pollutants. One of the explanations for this success is the mobilization of the local population and their subsequent adoption of the project.

On the other hand, the conservation objectives have not been met in the heating or the electricity sector. Transportation has not been reduced or transformed to renewable energy.

The project has been a colossal task for such a small society; and they even finished on schedule. Could the same be done in all of Denmark ?