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## <Renewable Energy Island> <Samsøe Energy Agency>, <Denmark>

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### Summary

Samsøe was in 1997 chosen to be Renewable Energy Island as a showcase for Denmark. Aim was to change into 100% renewable energy for heating and electricity. First break through was in 2000 when the many small windmills were followed by 11 new 1 MW windmills. Now electricity supply was 100% renewable from the windmills. By establishing renewable energy heating plants mainly based on straw the total level of 70% renewable energy was reached in 2005.

Area of the island is 11.400 ha with 75% farming and forestry / 4400 citizens and 2000 jobs on the island.

This showcase as Sustainable Energy Island is attracting a lot of foreign visitors to get inspiration / such as for example Chongming Island in Shanghai, China, where an Ecocity is now planned.

End-user area	Target Audience	Technical
New buildings	x Citizens	x Energy efficiency
Refurbishment of buildings	x Households	x Heating
x Transport and mobility	x Property owners	Cooling
Financial instruments	Schools and universities	Appliances
Industry	Decision makers	Lighting
Legal initiatives (regulations, directives, etc)	x Local and regional authorities	CHP
Planning issues	x Transport companies	District Heating
x Sustainable communities	x Utilities	x Solar energy
x User behaviour	ESCOs	x Biomass
x Education	Architects and engineers	x Wind
Other	Financial institutions	Geothermal
	Other	Hydro power
		Other

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### 1.1 Objectives

Danish Energy Agency selected Samsøe to become “Renewable Energy Island” in 1997 – with the purpose over few years to demonstrate that an integrated energy planning based on renewable energy source could be implemented within a limited geographic area.

Technologies were well known - and organising possible. The idea was to make the many different elements match each other – to demonstrate the real meaning of “integrate” – and such integrating cannot be left over to the free market condition on its own. It has to be organised this integration process.

## **1.2 Process**

The process of realising “Samsøe Renewable Energy Island” could have been considered as a top-down planning together with the municipality and regional authorities etc. But this was not the right way for Samsøe citizens. One main problem in such approach would be landowner conflicts e.g. for the locating of new windmills - or consumer conflicts e.g. in deciding all house owners in a city area to change from individual oil based energy supply installations to a new district heating system based on renewable sources.

The chosen approach was a bottom-up method by creating citizen involvement right from beginning. Interested citizens were invited to participate in work groups for all planning and development work. Starting point was to set up a 10 years planning for how to reach the objective of renewable energy island.

One first step was a biomass analysing – to see what energy sources are available within wind, solar, straw, wood waste from forestry etc.

Then some general frame was established – by knowing from this analysis what could be possible to implement regarding energy sources.

Technologies to choose – and way of organising actual renewable energy supply solutions – were also initiated in the same work groups by local interested people. A main purpose was to create local people’s “ownership” of the developed solutions.

Later on this was followed by involving local citizens in economic ownership of renewable energy plants – and also involved in operating some of the renewable energy plants.

## **1.3 Financial resources and partners**

Financial resources primarily came from Danish Energy Agency, Aarhus Regional Authority and Samsøe Municipality – which also were primary partners to main developer “Samsøe Energy- and Environmental Agency” also established in 1997.

Other partners are Samsøe Business Forum, Samsøe Farmer’s Association and Samsøe Energy Supply Company besides Ministry of Energy.

Samsøe Energy Supply Company was established in 1998 to be responsible for the overall coordinating of the many different energy supply projects.

Samsøe Energy Academy was opened in 2007 to be basis for research and education/training and for servicing the growing number of guests arriving to the island for studying the many renewable energy supply showcases.

## **1.4 Results**

The initial biomass analysis showed that there was plenty of available wind, solar, straw and wood waste to replace oil.

First major result was the implementing of 11 big windmills of each 1 MW in 2002.

In 2004 the fourth new heating plant on renewables was opened and now 6 villages were supplied with district heating based on renewables.

In 2005 was reached a 100% renewable electricity and 70% renewable heating – amongst others with district heating based on solar with additional wood waste – and with 250 individual house installations based on solar, biomass and heat pumps.

## **1.5 Internal success and failure factors**

Important factors for realising the renewable energy island best practice are:

- Bottom-up approach in any steps from creating ideas and planning to implementing and operating.
- Land-owner written agreements regarding possible location of energy plants/installations etc.
- Creating of local citizens’ ownership of project initiatives as well as of final solutions

## 1.6 External success and failure factors

For realising the renewable energy island best practice following external factors are important:

- Commitment from local, regional and national energy authorities
- Experiences and expertise available from energy authorities and research institutions
- Funding support

## 1.7 Lessons learned and repeatability

A main lesson learnt is the bottom-up approach with citizens' involvement in any step right from the beginning. One evident example is the implementing of new land based windmills, where you often end up with protesting like "not in my back yard" from private land owners. Here the initiative to a new windmill came from local involved land owners – and one of first things were to make a written agreement allowing the windmill to be located here – before further planning continued. And then again local people were involved later on in managing and operating the energy plants.

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Soeren Hermansen:

“Our energy solutions both have to be meaningful regarding sustainable community development as well as to be affordable for low income consumers”

Illustrating photos:

Harvesting of solar energy – 2500 m<sup>2</sup> solar plant for district heating (see annex)

10 offshore wind turbines more than balance the fuel burned by all the vehicles on the island including 3 ferries that connect the island to the mainland (see annex)