

"Think local - act local"

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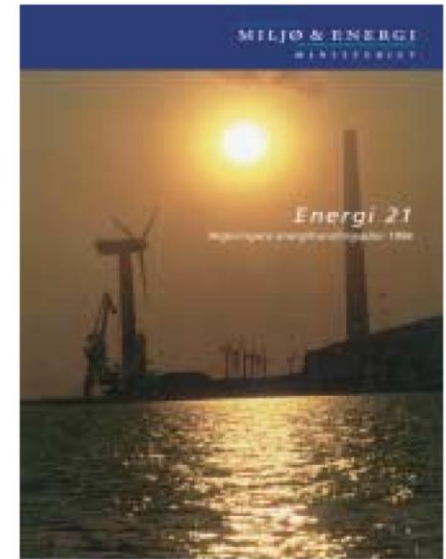


Experience from a Danish island



Background

- National Energy Strategy 'Energy 21' 1996
- Indicative target of 35% Renewables in 2035
- Pilot project to experience high share of RES in a well defined area
- Competition among 5 islands – Winner was Samsø
- Only limited financing for mapping and planning
- Mapping of available local RE sources
- Implementation of projects



The Ministry of Energy announced a competition in 1997. Which local area or island could present the most realistic and realizable plan for a 100 % transition to self-sufficiency with renewable energy? The Danish Energy Authority provided funding for the formulation of detailed plans for these transitions. Four islands and a peninsula participated in the competition: Læsø, Samsø, Ærø, Møn and Thyholm.

The background for the ministry's 1997 initiative was a report called Energy 21, which recommended an RE percent coverage of 35 % in the year 2030 for the country as a whole. With the above competition, the objective was to highlight renewable energy and study how high a percentage of renewable energy a well-defined area could achieve using available technology, and (almost) without extraordinary grants.

Projects

- 4 x District Heating plants
 - Tranebjerg, Straw, 3.7 m €
 - Nordby, Wood chips + solar, 2.7m €
 - Onsbjerg, straw 1.1 m €
 - Ballen-Brundby, straw 2.1m €
 - Investment subsidizes from national RES programme:
 - Tranebjerg 0, Nordby 1.2m, Onsbjerg 0.4m, Ballen 0.3m (0-44%, avg. 20%)
- Wind turbines
 - 11 x 1 MW on-shore
 - 10 x 2.3 MW off-shore
- Energy savings, individual heat pumps and individual RE boilers.

The share of the total heat 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.



RE district heating

- Investment in 4 new boilers based on local straw or wood chips
- Expansion of local DH grid
 - Replacing mainly oil based individual boilers and existing district heating also based on oil
- Feasibility and incentives
 - Loan financed and depreciated over life time (no big up-front payment)
 - Guaranteed by municipality and therefore best interest rates
 - Very low connection/registration fee
 - Biomass significantly cheaper than oil for heat production due to tax exception
 - Result: lower heat cost from day of connection

Ownership of District heating

- Nordby-Mårup & Tranebjerg
 - owned and operated by the utility company NRGi
- Onsbjerg
 - Owned and operated by a private investor (not common in Denmark)
- Ballen-Brundby
 - Owned and operated by cooperative – owned by consumers
- Consumers Heat Tariffs are cost reflective and regulated by national Heat Supply Act.

Cost of heat from District Heating

- Cheaper than individual oil boiler
- The Samsø DH systems are very small (80-400 consumers)
- Not the cheapest DH compared to bigger DH systems on mainland
- Nordby and Onsbjerg are cheapest – received also highest investment subsidy (37-44%)
- If no investment subsidies probably only one positive business case (Tranebjerg).

Fjernvarmeforsyning	Postnr.	Det koster det at opvarme et gennemsnitshus om året i kroner.	Fjernvarmeforsyning	Postnr.	Det koster det at opvarme et gennemsnitshus om året i kroner.
Hammel Fjernvarme	8450	7.859	Ryomgaard Fjernvarmeværk	8550	15.390
Hinnerup Fjernvarme	8382	7.914	Mejlby Kraftvarmeværk	8981	15.421
Galten Varmerværk	8464	8.375	Ulstrup Kraftvarmeværk	8860	15.476
Kjellerup Fjernvarme	8620	8.406	Holme Lundshøj Fjernvarme	8270	15.516
Skanderborg Fjernvarme	8660	9.432	Vivild Varmerværk	8961	15.548
Vejlby Fjernvarmcentral	8240	9.468	Havndal Fjernvarme	8970	15.874
Hadsten Varmerværk	8370	9.972	Ans Kraftvarmeværk	8643	16.163
Ebeltoft Fjernvarmeværk	8400	10.191	Onsbjerg Varmerværk	8305	16.479
Ry Varmerværk	8680	10.653	Nordby-Mårup Varmerværk	8305	16.483
Hørning Fjernvarme	8362	11.034	Nimtofte - NOFF - Takstområde 2	8581	16.522
Auning Varmerværk	8963	11.263	Gjerrild	8500	16.591
Ørsted Fjernvarmeværk	8950	11.326	Mesballe	8550	16.591
Rønde Fjernvarmeværk	8410	11.406	Tirstrup Varmerværk	8400	16.899
Grenå Varmerværk	8500	11.540	Balle Varmerværk	8444	16.935
Rundhøj Fjernvarme	8270	11.871	Rosmus Varmerværk	8444	16.935
Malling Varmerværk	8340	12.231	Nimtofte - NOFF - Takstområde 3	8581	16.940
Tranebjerg Varmerværk	8310	12.234	Stenvad Varmerværk	8586	17.189
Odder Varmerværk	8300	12.433	Laurbjerg Kraftvarmeværk	8870	17.306
Silkeborg Fjernvarme	8600	12.525	Ballen/Brundby Varmerværk	8305	17.354
Aarhus, Affaldvarme Aarhus (distribution)	8210	12.678	NRGI Lokalvarme A/S	8200	17.482
Løgsten-Skødstrup Fjernvarmeværk	8541	12.772	Langå Varmerværk	8870	17.797
Lystrup Fjernvarme	8520	13.115	Giesborg Varmerværk	8585	17.895
Thorsø Fjernvarmeværk	8600	13.313	Ørum Varmerværk, Ørum Djurs	8586	17.895
Allingåbro Varmerværk	8961	13.458	Voldby Varmerværk	8500	17.967
Fårvang Varmerværk	8882	13.922	Tranebjerg Fjernvarmeværk	8305	18.311
Kolind Fjernvarmeværk	8560	14.410	Thorsager Fjernvarmeværk	8410	18.496
Gjern Varmerværk	8883	14.425	Lading-Fajstrup Varmeforsyningselskab	8471	19.181
Hornslet Fjernvarmeselskab	8543	14.471	Rye Kraftvarmeværk	8680	19.579
Mørke Fjernvarmeselskab	8544	14.750	Boulstrup-Hou Kraftvarmeværk	8300	20.478
Assens Fjernvarme	9550	14.922	Uggeluse-Langkastrup Kraftvarmeværk	8960	22.020
Trustrup-Lyngby Varmerværk	8570	15.107	Gylling-Ørting-Falling Kraftvarmeværk	8300	22.181
Pindstrup Varmerværk	8550	15.109	Hundslund-Oldrup Kraftvarmeværk	8350	23.209
Verdo Varme A/S (Energi Randers Varme)	8920	15.115	Værum-Ørum Kraftvarmeværk	8870	24.481
Nimtofte - NOFF - Takstområde 1	8581	15.199	Mellerup Kraftvarme	8930	24.861
Gjerlev Varmerværk	8983	15.328	Gassum-Hvidsten Kraftvarmeværk	8981	28.377

● DH Samsø ● Individual oil boiler

Local ownership of wind turbines

- 2 onshore turbines organized as association with 450 local owners
- 9 remaining onshore owned by local farmers
- Offshore turbines:
 - Municipality: 5
 - Investors/Local farmers : 3
 - Associations with local owners: 2
- A new interconnector to mainland (the second to the island) was financed by power company



Feed-in tariff for electricity

Electricity production from wind turbines and connection to grid are regulated by national law

- For onshore: Fixed for the first 10 years, 8 EUR ct for first 12.000 'full-load hours' and then 6 EUR ct until ten year after connection
- For offshore: Market price based on Nord Pool exchange. Guaranteed minimum by State the first 10 years 6 EUR ct.
- Cost of each turbine incl grid connection ~ 0.8m onshore and 3.2m € offshore
- Positive business case for on-shore as well as for offshore

Samsø did it !

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- Energy production based on RES exceeds total demand for energy on island
- Self-sufficient in terms of energy consumption (net calculation)
- Already by 2005 local heat and power production on RES exceeded demand
- Only 35% of local biomass resources deployed
- Electricity production from wind turbines the most important source
- Still use of fossil fuels for ferry, road transport, farming and individual heating (1/3 based on oil)
- Surplus of electricity generation sent to mainland is bigger than remaining consumption of fossil fuels