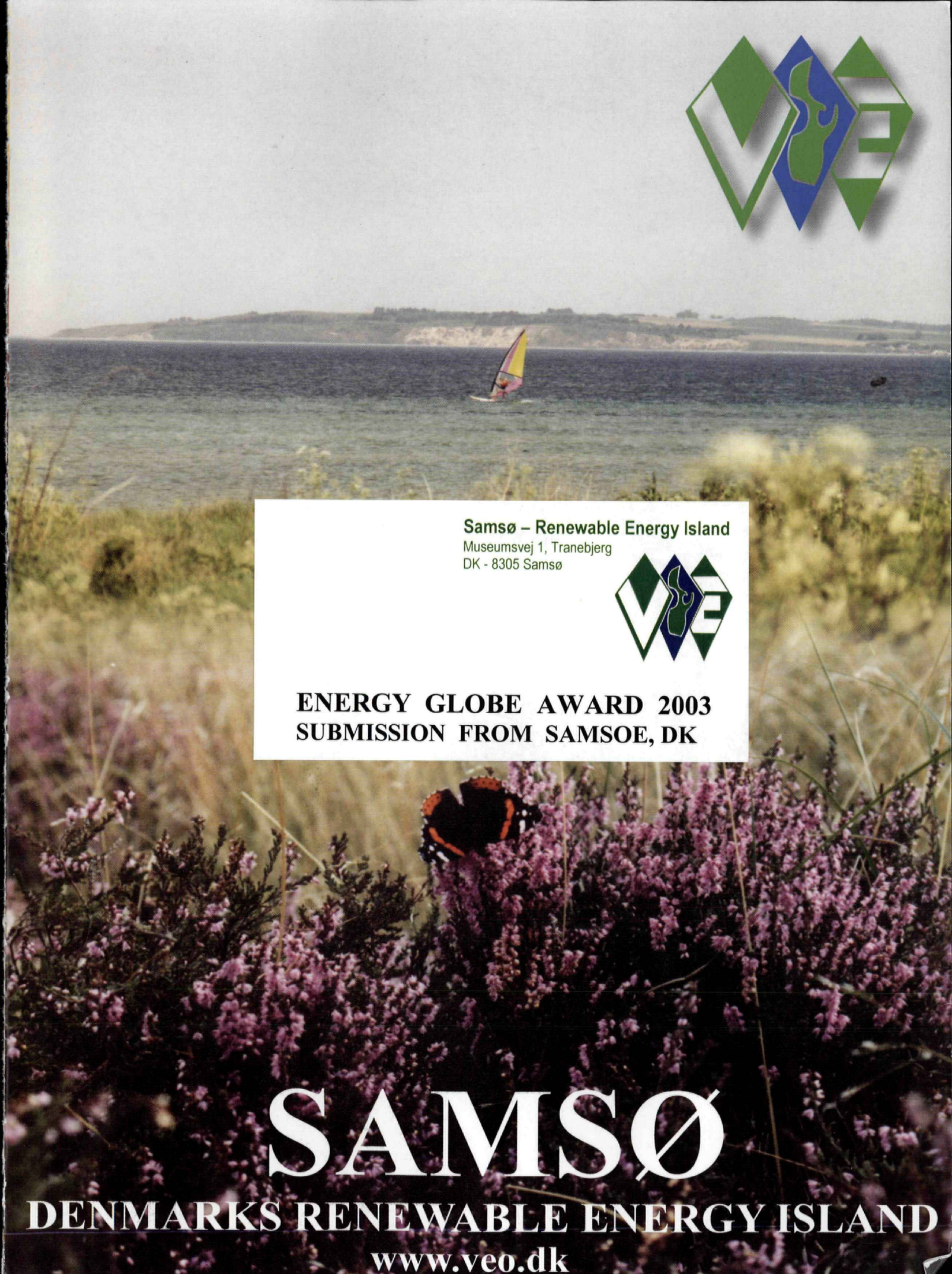


Samsø – Renewable Energy Island
Museumsvej 1, Tranebjerg
DK - 8305 Samsø

ENERGY GLOBE AWARD 2003
SUBMISSION FROM SAMSOE, DK

SAMSØ

DENMARKS RENEWABLE ENERGY ISLAND

www.veo.dk

...mpetition for Renewable ...rgy Islands in Denmark

...o... the government a...g...d a competition for Dan...sh islands. The goal was to establish an island community, which would run entirely on renewable energy. This takes a demonstration project of some proportion: Organisation, planning, economy and technology should be introduced in a way that allows a Danish island to run 100% on renewable energy by 2008.

The governmental initiative was linked to the goals of the UN Conferences on Climate Change, as it was part of the national Danish energy and environment policy objectives. A window exhibiting the newest technologies with the most recent experiences should be created. This in co-operation with a local community planning for a sustainable energy development.

Samsoe Wins the Competition

Samsoe worked out a project proposal and won the competition. The key elements in the realisation of the Samsoe project is described in this folder. The fact-sheets describe the development in specific areas. These sheets will be brought up to date in progress. So will the homepage www.veo.dk

In the project »Samsoe- The RE-Island of Denmark«, a big effort is put into co-operation with the local community and individuals. The development should be at a pace so that the mandate of the people isn't lost. Renewable energy is about technology and economy, but also about the local engagement and participation.

Renewable energy should be looked upon as a local resource. This is why the *organisational aspects* of the planning process on Samsoe have had first priority. The overall environmental policy goals in Denmark can only be reached with the involvement of local communities aiming at a sustainable development. Experiences from the Samsoe project can play a vital part in this process.

Project Samsoe, Denmarks Renewable Energy Island

The conversion of the energy system on Samsoe to renewable energy consists of 5 main themes.

• Electricity production based on wind energy and to some degree on decentralised CHP.

• District heating based on biomass, solar heating and surplus heat. In 10 villages the need for heat is considered sufficient to benefit from district heating systems.

• In rural areas heat consumption will be covered by individual solutions. Rural areas count 1200 all-year residents and 800 summerhouses. The potential solutions count solar-heating, biomass and heat-pump systems.

• The transport sector awaits a technical break-through. An offshore wind farm shall compensate for the energy consumption in this sector in short and medium term. In the longer term the electricity shall be used to secure a sustainable development of the transport sector on Samsoe.

• The future energy consumption shall be decreased via efforts toward energy savings. Actions count broad information, specific campaigns and economic incentives in the sectors of heating, electricity and transport.

Economy and Creation of Jobs

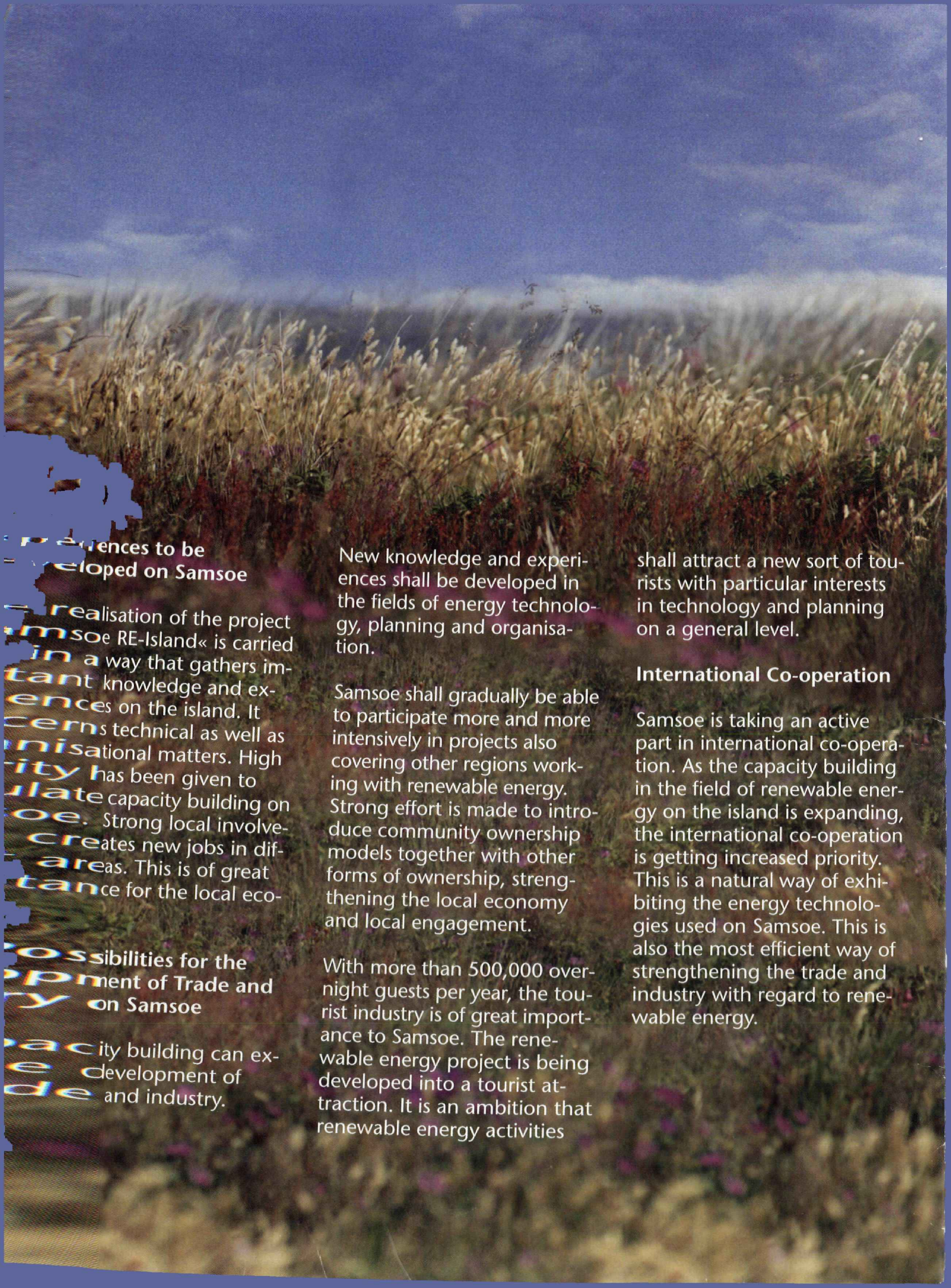
The project demands investments worth 80 million EUR. The conversion means 35 new jobs a year in the building phase as well as in the phase of operation.

The creation of jobs is a direct consequence of the project. The indirect effects on tourism and service have not been evaluated.

Organisation

Samsoe Municipality, Samsoe Farmers Union, Samsoe Trade Board and Samsoe Energy- and Environment Office have established Samsoe Energy Company. The secretariat of the company co-ordinates the project.

Samsoe Energy- and Environment Office works closely together with Samsoe Energy Company in realising the project. A separate company, Samsoe Offshore Wind Ltd, has been founded to realise the project concerning the offshore wind farm. The energy organisations have the same address.



...ences to be ...eloped on Samsoe

...realisation of the project ...msoe RE-Island« is carried ...in a way that gathers im...tant knowledge and ex...ences on the island. It ...cerns technical as well as ...nisational matters. High ...ity has been given to ...ulate capacity building on ...oe. Strong local involve... creates new jobs in dif... areas. This is of great ...tance for the local eco...

...ossibilities for the ...pment of Trade and ...y on Samsoe

...pacity building can ex... development of ...de and industry.

New knowledge and experiences shall be developed in the fields of energy technology, planning and organisation.

Samsoe shall gradually be able to participate more and more intensively in projects also covering other regions working with renewable energy. Strong effort is made to introduce community ownership models together with other forms of ownership, strengthening the local economy and local engagement.

With more than 500,000 overnight guests per year, the tourist industry is of great importance to Samsoe. The renewable energy project is being developed into a tourist attraction. It is an ambition that renewable energy activities shall attract a new sort of tourists with particular interests in technology and planning on a general level.

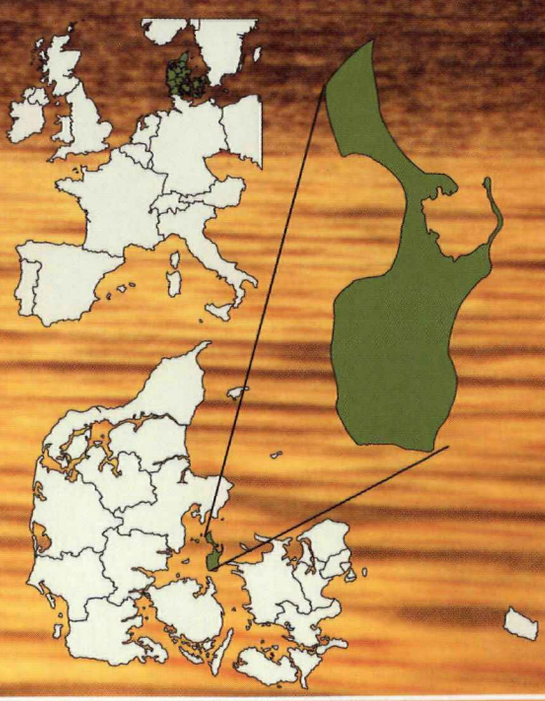
International Co-operation

Samsoe is taking an active part in international co-operation. As the capacity building in the field of renewable energy on the island is expanding, the international co-operation is getting increased priority. This is a natural way of exhibiting the energy technologies used on Samsoe. This is also the most efficient way of strengthening the trade and industry with regard to renewable energy.

Facts on Samsoe

Area	114 square km
Length North- South	26 km
Widest East- West	7 km
Sunshine hrs in relation to average of DK	+ 10 %
Precipitation in relation to to average of DK	- 10 %
Population	4,300
Full year jobs	2,100
Yearly overnight stays	500,000
Main professions	Agriculture, Tourism, Service

Samsoe in Denmark, in Europe, in ...



Samsø – Renewable Energy Island
Museumsvej 1, Tranebjerg
DK - 8305 Samsø

O.Ö. ENERGIESPARVERBAND
Landstrasse 45
A-4020 Linz
Austria

Samsø, d. 07.10.02

Dear jury and secretariat

Hereby a "Submission to the Energy Globe Award 2003" from Samsoe, Denmarks Renewable Energy Island.

- The Submission is sent in a separate envelope, enclosed some fact sheets and an Energy statistics.
- A video produced in the year of 2000 and a CD-Rom containing pictures etc. is sent in a separate envelope.

Best wishes

Aage Johnsen Nielsen
co-ordinator
Samsoe Energy Company

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Submission to the Energy Globe Award 2003

Address:

Museumsvej 1, DK - 8305 Samsoe
Company/institution

Samsoe Energy Company
Contact person

Aage Johnsen Nielsen
Street

Museumsvej 1, DK - 8305 Samsoe
Postal code/city/country

DK - 8305 Samsoe
+ 45 8659 3211, + 45 8659 2311, info@veo.dk, www.veo.dk
Tel/fax/e-mail/internet

I submit a project to the Energy Globe Award 2003 in the following category:

(please tick)

- ☐ building & housing
- ☐ companies
- ☐ transport
- ☐ municipalities, public institutions
- ☑ other

The following project documents are enclosed:

(please tick)

- ☑ project summary (including the project title)
- ☑ project description (goals, activities, level of implementation, effects/results)
- ☑ pictures
- ☑ video
- ☑ others Fact sheets and Energy Statistics

Further information on project submission, please see:
www.esv.or.at

My project submission can be characterised by the following key words:

- ☐ retrofitting
- ☐ green building
- ☐ lighting
- ☑ energy advice
- ☐ biogas
- ☐ organic waste
- ☑ biomass
- ☐ fuel cell
- ☐ office building
- ☑ energy efficient appliances/ installations
- ☐ energy efficiency
- ☐ energy storage
- ☑ energy policy/strategy
- ☑ renewable energy sources
- ☑ district heating
- ☐ financing
- ☐ window technology
- ☐ promotion programmes
- ☐ fossil fuels
- ☐ building envelope
- ☑ energy management
- ☐ geothermal
- ☑ heating boiler
- ☐ timber construction
- ☑ information campaigns
- ☑ climate protection
- ☐ motor vehicles
- ☐ CHP-combined heat and power
- ☐ cooling
- ☐ ventilation
- ☐ aircraft
- ☐ new products
- ☐ low energy buildings/ solar architecture
- ☐ photovoltaics
- ☐ production process
- ☐ rain water utilisation
- ☐ environmental friendly transport
- ☐ rail traffic
- ☐ school/training
- ☐ solar thermal collectors
- ☑ solar energy
- ☐ control technology/systems
- ☑ transport strategies
- ☐ traffic control systems
- ☑ insulation
- ☑ heat pump
- ☐ hot water supply systems
- ☐ hydro power
- ☐ hydrogen
- ☑ residential buildings
- ☐ vegetable oil/liquid fuels
- ☑ wind
- ☐ others

By participating in the Energy Globe Award 2003, give my agreement to publishing my project.

Please send your project submission to:

O.Ö. ENERGIESPARVERBAND
Landstraße 45, A-4020 Linz, Austria
T: +43-732-7720-14380
F: +43-732-7720-14383
E: energy.globe@esv.or.at
I: www.esv.or.at

Aage Johnsen

Fra: Aage Johnsen [post@veo.dk]
Sendt: 9. oktober 2002 16:24
Til: energy.globe@esv.or.at
Emne: Submission, Samsoe


Summary,Austria'02.doc


Article,Austria'02.doc

Dear secretariat

October 7. I posted and e-mailed you the submission from Samsoe.

I have just re-read the submission and have found a clasical failure conserning the sign "full stop (.)" and "comma (,)"

In Denmark we do use the signs in an opposite way. I therefore have corrected the failure on the enclosed documents.

I hope that it will be possible for you to replace the wrong documents with the enclosed documents.

Best wishes
Aage Johnsen Nielsen
Samsoe Energy Company

Summary concerning the project, Towards 100 % RES on Samsoe, Denmark

In the period of four years from 1999 – 2002 there has been installed and established:

- Two district heating systems.
- More than 200 individual biomass-, heatpump- and solarplants.
- 200 energy conservation projects in subsidised pensioners dwellings.
- 11 landbased wind-turbines.
- 10 off-shore wind-turbines.

The effect of the four year of establishing has been, that the electricity supply from RES on the island has increased from 5,5 % to 100 %. The RES supply in the heating sector has increased from 25 % to 57 %. Finally we will, more than, compensate the energy consumption and emission in the total transport sector by the erection of our off-shore wind-farm.

The emission has been reduced as follow:

- CO_2 by 142 %, from 46.0 to – 19.2 x 10^3 tons,
- SO_2 by 71 %, from 85.3 to 23.9 tons and
- NO_x by 41 %, from 338.1 to 200.8 tons.

The total investments has been 49 mill. €. The dependency on energyimport has been reduced from 7.3 mill. € per year in 1997 to 4.1 mill. € in the year of 2003 (all in '02 prices).

The year of employment in the construction sector has been approximately 80 in the four years period, and the creation of permanent jobs is 12 by the end of 2002.

Samsoe, the 6th of October, 2002.

Towards 100 % RES supply on Samsoe, Denmark

- ***Four years of experiences in energy savings, in establishing individual- and district heating plants and erection of wind-turbines on land and off-shore.***

Energy objectives

Samsoe has the long-term objective that the island's heating and electricity needs should be met solely by renewable energy sources in the course of a ten-year period. Another objective is to make the transport sector more efficient, thus reducing fossil fuel energy consumption in this sector. The various possibilities for a partial transition to renewable energy sources in the transport sector will also be explored.

The energy island project has the explicit objective to create an appreciable number of new jobs. The ten-year period of transition to 100% renewable energy in the heating and electricity sectors will create about 30 permanent new jobs in the island energy sector. The potential for new jobs in the service trades due to the energy island's tourists and guests in the important spring and fall seasons have not been examined.

New district heating areas

In April 2002 the utility Energy Company NRGi had opening of a new district heating system for the villages Nordby and Maarup, in the northern part of the island. The energy supply from the heating plant is based on wood chips from a local estate as well as a solar heating from a 2500 m^2 solarplant. 178 consumers are connected to the heating grid. The construction of the system began in June 2001.

In November 2002 another new district heating system will have opening in the village Onsbjerg, in the southern part of the island. This project is totally locally organized. The construction has been carried out only by entrepreneurs and craftsmen from the island. The builder is a local farming/entrepreneur firm and Samsoe Energy Company has had the projecting role. The energy supply is based on straw from the builder. Representatives from the consumers and the municipality are members of the board of the heatplant. 76 consumers are connected to the heating grid.

In the fall of '02 Samsoe Energy Company, in co-operation with a citizen group, have started up the planning for a new district heating plant for the villages Ballen and Brundby. The heat supply shall come from biogas and straw/Elephant grass.

Energy crops

12 hectare of Elephant grass has been planted in the year of 2001, as a demonstrating project. The involved farmers have agreed to grow these new crops on their marginal acreage. The Elephant grass will be used as biomass fuel in the district heating plants. If we succeed with this demonstration project, it will be possible to continue and enlarge the areas concerning this energy crop.

Individual renewable energy systems (for homes outside district heating areas)

In the spring of 1999 and 2000 we carried out a campaign for installing of RE energy installations in dwellings in the rural area. The campaigns in concert with the ongoing efforts of NRGi and the local tradesmen has sustained a strong rate of growth. Up to now, nearly 100 thermal solar systems, more than 100 biomass boilers and approximately 30 heatpump systems have been established in mostly private homes.

Lower heating costs in subsidised pensioner homes

We have carried out three campaigns since 1999. 440 pensioners who receive municipal heating subsidies have been mailed campaign material directly, suggesting them to consider energy conservation in their homes. A national programme reimburses pensioners up to 50 % of their energy conservation investments (up to a maximum reimbursement of 3,350 €). 200 of the island pensioners have participated in this programme since '99.

Status on heating from the beginning of 2003

The energy supply from RES in 1997 was app. 25 %. Because of energysavings, individual plants in the rural countryside and especially the opening of two new district heating systems in '02, the forecasted supply from RES in 2003 in percentage will grow to approximately 57 %.

Land-based windturbines

The 11 land-based 1 MW windturbines were installed in March and August 2000. This means that approximately 100 % of Samsoe's electricity consumption now is produced by windpower. Two of the turbines are owned co-operatively by Samsoe Windenergy, while local farmers privately own nine. A Energy Foundation receive annual 7,200 € in donations from 9 of the windmill owners. These funded money shall be available for public energy projects on the island.

Disposal site methane gas

In the spring of 2000, the energy organisations and a local farmer began to investigate the possible exploitation of methane gas from a closed landfill site. With financial support from The Danish Energy Agency, the installation was established in autumn 2000. The farmer invited other islanders to join him in this economic venture, and a co-operative was born – Samsoe Deponigas I/S. The methane gas runs a 15kW motor/generator. The excess heat is not (as yet) utilised. The electricity is sold to the grid. The experiences from this plant will be used in a larger plant, which shall be established later on.

Off-shore windturbines

It's difficult to convert the energy supply in the transport sector to renewable energy. Therefore we erect 10 off-shore windturbines south of Samsoe as a compensation for the fossil fuel energy supply (and emission) in the transport sector in the late 2002. The transport sector does include all of driving vehicles and machinery on the island, and the three ferries. The annual production from the windfarm will be app. 280 TJ. That's even more than the consumption in the transport sector. In the future we will explore the possibilities for using the electricity for electrical cars (to day we have only four) and hydrogen vehicles.

Other effects

Other effects that should be mentioned are: the environmental, showcase's and local economy.

The environmental

From 1997 to 2003 (forecasted) we have reduced the emission from CO_2 by 142 %, from SO_2 by 71 % and from NO_x by 41 %. The reason that we use the forecasted figures for 2003 are, that the year of 2002 has been "a great year of construction", by opening of two district heating systems and the off-shore windfarm. Of course there will be some slight corrections when we receive information from the nine supplying organisations in the year of 2004.

Showcases

When starting this energy island project it was a purpose to demonstrate different energysystems as tools for: reducing the emission of gases to the environment, demonstrating of possibilities for planning and solid energy technologies. And the number of technical visitors increases every year. In 2001 the number of visitors were approximately 1000. A greater part came from Scandinavia, Eastern Europe and the Far East (especially Japan).

In the same way we do participate in EU ALTENER-projects and we constantly do enlarge our "EU-network" concerning penetration for Renewable Energy.

Local economy

In a period of four years from 1999 – 2002 there has been investments of totally 49 million €. Approximately 40 mill. has been invested by the islanders in cash ore mostly via loans from the two local banks. App. 3 mill. € was given from national funds as direct public aids. App. 6 mill. € has been external financed from the Energycompany NRGi concerning the district heating in Nordby/Maarup and 1½ of the off-shore turbines financed by one investor (½ turbine) and an investing company (1/1 turbine).

In the four years period, the years of employment, concerning construction has been increased by approximately 80 in the entrepreneur- and crafts firms. The status concerning permanent jobs is 12 employed in services of the plants, energy supplying i.e. Extra jobs in the tourist sector and services from hotels etc. is not yet calculated.

The dependency on energyimport, concerning heating and electricity, will be reduced from 7,3 mill. € per year in 1997 to 4,1 mill. € in the year of 2003 (all in '02 prices).

Finally we have noted a great involvement from as well the consumers as the crafts firms concerning involvement in the respective projects an ideas for new projects.

Samsoe, the 6th of October, 2002

Aage Johnsen Nielsen

co-ordinator

Samsoe Energy Company