

**Take-Off AWARDS 2000**



**Denmark's Renewable Energy Island**

**Contribution from Samsø**



## The Transport sector

It is a difficult task to convert the transport sector to renewable energy. The first thing to be done is the installation of 10 offshore wind turbines to produce the same amount of energy for transportation as consumed at the moment.

In the long term the electricity from the wind turbines can be used for electric cars and hydrogen vehicles.

## Offshore wind turbines

The 10 offshore wind turbines each with a capacity of 2 MW will be erected at Paludans Flak about four kilometres south of Samsø. Examination by divers will take place during the year 2000, and the installation of the turbines in the year 2002.

## Samsø Energy- and Environment Office

The society was founded in 1997. The object was to encourage a change in the energy supply to renewable energy. And encourage a change to a sustainable development in biological balance.

### Membership of Samsø Energy- and Environment Office

Name \_\_\_\_\_

Address \_\_\_\_\_

Postal code/Town \_\_\_\_\_

Subscription is DKR 200 per year.

Please forward coupon to:



### Samsø Energi- og Miljøkontor

Søtofte 24, Tranebjerg – DK-8305 Samsø  
Tel.: +45 8659 2322 – Fax: +45 8659 2311

www.samsø.com E-mail: samsø@sek.dk

### Thorkild Bjørnvig, Samsø: Extract from “Our Damaged Earth” from *Epimetheus*, a collection of environmental poems 1980-90

*... If we passively register statistics, diagnoses  
and what the newspapers say,  
we hear in our inner ear  
the tick of the countdown, the eddies of  
attrition, the scraping of sand grains.*

*But when we act, we hope.  
Each action counts, each law reform.  
Our species has brought about untold harm.  
But from us could issue  
the countermeasures – the healing,  
the care of our damaged Earth.*

English translation: Paula Hostrup-Jessen

## Organizational Plan



# SAMSØ

## Denmarks Renewable Energy Island







# SAMSØ - DENMARKS RENEWABLE ENERGY ISLAND



## The energy plan for 1998- 2008

Throughout the 10 year period there will be intensive efforts towards savings in the energy sector: electricity, heat and transport.

## Power supply

On Samsø there has through the years been a power production from small wind turbines.

In the year 2000 the establishment of 11 new 1 MW wind turbines will take place: 3 in Tanderup, 3 in Permelille and 5 in Brundby Mark.

Then 75% of the power consumption is produced by wind turbines.

The remaining 25% will be produced from biogas and combined heat and power plants. This will happen in 2004.

## Heating

In the future 60% of the homes will be heated from district heating plants. The remaining 40% will install individual solar heating-, wood pills-, and heat pump systems.

## District heating

Today 90% of the homes in Tranebjerg are connected to a straw based district heating plant.

The new district heating systems will be established in the following villages and by the energy sources mentioned:

- Nordby/Mårup - woodchips and solar heating
- Ballen/Brundby - connected to district heating in Tranebjerg
- Kolby Kås/ Kolby - heat surplus from the ferries
- Besser area - biogas

Onsbjerg and the other villages are not yet decided.

## Neighbouring district heating

Small villages can use district heating on a small scale, where local farmers - apart from their own demands - can supply the neighbours with heat from straw-, biogas- or other biomass plants.



Photo: Jens Øster-Mortensen

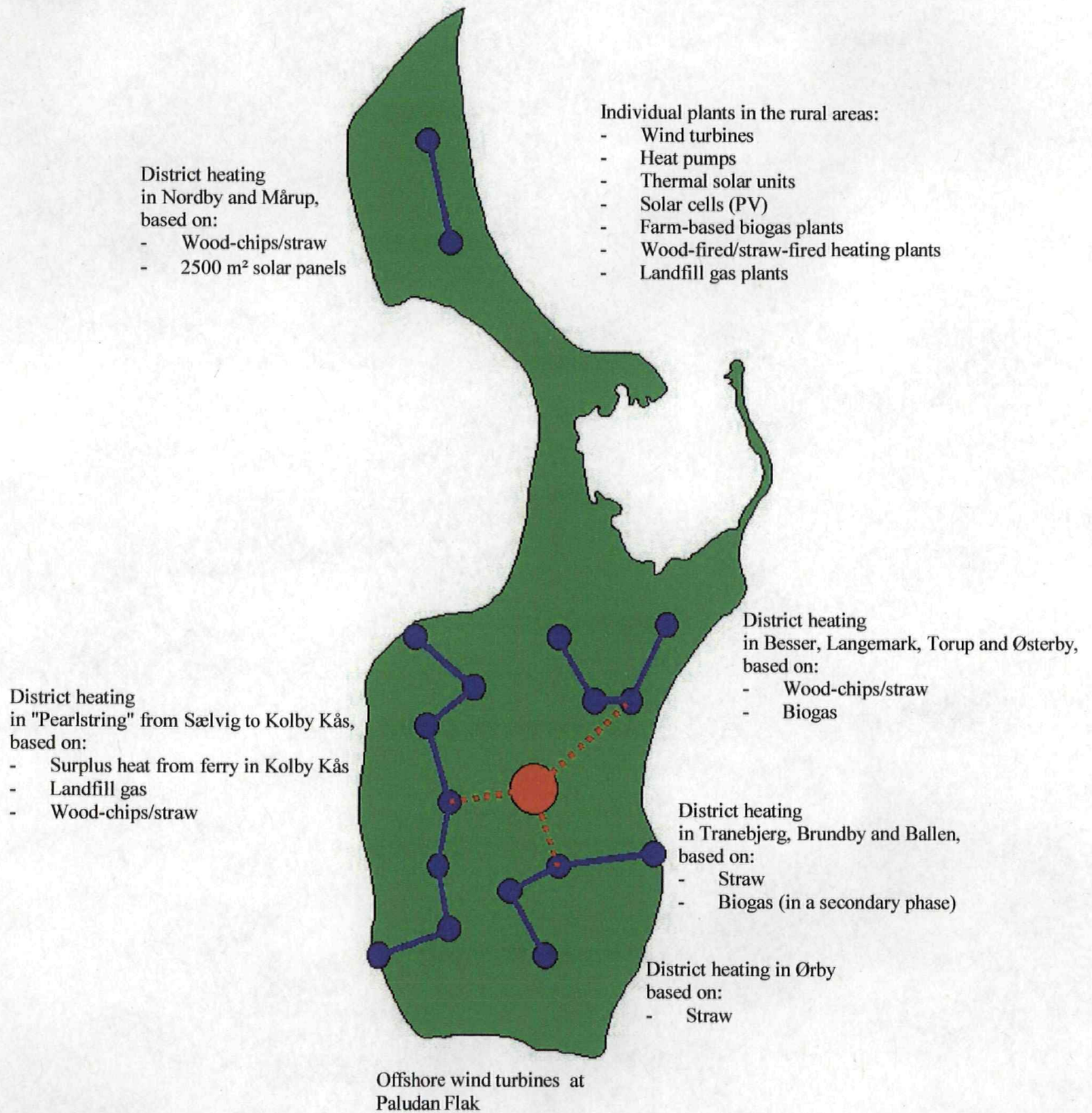




# Samsø

Denmark's Renewable Energy Island

## 1998 - 2008



Samsø was in the fall of 1997 appointed by the Ministry of Energy as "Denmarks Renewable Energy Island".

The objective is, that Samsø will be self-sufficient with Renewable Energy within a decade.





EUROPEAN COMMISSION

DIRECTORATE-GENERAL XVII, ENERGY  
The Director-General

Brussels, *November 26, 1989*  
XVII C2/MPL/pw D(99) 410678

Ms Birgit Bjornvig  
Chairperson  
SAMSO Renewable Energy Island  
Osterlokkevej 1 Tranebjerg  
DK-8305 SAMSO

Dear Ms Bjornvig,

I should like to thank you for your application to join the EU's Campaign for Take-Off and, more particularly, to form a Renewable Energy Partnership.

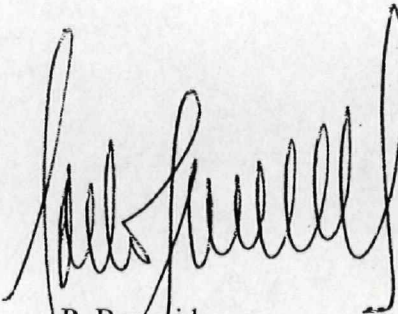
We have received your Renewable Energy Partnership Declaration concerning the "Samsö - the Danish renewable energy island concept" programme, and we feel it has the potential to make a significant contribution to the Campaign.

We assume that you agree with the general conditions stated in the attached guidelines. In accordance with these, you will be allowed to use the Campaign logo, to be cited in the Campaign Catalogue, and to be a candidate for the Renewable Energy Awards.

My services will be pleased to give any additional information or practical advice as required and provide any clarification in the future.

I am pleased to welcome you as one of the first Partners in the Campaign for Take-Off and I wish you every success.

Yours sincerely,



P. Benavides





**Samsø Energiselskab Smba, Østerlækkevej 1, 8305 Samsø**

**Declares its willingness to contribute to the implementation of Campaign for Take- Off by way of the following programmes or set of actions:**

**Samsøe was in 1997 elected as the Danish Renewable Energy Island  
The overall objective is to be 100% supplied by renewable energy in 10 years.**

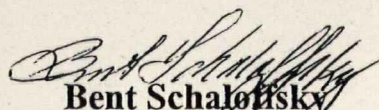
**The content of work is:**

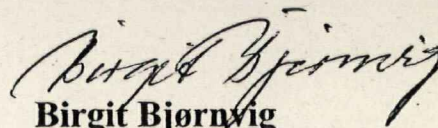
- ◆ **The establishment of a solar heating package, which shall supply approximately 1000 households on the island.**
- ◆ **The establishment of 4 village district heating systems based on biomass, two of them CHP- schemes, and a number of neighbour heating systems in the open land**
- ◆ **The establishment of biomass, wood pill, wood chip and other biomass production**
- ◆ **The establishment of 11 x 1000kW wind turbines on the island and 10 x 2000kW wind turbines offshore. Partly co-operative and private investments.**
- ◆ **The establishment of a reduced transport consumption by replacing half of the cars on the island with electrically powered cars. Furthermore and at a later stage use of hydrogen for trucks and heavy transport.**

**The organisation, through regular reports, will keep the European Commission informed on the implementation of the above actions.**

**The website for the project is [www.samsø.com](http://www.samsø.com)**

**Samsø, d. 08.11.99**

  
**Bent Schaløfsky**  
chairman

  
**Birgit Bjørnvig**  
vice chairman

**Samsø Energiselskab**

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[www.samsø.com](http://www.samsø.com)

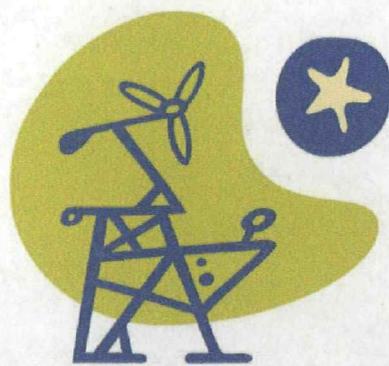
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# IDENTIFICATION

## 1 - Title of the partnership

Give the name of the project as defined in the partnership declaration:

**Samsøe, the Danish Renewable Energy Island**

## 2 - Promoter

**Samsøe Energy Company**

## 3 - Authorised representative

Candidates have to designate an authorised representative/person, **sole legal spokesperson**, to liaise with the competition organisers.

Name of mandated body/person:

**Aage Johnsen Nielsen**

Title of mandated body/person:

**Manager, B. Sc. (Eng.)**

Address:

**Samsøe Energiselskab**

**Soetofte 24**

**DK - 8305 Samsøe**

Telephone number: **+ 45 8659 3211**

Fax number: **+ 45 8659 2311**

E-mail: **energiselskabet@samsø.com**

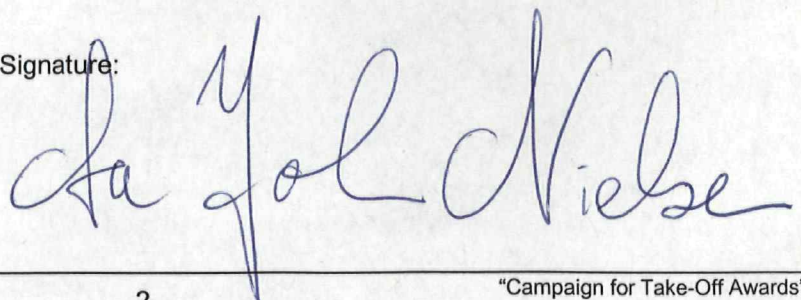
Web page: **www.samsø.com**

Name of contact person: **Aage Johnsen Nielsen**

Position held: **Manager**

Date: **09.08.00**

Signature:





#### 4 - Type of actor (Tick the relevant box or boxes)

- National governments
- Regions
- Municipalities and their distribution utilities
  - Authorities in charge of public procurement
  - Energy agencies
- RES (Renewable Energy Sources) developers and consumers associations
  - Town and country planning bodies and architects
- Industries, including energy sector and energy service providers
  - Industry associations
- Farmers associations
  - Forest-based industries and co-operatives
  - Financial institutions
  - Domestic and external trade associations
- Non-governmental associations

#### 5 - Partnership Category

In which category will you compete?

- |                |  |
|----------------|--|
| Industrial     | 100 Communities: city- or town-based                       |
| National scope | <input checked="" type="checkbox"/> 100 Communities: rural |
| Regional scope | 100 Communities: geographically isolated                   |

Which aspect(s) of your partnership would you like to put forward?

- |           |   |               |
|-----------|---|---------------|
| Financing | <input checked="" type="checkbox"/> Environment | Communication |
|-----------|---|---------------|

#### 6 - Nature of the partnership

Is your partnership...

A partnership between the Commission and

Public authorities, highlighting EU-wide co-operation on RES programmes implemented at national, regional or local level?

Industries and/or associations, aiming at eliminating reservations on the part of the RES industry, by creating a clear and well defined investment climate?

Or a partnership with promoters on framework agreements for the implementation of Renewable Energy Sources projects. The promoters can be:

- Financial institutions facilitating access to financing
- Local, regional, national authorities looking into administrative procedures
- Industry and/or consumer associations engaging information activities
- Actors such as trade associations involved in export promotion
- Non-governmental organisations promoting renewable energy and raising public awareness
- Other actors (please specify):



Does your partnership aim towards a 100% renewable energy target?

Yes

No

## 7 - Project priorities

In which key sector is your project active? (Tick the relevant box or boxes)

### Solar energy

Photovoltaic system

Photovoltaic system inside the European Union

Photovoltaic system outside the European Union

Thermal collectors

Domestic hot water production

Large collective solar systems

Space heating

District heating

Air-conditioning and industrial process heating

### Wind energy

Privately owned wind turbines

Small commercial wind farms (<5MW)

Large commercial wind farms (5-100 MW)

Utility owned wind farms (5-100 MW)

Niche markets (stand alone for rural electrification or special applications (desalination, ...))

### Biomass

Combined Heat and Power Biomass Installation

Dwellings heated by biomass

Biogas installations

Liquid Biofuels

### Communities aiming at 100% RES supply

Urban communities

Rural communities

Isolated communities



# DESCRIPTION OF THE PROJECT

## 8 - General description

8a - Background (please include information on the previous situation, energy context...)

After a competition between 5 islands in '97, initiated by the Danish Energy Agency, Samsøe was appointed as Denmark's Renewable Energy Island. The previous energy situation was, that 5 % of the electricity consumption was covered by RE (eight wind turbines and one bio-gas plant) and 15 % of the heating consumption was covered by RE (one district heating plant based on straw several individual bio-mass plants and a few solar heating plants).

8b - Objective (specific interest of the project, technical, economical, social and environmental objectives)

The objective is, to change the electricity and heating consumption to 100 % RE. "The main steps" will be electric. and heat savings (respectively 25 % and 20 %) establishing of wind turbines, district- or neighbour heating for 14 villages based on: biogas, solar, straw, wood chips and surplus heat from a ferry. In the rural area we will install individual plants and mainly: solar heating, biomass stoves and -boilers and heat pumps. As a result there will be total investments of approximately 50 mill. EURO. The needed support will be app. 10 mill. EURO. The yearly saving, concerning import to the island of fuel-oil and electricity produced on coal, will be app. 6 mill. EURO. A great part of this yearly import savings will circulate in the local community, strengthen the economy, giving us 30 – 35 new jobs. Local based energy systems, a stronger local economy and new jobs should give us a lot of opportunities to develop social relations on Samsøe. The environmental objectives are yearly emission savings of app.: 60 % SO<sub>x</sub>, 30 % NO<sub>x</sub>, 50 % Particles and 70 % CO<sub>2</sub>.

8c - Project description

In the first two years we have campaigned for: electricity savings, establishing of wind turbines on the island, heating savings, district heating in 10 villages and individual plants in the rural areas. As a compensation for the energy consumption in the transport sector, we are planning an off shore wind farm 4 km. south of Samsøe – the long run objective is that a lot of the islands cars and vehicles shall be driven by electricity and hydrogen fuel cells. As a part of our project, we have co-operated in an ALTENER project (Contract N° XVII/4.1030/Z/99-350 in the period of January 1999 – June 2000) for penetration of- and awareness about RE with three other EU-islands - El Hierro (ES), La Maddalena (IT) and Arran Islands (EI) – Samsøe was project responsible. The information about our "100 % project" has been rather extensive.

8d - Results

A great part of the municipal buildings have had installed electric saving equipment. 11 wind turbines each 1 MW has been installed in the year of 2000. There has been installed heat saving equipment in app. 15 % of the dwellings owned by retired persons. Just now we are in a detailed planning process which will result in two new district heating systems 2001 – 02 for four of the larger villages on the island (one system based on straw and the other system based on 2500 m<sup>2</sup> solar heating and a combined bio-mass boiling system). Further on we have detailed discussions with consumers representatives from five smaller villages whether we shall establish district- or neighbour heating in their respective villages. In the two years period there has been installed app. 50 solar heating plants in the rural area and app. 50 heat-pumps and wood-pellet boilers in all. We are in a phase-2 investigation concerning our off-shore wind farm meaning, that we are planning to establish 10 windmill each 2,5 MW in the year of 2002. The municipality has leased four electric cars. We have finalised our ALTENER project in June 2000. A great part of the planning, awareness and penetration of the described projects was made with financial support from ALTENER and the Danish Ministry of Environment and Energy . A lot of delegations, TV and journalists has visited the island over the two years period (from Japan, USA, England, Italy, Belgium, Germany, Sweden, Norway ....). We have participated in conferences, exhibitions, EXPO 2000 ....



8e - Barriers (barriers encountered during the implementation of the project, barriers overcome so far and barriers still remaining)

As usual we are up against what has been the normal energy supply over the latest decades. And of course economical investments related to the change to RE often can be a barrier – and that's why the consumers need support to some RE-systems. Approximately 40 % of the 4.300 inhabitants on the island are retired persons, and for a lot of them it's a barrier to make "long termed investments". As an island with a unique nature it can be a problem to install some RE-plants – we have had and still have planning problems because of the County and owners of summer cottage's, people that live outside the island. It takes a lot of extra work and planning to make RE-projects on Samsøe.

8f - Incentives (measures and incentives available for the implementation of the project)

The Energy Ministry's and -Agency's interest for "The Energy Island" is of course an important factor. The islanders in general take interest in the project – some of them are even proud to participate in this national project. A great part of the commercial sector and the municipality are aware of the possibilities in the project.

8g - Promoters of the project

The main promoter on the island is Samsøe Energy Company well supported by Samsøe Energy- and Environmental Office – in fact we share office facilities, and we discuss all the energy projects, and co-operate concerning most of the projects. Other promoters are the municipality, the Farmers Organisation and the Commercial Council. Off Samsøe the promoters typically are private consultants and –developers.

8h – Users

The awareness of the users is a very important aspect of the Renewable Island Project. Every time we start a new project, we use the local information sources such as: TV, radio and local newspapers. Workgroups has been established in the villages involved in the district heating plans helping to organise the owners of the eleven wind turbines on the island. These work groups participate in the local planning of the projects and in campaigns when it is needed. The Renewable Energy Project is, apart from a technical matter, also a democratic process. Samsøe Energy- and Environmental Office has daily opening hours for the public, where questions and information about energy savings and renewable energy can be asked.

8i - Main manufacturers and service suppliers

The main manufacturers are located in Denmark (outside Samsøe). One exception is a factory producing pipes for domestic heating. Another exception is a local "Metalworker-firm" which have started up sampling of solar collectors and a production of a new and more effective solar heating storage. This new production is a direct result of the overall RE-project. Up till now, all the RE-installations has been made by local crafts-firms. The black-smiths of the island have been certified to mount solar heating systems. The technical services can be made by the same firms. The island's farmers supply the existing district heating plant with straw, and they will participate in the future supply of new RE-plants. In addition to that, the farmer's organisation survey the possibilities for cultivating energy crops.

8j - Calendar

Indicate the starting date, the current state of development and the provisional closing date for the project.

Starting date:

Provisional closing date:

August 1998 (the ten years project period)  
January 1999 (the ALTENER project period)

August 2008  
June 2000

Intended timing:

The landbased- and off-shore wind-farms will be established respectively in the year of 2000 and 2002. The new district heating plants will be established over the period of 2001 – 2006. And then we have ongoing campaigns concerning E-savings and RE-plants in the rural areas up till 2008.

Current state of development of the project:

**Please look at 8d and 10a + b.**



## 9 - Relevance with the Campaign for Take-Off objectives:

Does the project promote the implementation of large scale programmes ?

No

Yes, give figures:

**2.500 m<sup>2</sup> solar heating plant “co-working” with a combined bio-mass boiler for district heating in two villages. 25 MW off-shore wind-farm as a compensation for the energy consumption in the transport sector (in the short term). The objective is, that a lot of the island’s cars and vehicles shall be driven by electricity and hydrogen fuel cells (in the long term).**

In which way does the project send clear signals for greater use of Renewable Energy Sources: directly concerned population and informed population

Directly concerned population	Planned	Achieved
Permanent	All the islanders	All the islanders
Temporary	*) Please look below	*) Please look below

Informed population	Planned	Achieved
Contacted persons	All the islanders	All the islanders

Other information:

\*) It's difficult to conclude when it comes to information – at least how we succeeded with the achieved results! Over the two years of planning we have contacted all the islanders several times.

- Every one on the island has received a general pamphlet about the RE-project. And in the same way all the owners of dwellings have received a pamphlet concerning insulation.
- The retired persons have received two letters concerning insulation.
- Owners of summer cottages (app. 750 cottages) have received pamphlets two times. Once about possibilities for buying shares in the landbased wind-turbines and once about the possibilities for installing solar-heating.
- Owners of dwellings, outside the planned district heating areas, have received pamphlets two times concerning the possibilities of installing individual RE-plants.
- The local utility company has written four times to all the inhabitants in six villages, informing about the possibilities for joining two separate district heating systems.

All the campaign pamphlets and –letters have been followed up by a lot of advertisements in the local media.



# PROJECT ANALYSIS

10a - Evaluation of the project vis-à-vis the Partnership objectives:

If you are pursuing quantitative objectives in the key sectors, please give details below:

Key Sectors Objectives	Project Objective	Achieved
------------------------	-------------------	----------

## Solar Energy

<b>1,000,000 PV systems</b>		
650,000 PV systems inside EU	70	0
350,000 PV systems outside EU		

<b>15 million m<sup>2</sup> solar collectors</b>		
5 million m <sup>2</sup> domestic hot water production	2000 m <sup>2</sup>	200 m <sup>2</sup>
3 million m <sup>2</sup> large collective solar systems		
3 million m <sup>2</sup> space heating	2000 m <sup>2</sup>	250 m <sup>2</sup>
2 million m <sup>2</sup> district heating	1800 m <sup>2</sup>	2500 m <sup>2</sup> (in 2001)
2 million m <sup>2</sup> air-conditioning and industrial process heating		

## Wind Energy

<b>10,000 MW of wind turbine generators</b>		
500 MW privately owned wind turbines	11.5 MW	11.5 MW
1,000 MW small commercial wind farms		
4,500 MW large commercial wind farms	22.5 MW	25 MW (in 2002)
3,000 MW utility owned wind farms		
1,000 MW niche markets		

## Biomass

<b>10,000 MWth combined heat and power biomass generation</b>		
1,000,000 dwellings heated by biomass	1400	400
1,000 MW of biogas installations	0.85 MW	0 MW
5 million tons of liquid biofuels		



10b - Key action : Communities aiming at 100% Renewable Energy Sources supply

Key Sectors Objectives	Project objective: date of achievement	Achieved RES supply (%)
100 communities aimed at 100% RES supply	100 % in 2008	Electricity, 75 % in 2000, Heating, 15 – 20 % in 2000

Constitutive actions	Project objective	Achieved (%)
Establ. of landbased wind-mills Campaigns for district heating in 5 villages	11 x 1 MW registered 100 %	100 % 60 – 80 %
Planning an off-shore wind-farm, to be established in 2002	10 x 2,5 MW	0 % so far

## 11 - Actions

Detailed description of the actions to implement, their timing, and their degree of achievement

Actions	Timing	Degree of achievement
Campaigning for land-based wind-mills Campaigning for heat savings (retired persons) Campaigning for district heating Campaigning for RE-plants in the country side Planning an off-shore wind-farm	1998 – 99 1999 1998 – 2000 1999 + 2000 1999 - 2002	Establ. in the year of 2000 15 % installed savings 60 – 80 % were registered 100 plants were installed

## 12 - Financial information

Statement of sources of financing and their allocation among parties, including the costs for the agreement management and monitoring

*Achieved !*

Sources of financing	Allocation (in Euro)
- Investment, E.savings,W- mills, solar-heat, heat-pumps, bio-mass, ALTENER+planning/campaign.	11.8 mill.
- Financial resources <ul style="list-style-type: none"> <li>• Partners share, private investm.</li> <li>• Public aids, Danish Agencies, ALTENER</li> <li>• External financing</li> </ul>	11.07 mill. 0.73 mill.
- Single payback period	7 – 15 years



Financial Investment in RES generation in the framework of the programme:

Investments	Planned	Achieved	Comments
Total			
PV systems	0.73	0	
Solar thermal collectors	3.4	0.44	
Wind turbine generation	43.32	10.59	
Combined Heat and power			
Dwellings heated by biomass	17.6	0.2	
Biogas installations	1.33	0	
Liquid biofuels			
Others (specify) <b>Savings + Heat Pumps</b>	12.0	0.57	

### 13 - Monitoring (if relevant)

Identification of the independent party that will/does monitor the process, definition of the indicators to monitor and cost estimate

.....

.....

.....

.....

### 14 - Environment

What benefits has your project brought/ will your project bring to the environment?

The future benefit will be calculated emission savings (tonnes per year), as described below:

Particles, 31,5 t./year

SO<sub>x</sub> , 72,0 t./year

NO<sub>x</sub> , 129,0 t./year

CO<sub>2</sub> , 81,0 t. x 10<sup>3</sup> t./year



Monitoring of reduction of CO<sub>2</sub> emissions (if relevant)

Estimates of the conventional energy sources substituted each year by the key actions

Energy forms (ktoe)	Planned	Achieved
Solid fuels		
Gasoline		
Gasoil		
Heating oil		
Heavy fuel oil		
Other oil products		
Natural gas		
Derived gases		
Distributed electricity (MWth)		

Estimated reduction of CO<sub>2</sub> emissions by year: **accumulated**

Reduction of CO <sub>2</sub> emissions (kton/year)	Planned	Achieved
2000	20	20
2001	23	
2002	53	
2003	56	

### 15 - Local indicators:

Local indicators	Project objective	Achieved
Contribution to reduce the dependency on "energy imports" or cost	7.2 mill. EURO per year	1.3 mill. EURO per year
Contribution to the reinforcement of energy supply	100 % Renewable Energy Supply (RES)	Electricity 75 % RES Heating 15 – 20 % RES
Creation of local permanent jobs	35 perm. jobs per year	5 perm. jobs per year
Contributing to develop the local R&D and Innovation potential	No objective	2 new jobs in "solar production"



## 16 - Replication potential

Considering your experience, what is the potential for replication existing for similar projects?

Potential of replication	Number of replication
At local level	a lot
At national level	a lot
At European Union level	a lot

This potential for replication depends mainly from:

Conditions	Comments
Local conditions (urbanisation, district heating...)	Help to- and awareness of the users and stimulating of the democratic process
Regional conditions (weather, energy resources...)	Good "Wind- and Farming Resources"
Industrial conditions (local industry, specific demand...)	Good local crafts-firm and supplementary training of the employees
Financial conditions (subsidies, fiscal aids...)	Some sort of economical subsidies in the beginning of the process
Markets rules (share of renewables, appropriate legislation, prices...)	A political interest for developing and promoting RE; especially on the national level

## 17 - Communication

Ways of dissemination	Local/Country/EU,	Planned target population	Achieved target population
Using the local media and establishing of local citizens group concerning every new projects	On the island	4.300 inhabitants	All the inhabitants are aware of the overall project
Using the national media, participating in conferences i.e.	In Denmark	5.5 mill. inhabitants	We don't know
Using the international media, participating in an ALTENER-project and participating in EXPO 2000	World-wide The inhab. on the 4 project islands The visitors at the exhibition	No specific plans Approximately 27.000 inhab. in all App. 3 mill. at the Danish pavilion	We don't know We believe that we achieve 100 % We don't know – maybe 50 %



#### Communication policy

Indicate the major aspects of your communication policy (strategy, slogan, logo, and so on...):

**Our main task's is to implement Energy Savings and Renewable Energy Plants (collective- and individual plants). That means, that our communication strategy is to inform the respective target population whenever we are doing a specific campaign. Over the period of two years campaigning twelve letters and pamphlets have been send to specific target population (please look at page 7).**

**The tourist's can receive a pamphlet when they arrive to the islands three Marinas, when they visit the Tourist Bureau, the Museum, some of the hotels and camping sites (a pamphlet is enclosed). In the same way we have mounted signs (in three languages – DK, D, GB) at a lot of the RE-plants which are open to the public. 60.000 – 70.000 tourist's are visiting Samsøe each year.**

## IMPACTS OF THE PARTNERSHIP

#### 18a - Promotion of the partnership:

In which way does the project promote the partnership?

**Our objective is, to be 100 % self sufficient by RES over a period of ten years – concerning electricity and heating. Over the same period we want to establish an off-shore wind-farm as a compensation for the energy consumption in the transport sector. The long termed objective is, that a lot of the cars and vehicles shall be supplied from this wind-farm – some of them using electric batteries and others using fuel-cells based on hydrogen.**

**Concerning heating and especially electricity we find that a lot of our objectives have been full-filled in the first two years of the campaign period. The process has been speeded up by an ALTENER support to Samsøe and El Hierro, La Madalena and Aran Islands.**

#### 18b - Investment Climate:

In which way does the project eliminate reservations on the part of RES industry by creating a clear and well defined investment climate?

**There has been an extraordinary eager among the farmers concerning investments in landbased wind turbines. We try to organise our planned off-shore wind-farm in a way, so that the farmers and other local investors will be able to participate in that wind project. In that way there is no reservations from the wind industry.**

**Concerning solar heating one of Denmark's larger industries has decided to move a part of their production to a Samsøe crafts-firm. This firm has in addition to that decided to participate in developing a new solar storage.**

**In our opinion there is no reservations in the bio-mass- and heat-pump industries as well.**

Does the project help streamline authorisation procedures?

**As described we have had some problems with the County Authorities concerning our landbased wind turbines and in addition we still have problems concerning a larger solar heating plant in a harbour owned by the municipality. Therefore we are very careful to have a close contact to the County concerning the "off-shore planning".**

#### 18c - Financing the actions:

In which way does the project facilitate access to financing?

**We have had no problems financing the RE-plants so far. In fact the two local banks are involved in most of the financing, including the landbased wind-turbines. In organising we will try to involve the local banks as well.**



18d - Impacts on export

Does the project promote exports of the European Union Renewable Energy Sources products or technologies... (specify the countries or regions)

**We know, that some of the Danish RES-industries are using Samsøe as “an exhibition window”.  
But we are not aware of eventual export results?**

**A German solar firm (Solarvision) is planning to establish a Scandinavian Agency at Samsøe.**

18e - Promotion of Renewable Energy Sources by the public

In which way does the project facilitate access of the public to Renewable Energy Sources?

**We try to involve the local inhabitants in all our RE-initiatives – it’s the only way to succeed with our “100 % RE-plan”.**

**Samsøe Energy- and Environmental Office has a lot of “Public Service Obligations” concerning special- and general information about RES.**

**And as described, all our guests have access to our homepage and the public RE-plants on the island.**

Other information:

.....  
.....  
.....  
.....



## APPENDICES

**19 - Are there any other aspects of the project of which you think the jury should be aware?**

We have noticed a great part of interest concerning the way we are organising our projects. The fact, that we do involve all the local parts from the very beginning (especially the consumers and users) make some impression on all our visitors – especially the media and planners from outside Europe. We have had a lot of visitors from Japan showing their interest for that aspect.

**20 - List of documents to provide:**

- X A copy of the signed partnership agreement
- (X) Pictures (please look at our homepage)
- (X) Slides (Format 24x36 mm) – **can be shown on the conference, just now we are erecting our last landbased wind-turbines**
- X Audio-visual components (film, video, etc.) **A presentation Video from EXPO 2000, especially about Wind Energy (the theme of the actual Danish pavilion)**
- X Digital components (CD ROM, address of web sites, etc.) [www.samsø.com](http://www.samsø.com)
- X Location map of the project **The general Energy Report and an Actual Map**
- X A tourist pamphlet



**> THE CAMPAIGN  
FOR TAKE-OFF AWARDS**  
Renewable Energy for Europe

Questionnaire - Year 2002 Round



**Contribution from Samsoe, Denmark's Renewable Energy Island**



## IDENTIFICATION

### 1 - Title of the RE partnership

Give the name of the project as defined in the RE partnership declaration:

**Samsøe, the Danish Renewable Energy Island**

### 2 - Promoter

**Samsøe Energy Company**

### 3 - Authorised representative

Candidates have to designate an authorised representative/person, **sole legal spokesperson**, to liaise with the competition organisers.

Name of authorised representative:

**Aage Johnsen Nielsen**

Position:

**Manager and co-ordinator, B.Sc.(Eng.)**

Address:

**Museumsvej 1**

**DK - 8305 Samsøe**

Telephone number: **+45 86 59 32 11** Fax number: **+45 86 59 23 11**

E-mail: **info@veo.dk**

Web page: **www.veo.dk**

Name of contact person:

**Aage Johnsen Nielsen**

Position held: **Manager**

Date: **26.09.02**

Signature:



#### 4 - Type of actor (Tick the relevant box or boxes)

- National governments
- Regions
- Municipalities and their distribution utilities
- Energy agencies
- RES (Renewable Energy Sources) developers and consumers associations
- Industries, including energy sector and energy service providers
  - Forest-based industries and co-operatives
  - Financial institutions
- Non-governmental associations
- Others

#### 5 - RE Partnership Category

In which category will you compete? (tick only one box)

- |   |  |
|---|--|
| <input type="checkbox"/> National scope   | <input type="checkbox"/> Developing countries                |
| <input type="checkbox"/> Regional scope   | <input type="checkbox"/> 100 Communities: urban              |
| <input type="checkbox"/> Local scope *    | <input type="checkbox"/> 100 Communities: rural              |
| <input type="checkbox"/> Industrial scope | <input checked="" type="checkbox"/> 100 Communities: islands |

\* Local scope category includes cities and islands

#### 6 - Nature of the RE partnership

Is your RE partnership...

1. A RE partnership between the Commission and

- Public authorities, highlighting EU-wide co-operation on RES programmes implemented at national, regional or local level?
- Industries and/or associations, aiming at eliminating reservations on the part of the RES industry, by creating a clear and well defined investment climate?

Or

2. A RE partnership with promoters on framework agreements for the implementation of Renewable Energy Sources projects. The promoters can be:

- Financial institutions facilitating access to financing
- Local, regional, national authorities looking into administrative procedures
- Industry and/or consumer associations engaging information activities
- Actors such as trade associations involved in export promotion
- Non-governmental organisations promoting renewable energy and raising public awareness
- Other actors (please specify):



Does your RE partnership aim towards a 100% renewable energy target?

Yes

No

## 7 - Project priorities

In which key sector is your project active? (Tick the relevant box or boxes)

### Solar energy

Photovoltaic system

Photovoltaic system inside the European Union

Photovoltaic system outside the European Union

Thermal collectors

Domestic hot water production

Large collective solar systems

Space heating

District heating

Air-conditioning and industrial process heating

### Wind energy

Privately owned wind turbines

Small commercial wind farms (<5MW)

Large commercial wind farms (5-100 MW)

Utility owned wind farms (5-100 MW)

Niche markets (stand alone for rural electrification or special applications (desalination, ...))

### Biomass

Combined Heat and Power Biomass Installations

Dwellings heated by biomass

Biogas installations

Liquid Biofuels

### Communities aiming at 100% Renewable Energy Sources supply

Urban communities

Rural communities

Islands communities



## DESCRIPTION OF THE PROGRAMME

### 8 - General description

8a - Background (please include information on the previous situation, energy context...)

Samsøe was awarded as Denmark's Renewable Energy Island by the end of 1997. After an up-start period the first kick-start meetings with the islanders began in August '98. The previous energy situation was, that 5.5 % of the electricity consumption was covered by RES, and 25 % of the heating demand was covered by RES.

8b - Objective (specific interest of the project, technical, economical, social and environmental objectives)

The objective is to meet the electricity demand by 100 % RES from windturbines and biogas (after 25 % savings) and the heating demands by 80 % RES (in 2008) and 100 % RES in the long run, from biogas, solar, straw, wood-pellets, wood-chips and surplus heat from a ferry (after 20 % savings).

8c - Actions

Detailed description of the actions to be implemented, timing, and degree of achievement

Actions	Timing	Degree of achievement
<b>11 Landbased wind-turbines *)</b>	<b>'98 - '00</b>	<b>100 %</b>
<b>E.-savings, houses of retired people *)</b>	<b>'99 - '02</b>	<b>Approximat. 50 %</b>
<b>Individual RE-plants in rural areas *)</b>	<b>'99 - '00</b>	<b>Approximat. 25 %</b>
<b>District heating, solar + woodchips *)</b>	<b>'99 - '01</b>	<b>Approximat. 80 %</b>
<b>District heating, based on straw</b>	<b>'01 - '02</b>	<b>Approximat. 70 %</b>
<b>10 off-shore wind-turbines *)</b>	<b>'98 - '02</b>	<b>100 %</b>

\*) Campaigns supported by ALTENER (350/99) in the period of: January '99 - June '00.



### 8d - Results

Eleven 1 Mw windturbines has been installed on the island in 2000. Ten 2.3 MW off-shore windturbines will be erected in this year.

A district heating plant for two villages (based on solar and woodchips) had opening in April '02 and another district heating plant (based on straw) will have opening in the late fall '02.

Approximately 200 dwellings in the rural area has installed woodpellet boilers, heat pumps and solar heating plants. Retired persons has installed energy saving equipment in 200 dwellings.

More than 1000 "technical tourists" are visiting the island every year, and we constantly do enlarge our international network.

### 8e - Barriers (barriers encountered during the implementation of the project, barriers overcome so far and barriers still remaining)

Long termed loans and new technologies are barriers for especially retired persons (app. 40 % of the islanders). But the described projects shows, that we have overcome a lot of barriers. We don't know yet the effect of the new energy policy in Denmark, concerning Renewable Energy – but it will not be easier to implement RE.

### 8f - Incentives (measures and incentives available for the implementation of the project)

The awareness of changing from imported energy to a local produced energy is an important factor for the municipality and the commercial sector. Before the start of the project in '97, the island imported energy for more than 12 million €. each year ('02 prices). The change to local produced energy will strength the islands economy. A lot of the normal consumers are aware of that as well.

It will still be possible to have some "national support" for energy saving projects. So we will focus more on that urgent sector in the future.

### 8g – Financial resources

Statement of sources of financing and their allocation among parties, including the costs for the agreement management and monitoring

Sources of financing	Allocation (in Euro)
- Investment	Million € 49
- Financial resources	Million € 40
• Partners share, <b>incl. of loans</b>	- € 3
• Public aids	- € 6
• External financing, <b>for 1½ off-shore wind-turbine and one district heating plant (a utility comp. in Jutland)</b>	
- Single payback period	2 – 22 years



**8h - Monitoring (if relevant)**

Identification of the independent party that will/does monitor the process, definition of the indicators to monitor and cost estimate

**Annabelle Jacquet, a consultant from APERe asbl, rue Royale 171, Bruxelles, visited Samsøe and Samsøe Energy Company for several days in May 2002, for monitoring purposes.**

**In our opinion this Monitoring Project were supported by ALTENER no. 461 (I don't have the year).**

**The consultant visited a lot of our projects and we supplied her, with a lot of figures and calculations.**

**We haven't seen the resulting report from this visit yet.**

**In stead we enclose "Samsøe Energy Statistics". This statistics is based on information from all parts of energy suppliers to Samsøe.**

**A Consultant firm in Denmark (PlanEnergi, Nordjylland, [nord@planenergi.dk](mailto:nord@planenergi.dk)) has calculated on the statistics and we enclose their results as well.**



8i - Commitments of each party

Applies only if a framework agreement is signed.

.....

8j - Users

**The awareness of the users is important for the overall energy project. In each of the large projects we have been able to involve representatives for the users.**

**The energy project is, apart from the planning- and technical matters, also a democratic- and educational process. As well the Energy Company as the Energy- and Environmental Office do participate in these processes.**

8k - Main manufacturers and service suppliers

**The manufactures are mainly located outside of Samsoe. One exception is the production of some of the high insulated pipes for the district heating plants. Another exception is a firm, sampling solarpanels and producing a high efficient storage for solar combined with biomass furnaces or –boilers.**

**In general local craftsmen and entrepreneurs are responsible for the constructions concerning the new RE-plants on the island. The local farmers supplies the three district heating plants with straw, wood-chips and later on “elephant-grass”**

8l - Calendar

Indicate the starting date, the current state of development and the provisional closing date for the project.

Starting date:

August 1998

Provisional closing date:

December 2008

Intended timing, for new projects:

- **We are planning for construction of a new district heating plant for two villages with opening by the end of 2003. The energy supply will be straw and later on supplied by bio-gas. Further on we are planning for a district heating system in a small village supplied from an existing boiler on an estate.**
- **Approximately twenty private owners are interested in installing PV-plants on their dwellings in 2003.**
- **We intend to start up investigation for the use of hydrogen in our transport sector, based on the electricity production from our new off-shore windfarm**

Current state of development of the project:

**Please look at the diagram under 8c, page V, and the enclosed energy statistics, fact sheets and pictures**



## PROGRAMME ANALYSIS

### 9 - General analysis

9a - Evaluation of the programme vis-à-vis the RE Partnership objectives:  
If you are pursuing quantitative objectives in the key sectors, please give details below:

Key Sectors Objectives	Programme Objective	Achieved
------------------------	---------------------	----------

<b>Solar Energy</b>		
<b>1,000,000 PV systems</b> Indicate number of systems and capacity (kWp)		
<i>650,000 PV systems inside EU</i>	<b>70</b>	<b>0</b>
<i>350,000 PV systems outside EU</i>		

<b>15 million m<sup>2</sup> solar collectors</b> Indicate m <sup>2</sup> installed		
<i>5 million m<sup>2</sup> domestic hot water production</i>	<b>2000 m<sup>2</sup></b>	<b>250 m<sup>2</sup></b>
<i>3 million m<sup>2</sup> large collective solar systems</i>		
<i>3 million m<sup>2</sup> space heating</i>	<b>2000 m<sup>2</sup></b>	<b>350m<sup>2</sup></b>
<i>2 million m<sup>2</sup> district heating</i>	<b>1800 m<sup>2</sup></b>	<b>2500 m<sup>2</sup></b>
<i>2 million m<sup>2</sup> air-conditioning and industrial process heating</i>		

<b>Wind Energy</b>		
<b>10,000 MW of wind turbine generators</b> Indicate number of wind turbines and capacity (MW)		
<i>500 MW privately owned wind turbines</i>	<b>11.5 MW</b>	<b>11.5 MW</b>
<i>1,000 MW small commercial wind farms <b>off-shore south of Samsøe</b></i>	<b>22.5 MW</b>	<b>23 MW</b>
<i>4,500 MW large commercial wind farms</i>		
<i>3,000 MW utility owned wind farms</i>		
<i>1,000 MW niche markets</i>		



<b>Biomass</b>		
Indicate number of installations and capacity		
10,000 MWth combined heat and power biomass generation		
1,000,000 dwellings heated totally by biomass	<b>1400</b>	<b>400</b>
1,000 MW of biogas installations	<b>0.85 MW</b>	<b>0 MW</b>
5 million tons of liquid biofuels		

9b - Key action: 100 Communities aiming at 100% Renewable Energy Sources supply

<b>Key action</b>	<b>Project objective:</b>	<b>Achieved RES supply (%)</b>	<b>date of achievement</b>
100 communities aimed at 100% RES supply	<b>Electricity, 100 % RES</b>	100 %	2000
	<b>Heating, 100 % RES</b>	57 %	2003
Number of communities and population	<b>One community with a population of app. 4300</b>		

Detailed description of the actions leading to the 100% RES supply

### **New and planned projects**

<b>Constitutive actions</b>	<b>Project objective</b>	<b>Achieved (%)</b>
<b>District Heating 2 villages in '03</b>	<b>App. 150 residents</b>	<b>90 %</b>
<b>District Heating 1 village in 2004</b>	<b>App. 50 residents</b>	<b>None so far</b>



10 - Financial Investment in RES generation in the framework of the programme:

<b>Investments (in Euros)</b>	<b>Planned</b>	<b>Achieved</b>	<b>Comments</b>
<b>Total, Million €</b>	<b>67.5</b>	<b>49.0</b>	
PV systems	0.6	0.0	
Solar thermal collectors	3.6	1.1	<b>Rural area + 1 Distr. heating plant</b>
Wind turbine generation	43.0	43.0	<b>11 MW on land + 23 MW off-shore</b>
Combined Heat and power			
Dwellings heated by biomass	7.5	1.5	<b>In the rural area</b>
Biogas installations	4.4	0.0	<b>Farms + 2 District heating plants</b>
Liquid biofuels			
Others (specify) <b>District Heat based on biomass</b>	8.4	3.4	<b>3 village opened + 6 more planned</b>

Organise Organize

### **11 - Environment**

What benefit has your programme brought/ will your project bring to the environment?

**By realisation of the projects mentioned in the above figure (Investments of 49 million €), Samsøes benefit to the environment shall be savings of from 2003:**

65,200 ton CO<sub>2</sub> pr. year,

61,4 ton SO<sub>2</sub> pr. year and

137,4 ton NO<sub>x</sub> pr. year.



Estimated reduction of CO<sub>2</sub> emissions by year:  
(For 2002 and 2003 give an estimation of the reduction)

Reduction of CO <sub>2</sub> emissions (kton/year)	Planned	Achieved
2000		
2001 <b>in fact</b>	<b>46,000</b>	<b>23,400</b>
2002		
2003 <b>estimated</b>	<b>22,600</b>	<b>41,800</b>

### 12 - Local indicators:

Local indicators	Project objective	Achieved
Contribution to reduce the dependency on "energy imports" or cost, concerning heating and electricity, based on '02 price	Million € 7.3 per year, total incl. of transport and ferries	Mill. € 3.2 per year total incl. of off-shore turbines
Contribution to the reinforcement of energy supply	100 % RES	57 % RES, Heating E 100 % RES, Electric. Transp. Compensat. 147 % RES, off-shore
Creation of local permanent jobs	30	12
Contributing to develop the local R&D and Innovation potential	None	

### 13 - Replication potential

Considering your experience, what is the potential for replication existing for similar programmes, local, regional and national?

**In our opinion, there is a lot of potential for replication of our programme concerning: planning, organisation, education, projecting and construction. It could be aimed both local, regional, national and international.**

**In fact we do co-operate with partners in the frame of EU/ALTENER and with organisations from Japan, Thailand and Vietnam.**



**14 - Communication**

Means of dissemination	Local/Country /EU,	Planned target population	Achieved target population
Using the local media for campaigns and news.  Involving citizens group in new projects.	On the island	4,300 inhabitants	The inhabitants are aware of the proj. 60 – 100% do participate in the respective projects.
Servicing national media technical tourists etc.	Country	5.5 mill. inhabitants	We don't know
Servicing international media, technical tourists	EU and Global	No plan so far	

**Communication policy**

Indicate the major aspects of your communication policy (strategy, slogan, logo, and so on...):

We must admit, that communication not is our specific "strong side". We have been in a stressed period for more than four year to: co-ordinating and collecting money etc. (one employed), planning, campaigning and projecting etc. (one employed), organising citizens, campaigning, servicing technical tourists etc. (one employed). We are three employed in all.

Just now we try to communicate our good results to the outside word, updating our homepage - please look at examples enclosed (facts sheets and statistics)!

Besides of the technical tourists (app. 1000 per year), we have a lot of "normal tourists" on this green island. We serve them with pamphlets, signs by the plants, guided tours, a permanent exhibition etc.

**15 - Relevance with the Campaign for Take-Off objectives:**

Does the project promote implementation of large scale programmes ?

No

Yes, give figures:

For an island with 4.300 inhabitants, it has been a large scale programme so far:

- we have made large scale investments, for total 49 million €,
- large CO<sub>2</sub> savings, 65,200 ton and
- reduced imported fossil energy for 3.2 mill. € per year, from 2003

but it concerns a lot of plants!



## **16 – Impact of the RE partnership**

In what way does the programme promote the RE partnership?

**By changing the electricity supply from 5.5 % to 100 % RES, the heating supply from 25 % to 57 % and more than compensating the transport supply (and emissions) by RES electricity we feel, that we strongly promoted “the Take-off campaign” and the “RE partnership”.**

**More than 1000 “technical tourists” per year, from EU and the hole world, shows us, that there is a clear focus on RE, the Partnership and Samsøe as a good example.**

In what way does the programme address reservations on the part of RES industry by creating a clear and well defined investment climate?

**We don't feel that we have any reservations on RES concerning our small industries and crafts firms – on the contrary. The firms do participate in a positive way in all our projects and they do take initiatives them selves, contacting us for new projects etc.**

**Except for the off-shore windfarm most of the construction has been carried out of local crafts- and entrepreneur firms. In addition two small firms are producing solar heating plants and high insulated twin-pipes for district heating.**

**The daily and yearly service on the RE plants is carried out of local firms.**

In what way does the programme facilitate public access to Renewable Energy Sources?

**The Energy Company and the Energy Office do make a lot of campaigns addressed to the public and the consumers. We do it through advertising, information to the medias and public meetings. In addition to that, we do give personal information and services to the consumers and to the craft firms, when they visit our offices – which are located in the main street of Tranbjerg (the main village of the island).**

**Below we have described how we (in addition) gives tourists access to RES.**



## APPENDIXES

### **17 - Are there any other aspects of the programmes of which you think the jury should be aware?**

We have noticed an increasing interest for the project from Europe, Eastern Europe, Japan and the Far East. Beside of interest for the planning, projecting and construction, there is an interest for our way to organise projects. Therefore we have carried out seminars on the island and in some cases in Japan and Thailand concerning all aspects of, how to realise RE in different communities and regions.

Just now we do consider to establish a Renewable Energy Centre on the island to strength the possibilities for education, visiting of scientists for a shorter or longer period of time etc.

### **18 - List of required documents:**

**X** A copy of the signed RE partnership agreement

**X**8 pictures (digital file, high resolution - 350 dpi -, 20 cm width)

**X** Audio-visual components (**video locally produced in 2000 and 2001**)

and any additional documents which could help the jury

Digital material (CD ROM, address(es) of web sites, etc.)

**X** Location map of the project

**X** Fact sheets which will appear on our new homepage [www.veo.dk](http://www.veo.dk) by the end of 2002 (among a lot of others)

**X** Energy- and emission figures

**X** A tourist pamphlet

**Adequate documents are mandatory in order to improve the presentation of the programme to the jury.**