

100 % Renewable Energy Communities in EU

Local supply has been the focus of many initiatives in the EU countries in the last ten years. In order to foster the implementation of the Community Strategy and Action Plan, the European Commission launched "The Campaign for Take-Off".

The campaign, which supported 98+ initiatives, ran from 2000 to 2003. The overall aim of these projects was to prove that various energy sources such as wind, sun and biomass can be linked to guarantee a reliable and tailor-made energy supply.

One of the key sectors of the campaign consisted of "Communities Aimed at 100% Renewable Energy Supply" projects, a number of which are islands. Some of these islands already have produced remarkable results, like the Danish Samsø and the Greek Crete. These two islands have followed totally different approaches to the development of renewable energy, according to their respective available natural resources.

Sustainable Energy Communities (SEC) can be defined as local communities in which politicians, planners, developers, market actors and citizens actively co-operate to demonstrate and to develop high degrees of decentralized energy supply, favoring renewable energies as sources, together with a conscientious application of energy-efficiency measures in all end-use sectors.



SAMSØ:

The island of Samsø was selected in 1998 by the Danish Government as a demonstration case for a community to be supplied with 100% renewable energy. The island, which covers 114 km², has 4,400 inhabitants.

The most important means of achieving

the objective of 100% community renewable energy supply are:

- **Cuts in consumption and increased efficiency in terms of heat & electricity** during the period of 1998-2008. Improved housing insulation and the technical effectiveness of heating plants should make it possible to save 21% of heating requirements on average. The target for average savings is about 25% of electricity consumption.

- **Expansion of the district heating supply systems and individual heating systems using local biomass resources.**

About 60% of the total heating on Samsø is expected to be supplied from district heating based on biomass (straw, wood and biogas), heat pumps, and solar thermal collectors. The remaining 40% is in

the rural areas, where houses are planned to supply heating individually by wood stoves, heat pumps and solar thermal collectors.

Presently, roughly 25% of the residences in the rural areas are now supplied entirely from renewable energy sources. The other residents of rural areas complement their RE heating supplies with conventional heat. The concept of neighbour heating has also been integrated, allowing farmers to supply neighbours with heat produced at the farm, for example from a large straw boiler.

- **Construction of wind power plants to cover electricity production.**

Eleven 1-MW land-based wind turbines cover 100% of the electricity consumption of the island. An offshore wind farm was installed in 2002 and contains ten 2.3-MW wind turbines. Their production is a compensation for the fossil-fuel energy supply in the transport sector. The ownership is a mix of co-operatives, private and the local municipality.

- **Gradual conversion of the transport sector from petrol to biofuels, electricity and, later, to hydrogen:**

The development of alternative fuels is slow but some biofuel projects are in progress. A rapeseed press has been installed to produce pure plant oil for diesel cars. The future hydrogen based transport is under development.



School children in the top of the wind mill.

100% Samsø Success

All of these actions have led to an impressive 100% renewable energy coverage of the electricity consumption, which has remained stable even as people have obtained more electrical equipment. In 2005, Samsø produced 130% of its electricity needs without CO₂ emissions, exporting a surplus of approximately 80,000 MWh to the mainland from the offshore turbines.

The success is a story of local commitment and global responsibility.

One of the key actors, the association of the Samsø Energy and Environment Office, is also an active member of INFORSE.

In June 2006, an "Energy Academy" will open on Samsø. It will be a house where scientists and researchers can meet, seminars and training sessions will be arranged and a permanent exhibition will demonstrate renewable energy and local sustainable development.

District heating system based on biomass, and solar thermal collectors. Photos by Søren Hermansen, Samsø Energy and Environment Office.



CRETE

Crete is the largest island in Greece, with 8,335 km² and 601,000 inhabitants. The topography of the island is very mountainous, which creates good conditions for wind power. Crete also receives an abundance of sunshine. The total energy consumption in Crete reached 34,000 TJ in 2004.



In 1998, the Region of Crete and its Regional Energy Agency launched the programme “Large Scale Deployment of Renewable Energy Sources in Crete”, which was given the first Award for the Best Regional Renewable Energy Partnership in Europe within the framework of the 2001 “Campaign for Take-off Awards”.

Through the Greek Operational Program of Energy and the Greek Operational Program of Competitiveness, around 100 investments have been realised in the sector of RE, rational use of energy (RUE) and energy-saving, especially in hotel units and small industries. The most important means to promote renewables in Crete are:

- **Reduction of Electricity Consumption**

- *Demand-side Management*

Energy-saving measures have been taken to decrease demand. For instance, passive and hybrid systems for cooling in dwellings, hotels and bungalows have been set up. The establishment of a time-zone pricing system will also smooth the daily variations in the load curve.

- *Electricity Savings*

The substitution of more efficient light bulbs in the residential sector and the use of passive and hybrid cooling in new constructions could lead to a 10% reduction in the net electricity production over the 1998-2010 period.

- **Energy Storage**

Reverse-pumping hydro-storage systems will permit larger use of intermittent renewable energy sources in the electricity system of Crete. They will also facilitate the management of the conventional electricity production system and replace the expensive use of gas turbines during the peak hours.

- **Wind Power:**

16 wind parks of 89 MW total capacity are in operation, providing almost 8-10% of the electricity in Crete, while 9 new wind parks of 50 MW in total capacity are under construction.



- **PV Applications:**

30 photovoltaics (PV) installations (200kW installed capacity) are integrated into lighthouses and small hotels for ecological tourism, as well as into residential housing.

20 new PV installations of 1.2MW total are under construction. Further development of PV energy is expected beyond 2010.

- **Solar Hot Water Systems (SHWS):**

Almost 3% of the total energy demand is supplied by solar thermal collectors. There are about 190,000 m² of solar thermal collectors (central and distributed) for water heating, which are mainly installed in hotels, industrial buildings, and residential housing. Two solar cooling/air-conditioning systems have also been installed in hotels.

- **Biogas, Biomass and Biofuels:**

Two biogas combined heat and power plants are in operation. Biomass is, however, more widespread in Crete and provides more than 8.5% of the island's total energy demand. Biomass is mainly derived from residuals of the large-scale olive production processed on the island and used in thermal-energy applications



in olive-oil mills, greenhouses, hotels, houses and small manufacturing units. Olive kernel wood is also used as fuel instead of oil, as it costs 5 times less than the required quantity of oil for the same efficiency.

All these installations have been followed by “soft measures” like voluntary programs for electricity peak “saving” during summer, promotion of efficient electric bulbs, and public information for the promotion of renewables and energy saving. The program created new activities and new jobs, thus decisively contributing to energy innovation, to environmental protection, and to the reduction of greenhouse gas emissions.

Successes Can be Replicated

Both Samsø and Crete have been successful. They have sharply increased the use of renewable energies, following the plans made at the start of the initiatives 10 years ago.

Many of the other projects registered as “100% renewable communities” have similar results, and their results are being replicated world wide.

While Crete enjoys a climate very favourable to solar, wind, and biomass energy, good results can be obtained in less promising climates. For instance, Ærø, a Danish island in the Baltic Sea, managed to expand its use of solar thermal collectors without the benefit of Mediterranean weather conditions.

More Information:

- “Take off” Campaign:

http://europa.eu.int/comm/energy/en/renewable/idae_site/dep/lay/mapa_site.html

- European renewable-energy islands:
www.europeanrelands.net

- Crete & Samsø:

www.crete-region.gr/greek/energy/
www.veo.dk/eng/