

GENERAL APPROACH

SAARBRÜCKEN (Germany)

12 % of the total EU energy consumption shall by 2010 be covered by renewable energy sources. This is the objective that the Community agreed on in its white book on « renewable energies ». At the same time, an European-wide action plan has been set up. In order to achieve these goals, local communities do need to actively contribute to this. The City of Saarbrücken and its municipal utility act therefore since many years in the fields of research, demonstration and promotion of these energy sources as well as in the field of energy savings.

THE CITY

Saarbrücken, having nearly 190.000 inhabitants, is the capital of the Saarland, being the smallest Land in Germany. Two main features characterise the city and its historical development:

- The city of Saarbrücken is situated in a coal mining region, for more than a century coal mining has been a formative influence on the industrial and social development of the region.
- the proximity of the French border.

Climatic data:

Solar radiation: 1,200 kWh/(m²a)

Annual mean temperature: 10,4°C



CONTEXT

In response to the worldwide oil crises of the 1970s, Saarbrücken developed its 'Energy for the Future' concept as early as 1980. The basic principles were and are remained:

Improving efficiency; the power station park has been modernized and transformed into combined heat and power production. The district heating network has continuously been extended, using waste heat from the power-stations.

Mobilizing energy-savings at the consumer

Building the bridge to the solar age by demonstrating and promoting the use of renewable energies.

It was very important for the successful work, that the energy utility, Stadtwerke Saarbrücken AG was a 100% municipally controlled company and the cooperation between the involved persons (lord mayor, deputies and director of the Stadtwerke) is excellent. The *Stadtwerke Saarbrücken AG* has developed into a modern energy services company. The core company philosophy is no longer to attain the largest possible energy sales volume but rather to offer energy services with emphasis on responsible resource management.

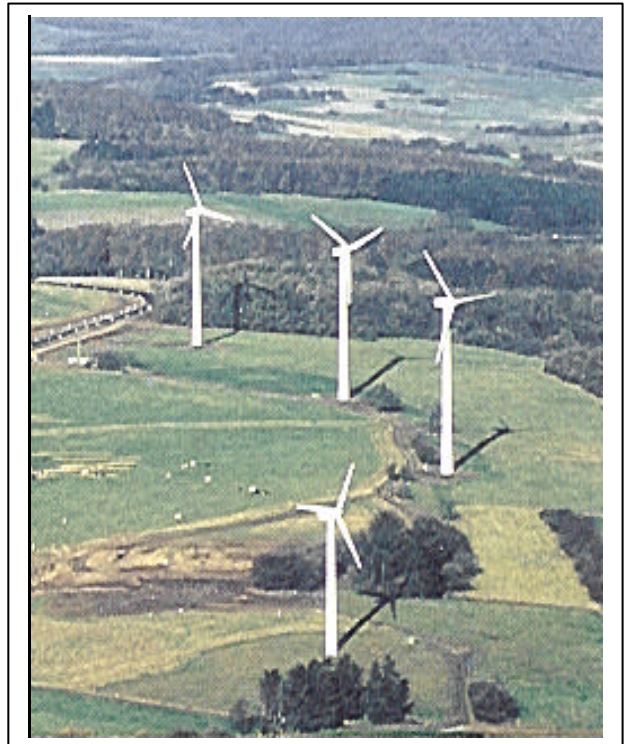
With the liberalisation of the electricity market in Europe it was important to find a new partner. This new partner is Electrabel, willing to continue the successful work of the Stadtwerke. And as imposed by the new legislation a new organisation was necessary with Electrabel running the power plants, the Stadtwerke responsible for all networks and the new company Energie-Saar-Lor-Lux for the marketing.

The climate protection program has targeted a 25 % reduction in CO₂ levels for the energy and transportation sectors by the year 2005. A recent result: CO₂ emissions fell by 18% between 1990 and 2000.

EXPERIENCE OF SAARBRÜCKEN

There is a wide range of renewable energy implementation measures going on in Saarbrücken, encompassing mainly the use of PV, thermal solar heating and biomass, but also wind energy and hydro power. The aim of the municipality and the Stadtwerke is to promote research on these energies, to ease their application in integrating them into the existing building stock or existing energy supply, to foster their mass production and finally reduce their price in order to make them available for as many citizens as possible. Below the measures undertaken in Saarbrücken figure:

- the "solar package" includes subsidies for collector-systems for the heating of warmwater for showers. This can be combined with subsidies from the region.
- a noise barrier with an integrated photovoltaic system
- all roofs of the municipality are offered to companies to make installations of photovoltaic systems (this can be economic for small companies with the actual legislation in Germany)
- a portfolio of wind power stations outside the city boundaries (windspeed is too low within the city)
- cultivation of C4 plants – reviewing the possibilities of growing them in the water catchment area of the utility
- residual wood utilisation
- installation of a hydro-power-plant
- absorber systems for the outdoor swimming pools of the municipality.



Some projects will be presented in more detail below, being examples of innovative integration of renewable energies into existing structures and at the same time, trying to foster their market penetration.

Thermal Solar Power in a Swimming Pool

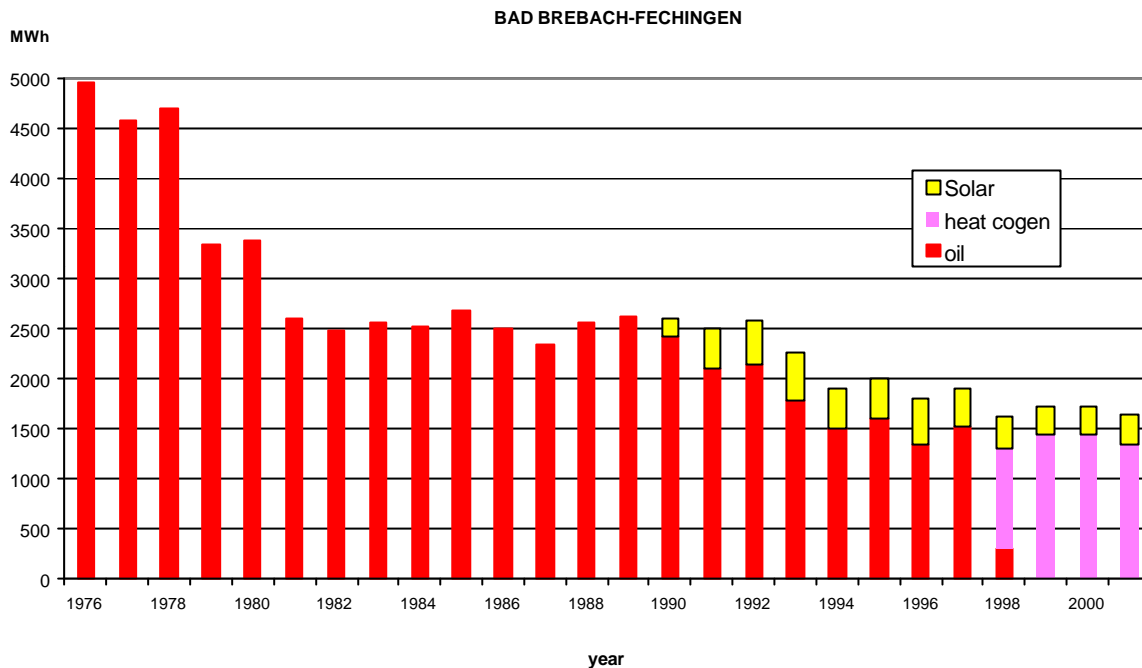
One of Saarbrücken's swimming pools (with both a covered and an open air part) used to have 2 oil-fired boilers. In order to reduce the use of and to substitute the fossil fuel, the municipality and Stadtwerke Saarbrücken made several investments:

- a 760 m² absorber-system for the heating of the outdoor-swimming pool. This system serves also for the heating of the fresh water for the indoor-pool.
- a new ventilation-system with a high performance heat-recovery of an efficiency of 80%
- a thermal solar system, installed on the roof of the swimming pool building. This installation heats the water for showers in two steps:
 - first, the water is heated by 80 m² of absorbers
 - then, there are 120 m² of high performance flat collectors, that serve to heat the water as much as possible by the use of solar energy.

If both systems cannot sufficiently heat the water, the old oil-fired boilers takes over this final part.

- the final step was the installation of a combined heat and power system using natural gas, replacing the oil-fired boilers.

The observed heating demand is presented in the diagram:



Integration of PV-cells in a motorway noise barrier

PV-systems shall use existing surfaces like roofs, and not green spaces. The necessity to construct a motorway noise barrier, the Stadtwerke Saarbrücken developed plans to integrate PV cells for this purpose. The additional advantage are low costs. Two different systems are realized:

- on one part of the barrier (about 293 metres), transparent PV cells have been integrated to reflect the sound emitted from the traffic. The whole installation has an output of 40 kW_p.
- on another part of 217 metres length, the PV cells absorb sounds, therefore the cells are not transparent. The output is about 20 kW_p.

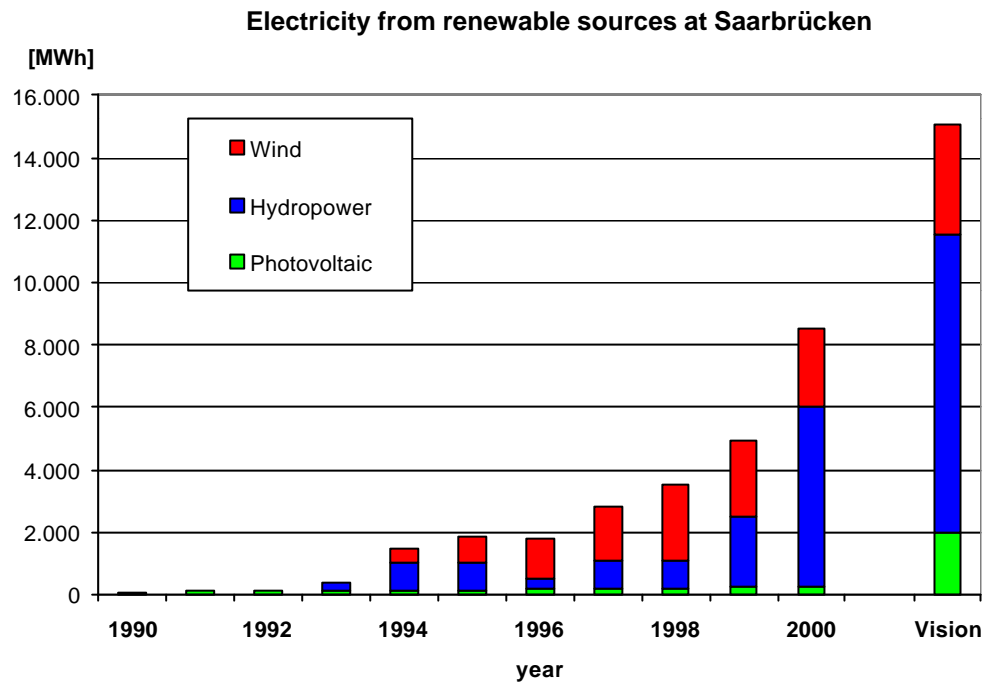
The cost of both parts is about 6.670 €/kW_p, being at the time a low price. This was made possible by the integration of solar cells into the noise barrier structure and the substitution of conventional noise protection elements. The project has been subsidised by the German Federal Ministry for Education and Research and the Saar Ministry for Environment, Energy and Transport.

EVALUATION AND OUTLOOK

Some figures to show the success of the policy lead by the municipality and the Stadtwerke:

- Progress for the collector-systems installed was going up from 1,700 m² in 1990 to nearly 4,700 m² in 2000.
- Electricity generated from renewable energies in the grid of the Stadtwerke Saarbrücken has been risen from 100 MWh to 8,500 MWh (see diagram).

- The participation in the windpark will be enlarged. With the new law for the definition of suitable prices for electricity from renewables, which has passed in March 2000, new installations for photovoltaics are in preparation (more than 2 MW!, today we have 380 kW). These projects are prepared by private companies and a citizens-network. The municipality helps to find the necessary rooftops for the installations.



Actual programs for research and development and for demonstration are running by the Stadtwerke as well as by the municipality of Saarbrücken. These EU-funded programs are:

- Urban Planning (APAS)
- Bioelectricity (APAS)

These programs will help to further develop the use of renewable energies at Saarbrücken.

FURTHER INFORMATION

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