

General Approach

BESANCON (France)

GENERAL ASPECTS

Besançon is the capital of the Franche-Comté Region. Approximately 120,000 inhabitants live in the city of Besançon and 160,000 in the conurbation. The city centre is located in a meander of the River Doubs with the "Citadelle", a fortification built by Vauban towering above the city. In the 18th century, Swiss clock and watchmakers came to settle in Besançon. They established a tradition for horology that is now partly supplanted by microtechnology. The local economy is based on an industrial fabric of SMEs and public tertiary activities. Besançon is twinned with Fribourg en Brisgau.

Climatic data:

Degree days (Base 18 °C): 2878



BACKGROUND

Besançon has developed a strong environmental reputation. Located in a remarkable natural setting, Besançon initiated a number of actions, often innovative ones, in the field of urban transport, air quality, noise abatement, tree management etc. All are long term actions that were initiated in the 1980s or even before. The Municipality received and continues to receive prestigious awards and honorary mentions.

In the 1970's, the Municipality of Besançon became proactive in local energy conservation through a series of actions in wide-ranging areas: public transport, heat network with service galleries, public buildings, biogas, waste-to-energy schemes, cogeneration, etc.

In 1983 a Deputy Mayor was appointed to take charge of energy conservation and environmental issues. This political commitment, together with the motivation of the technical team and the support of ADEME, the French Energy Agency explain the results achieved.

Besançon's commitment towards sustainable energy - although the term was not in use at that time - is at the origin of the creation in 1990 of a first network aimed to encourage exchanges of experience between a small group of European municipalities. This network later became Energie-Cités and it is quite naturally in Besançon that the association set up its head office some ten years ago, thus providing its members with a place when they can get information, benefit from various services, and exchange experience.

EXPERIENCE OF BESANCON

Energy management in municipal buildings

The Municipality of Besançon administers around 300 buildings (schools, gymnasiums, swimming pools etc.), the equivalent to 5,600 dwellings. Early in the 1980s, the Municipality initiated a long term action aimed at reducing energy consumption in municipal buildings that is still being implemented.

A first "emergency" phase prompted by the second oil crisis of 1979 consisted in defining guiding principles that are still being used today: technical improvements to heating equipment, reduced heated floor space and insulation, programming, regulation and above all, establishment of performance indicators so as to be able to compare consumption levels and presentation of an annual energy report to the elected representatives.

In 1983, a Deputy Mayor responsible for energy conservation and environmental issues was appointed. This marked the beginning of a more ambitious policy with the decision to carry out an energy audit of the municipal estate. This document is precious in that it provides a way to identify potential thermal improvements in a building at a relatively low cost and is still used today in the oldest buildings where energy conservation measures also involve undertaking heavy restructuring works. Works to convert boilers to natural gas also started in 1983 and continued till 1988.

Remote monitoring systems were introduced between 1985 and 1988 and greatly contributed to solving some of the problems inherent in the management of municipal building stocks. All municipal installations bigger than 50 kW, i.e. 160 boilers in total, are connected to the system and benefit from various options: remote alarming, remote control, remote metering etc.

All these measures resulted in a 40% reduction in energy consumption between 1979 and 2001. CO2 emissions dropped from 18,900 to 8,960 tonnes, which corresponds to savings of more than 52%. As regard local pollutant emissions, SO2 emissions decreased by 87% and NOX by 31%. The main task is now to maintain such good performance level by ensuring efficient energy monitoring.

Municipal officers in charge of energy conservation also pay special attention to new buildings, even before the design phase. Electricity consumption in the municipal estate in particular has been the focus of municipal action over the last years and remote monitoring has been applied to street lighting. All these measures generated savings that were used to finance investments and to improve comfort.

Several actions in co-operation with twin towns (Bielsko-Biala in Poland, Bistrita in Romania) were carried out to promote energy conservation actions in these cities.

Cogeneration

The urban heating plant supplies the heat network of the Planoise district. Initiated in 1997, it now serves 7,700 dwellings and 3,300 dwelling-equivalent in office blocks, administrations, schools, hospitals, companies, etc. The plant produces 4,200 TOE of energy from domestic waste and covers 40% of the heat network supply in replacement of coal and fuel oil. In 1994, the installations were upgraded and a gas turbine capable of producing 4.7 MW of electricity in cogeneration mode was put into service. Besançon was at that time the first city in France to own such installation. The project was financed by a loan over a fixed period (7 years) and savings were achieved as soon as the first year. The electricity produced is sold to EDF.



With an average overall efficiency of 80%, cogeneration reduces by 29% the use of primary finite energy resources. 2,500 tonnes of coal - out of a total of 6,100 - and 2,300 tonnes of fuel oil have been substituted by gas. Associated savings in emissions to the atmosphere are estimated at 41% for dust particles, SO2 and HCL, 6% for NOX.

A 450 KW biogas plant was then commissioned (see "renewable energy"). Several feasibility studies were also carried out to investigate potential applications in a swimming pool, a sports complex etc. but EDF price policy militates against the development of such projects.

Renewable energy

Renewable energy sources were not promoted as part of a voluntary national scheme before the end of the 1990s. In Besançon, they have never been integrated into an overall policy but the new municipal team elected in 2001 has opened new perspectives for renewables. A series of pilot experiences already exist that can be used as a basis for a more dynamic policy:

- 1980: solar heating for the open-door swimming pool
- 1992, geothermal installation: a heat pump located in an underground car park and utilising ground water as the heat source is used to heat a municipal administrative centre. As water circulates through the circuit, it gets colder and is used for cooling adjacent computer rooms.
- 1992, photovoltaic installations on municipal fleet vehicles are used to provide energy to on-car road works warning signs, thus saving the need to run the engine all day long.
- Biogas from the wastewater treatment plant was first exploited in 1985 using two small CHP units. In 1995, a bigger unit of 450 KW was installed. The new unit is capable of producing all the heat and 30% of the electricity of a 145 000 inhabitant-equivalent wastewater treatment plant. The plant can generate much more electricity, but unattractive purchase prices from EDF combined with low electricity selling prices in summer account for the fact that the installation is not running at full capacity. The Electricity Directive should bring modifications to current price structure but it is not effective yet.
- 1999 installation of an automatic wood-fuelled boiler (150 kW) to supply a small group of houses in the Chailluz Forest. The forest has many foot paths and serves environmental educational purposes as well as demonstration ones by providing the fuel for the boiler. A wood-fuelled boiler (6 to 10 MW) is currently being investigated as a way to further reduce the use of coal and fuel oil. The University has just decided to have a 3MW wood-fuelled boiler installed to supply the Campus heat network. This trend, which extends to the whole Franche-Comté region, is the result of an active and continuous strategy adopted by ADEME over the last fifteen years.
- The waste-to-energy plant will also be upgraded so as to be able to produce the same quantity of energy using sorted waste collected from a wider area.

The Municipality of Besançon also took part in a European project (APAS) in 1995-96 the objective of which was to identify renewable energy opportunities within city limits in all the sectors. Most of the data collected are still valid in 2001. This action was co-ordinated by IFEU Institut of Heidelberg and Energie-Cités and involved cities from Germany (Pforzheim and Ettlingen), France (Rochefort and Besançon,) and Portugal (Funchal and Bragança).

EVALUATION AND OUTLOOK

Following the municipal elections of March 2001, it was decided to continue along the same political lines: Deputy Mayor in charge of energy conservation and environmental issues, creation of an energy-environment "interdepartmental" mission to improve horizontal enforcement of municipal initiatives. Information actions directed towards the general public are also being planned and an Energy Information Centre should open soon in the city. Examples of new energy projects in France should give a fresh boost to local authorities' action, including in Besançon.

FOR FURTHER INFORMATION

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ADEME

