

Electricity demand-side management

MONTPELLIER (FR)

GENERAL ASPECTS

Montpellier is a city with 229,000 inhabitants, including 63,000 students, and is the capital of the Languedoc Roussillon region. The historic core features prestigious mansions from the 17th and 18th century. Since the 1970s, the city has earned the reputation of being a dynamic city and is now a pole of development for research and state-of-the-art technology. A number of ambitious planning projects were launched in Montpellier, among which the Antigone district. Montpellier is twinned with Heidelberg.

Climatic data:
Degrees day: 1600-1800
Annual mean temperature: 14.0°C (summer: 19.1°C; winter: 8.9°C)



BACKGROUND

Early in the 1980s, the Municipality of Montpellier set up an internal organisational structure responsible for co-ordinating energy conservation actions. This included appointing an elected member to take charge of energy conservation issues and creating an Energy Department. An internal debate on the overall organisation of the energy system was initiated and measures were adopted in the different areas in which the municipality has responsibilities: municipal buildings, production and distribution, town planning, involvement of energy stakeholders.

In Montpellier, there is a strong commitment towards finding a new equilibrium for the city by bringing closer the areas where people live to those where they work. The Antigone and Port Marianne districts, both designed by Ricardo Bofill and located close to the town centre are good examples of this. A Plan de Déplacement Urbain (Urban Travel Plan) was also designed, which gives the priority to public transport (introduction of a tramway line in July 2000) and to pedestrians.

A number of demand-side management actions aimed at reducing the consumption of electricity and energy have been implemented in areas where the municipality can have a direct impact or influence the decision-making process and produce remarkable results in existing and new buildings.

THE EXPERIENCE OF MONTPELLIER

Electricity demand-side management

The Municipality of Montpellier has 1100 points to which electricity is delivered and handles more than 5000 bills for street lighting, traffic lights and municipal buildings every year. Appropriate tools geared to the complexity of the problems to be tackled are therefore needed to manage all these data, detect abnormalities and optimise tariffs.

In 1987, a first study was carried out to take stock of the situation. The conclusions were that nearly two-thirds of total energy expenses in municipal buildings were linked to electricity consumption (61 %, representing around 1.4 Mil. EURO), while street lighting and traffic lights cost a further 1.6 Mil. EURO. With a total bill of 3 Mil. EURO, electricity accounts for 69% of the local authority's total energy costs.

Given the weight of electricity in the energy bill, it was decided to introduce measures aimed at reducing electricity consumption. These measures include:

- Recruiting a person responsible for electricity conservation,
- Centralised management of all electricity bills at the Energy Department which is responsible for controlling and monitoring them using computerised systems,
- Tariff optimisation for all the contracts,
- Progressive installation of energy efficient lamps in all the buildings, taking care to comply with regulatory illumination levels, and suppression of incandescent lamps in all new buildings,
- Progressive upgrading of existing pumps and fans, especially in old buildings where overratings of 100% are frequent,
- Progressive replacement of all electric heating systems by gas-fuelled hot water central heating systems, less expensive to operate,
- Minimisation of cooling requirements in new buildings by using passive solar design principles: wall inertia, insulation and efficient utilisation of direct solar gains to provide optimum comfort in summer.

Between 1987 and 2000, the municipality achieved the following results:

- 5.1% decrease in subscribed demand levels,
- electricity savings of 2.1%
- 10.8% savings on expenses,

It is to be noted that in the meanwhile, the stock of municipal buildings had increased by 26% and electricity prices, after much fluctuating, had come back by 2000 to their 1987 levels.

In a context of growing energy consumption in a country where the concept of energy conservation is still something new, such a performance has much to recommend it.

A political commitment fully backed by the administration

Actions involving municipal buildings were basically initiated as a means to curtail budget expenses. They are the result of the political vision defended by the Deputy and Mayor, Georges FRECHE, which led in particular to the appointment of a Deputy Mayor in charge of Energy.

To improve energy management, the City Council's General Secretary signed two memorandums:

The first one was addressed to the directors, heads of departments and managers of municipal companies. These were asked to reduce energy expenses for heating purposes and energy consumption in municipal buildings, in compliance with the guidelines defined by the Mayor. The memorandum reads as follows:

- *"electricity consumption accounts for 2/3 of total energy costs in municipal buildings", it is therefore necessary to "be vigilant, in particular as regard lighting, by making sure that all the lights are off when the building is not occupied" and "the energy department will progressively replace all the incandescent and halogen lamps by compact fluorescent bulbs that consume five times less energy,*

- "maximum regulatory heating temperatures are the following: gymnasium: 14° - schools, offices: 19° - day nurseries: 21° (+ 1°C would mean a 20% increase in heating costs for gymnasiums and a 10% increase for schools and offices)",
- "no back-up electric heaters will be authorised in buildings fitted with a hot water central heating system".
- "a fact sheet describing all the regulations that must be complied with when building or retrofitting a municipal building is available at the Energy Department (low energy buildings)",
- "Given the amount of money spent on energy - around 14 247 000 francs (2.17 Mil. EURO) in 2001 for municipal buildings alone - and in particular on electricity, I thank you in advance for your help in fighting wasteful behaviours".

The second "low energy" memorandum is addressed to all stakeholders, whether internal or external, involved in the building or retrofitting of municipal buildings. Recommendations concern a wide range of subjects from thermal insulation, heating, building orientation, wall design, ventilation, lighting through to domestic hot water. Such approach involves taking account of not only construction costs but also all operating costs necessary to cover the building's energy requirements during its entire life. Implementing such recommendations in a new school building for example may result in savings of up to 41%. Since 1995, all municipal departments have received this memorandum. It is also distributed to target groups (architects, consultancy firms, etc.) together with explanatory documents each time a kick-off meeting for a new construction or retrofitting project is planned.

The Energy Department of the municipality of Montpellier is responsible for seeing to the good administration of these memorandums via the specifications attached to the invitations to tenders and/or by monitoring designers' work. The Department is in contact with all the Municipality's project managers to discuss issues relevant to heating and air conditioning in municipal buildings as well as specific uses of electricity. The emphasis is laid in particular on new equipment performance.

The example of the public library Antigone...

In 1996, Société d'Équipement de la Région de Montpellier (SERM) and the Energy Department of the municipality launched a competition for the design of a library-archives complex to be located in the Antigone district opposite the new Olympic swimming pool. Attached specifications included extremely precise energy performance requirements in winter and in summer. The competitors were then perfectly aware that "energy conservation" would be a critical factor in selecting the offers.

Energy choices were defined as soon as the design phase and it was a prerequisite that the new building be connected to the city's urban heating and cooling network already supplying the Antigone district.

A first selection allowed to identify 4 proposals out of 85. The thermal behaviour of those four projects was assessed by a specialised consultancy firm. During several days, a software compiled all the data provided by the architects in order to predict the behaviour of each building over a one year period, zone by zone and hour by hour.

Once the successful tender was chosen, the same consultancy firm was called again to assist the architects. All the technical options (type of glazing or shading systems, ventilation, etc.) were simulated on a computer and compared to achieve minimum energy consumption in the building. During several months, the various partners to the project - SERM, the Energy Department of the Municipality and the architects – regularly met together. Compared with the initial proposal, power requirements were reduced by 30-40% and yearly expenses for air conditioning and space heating were reduced by half.

Commissioned in 2000, the new library gives complete satisfaction to the users and to energy managers.

... and other projects

Cogeneration

Montpellier pioneered research in this field and is the only city in France in having developed a heating and cooling network. This network was created in the Antigone district designed by Ricardo Bofill between 1979 and 1986. In 1996, a CHP unit fuelled with natural gas and capable of producing 3.7 MW of electricity and 4.5 MW of heat was installed. A tri-generation plant composed of two CHP engines with an output of 6.3 MWe and 6,4 MWth respectively and a 1.44 MW hot water absorption chiller was put into service by the end of the year 2000.

Tramway

Montpellier is a fast-expanding city where the whole mobility issue had to be rethought to improve space utilisation and travels in the city while enhancing the quality of the life and the environment. In July 2000, the first tramway line (15.2 km) was put into service as part of an overall mobility scheme. This was also to comply with the law on air quality and rational use of energy, which places French local authorities under the obligation to set up Urban Travel Plans. A second line (19 km) is being planned and should be operational by 2005.

EVALUATION AND PERSPECTIVES

The energy policy of Montpellier is a long term undertaking that is still building up. The municipality of Montpellier intends to play an active role in the new liberalised energy market. They are also interested in developing co-operation with South-Mediterranean countries, in particular in the energy field.

FOR FURTHER INFORMATION

MAIRIE DE MONTPELLIER

Contact persons Michel IRIGOIN

michel.irigoin@ville-montpellier.fr

[Directeur de l'Energie et des Moyens Techniques](#)

[Isabelle LE VANNIER e.demt@ville-montpellier.fr](mailto:Isabelle.LE.VANNIER_e.demt@ville-montpellier.fr)

[Chef du service énergie](#)

[Hôtel de ville](#)

[F-34064 MONTPELLIER Cedex 2](#)

[Tel : +33 \(0\)4.67.34.73.12](tel:+33(0)4.67.34.73.12)

[Fax : +33 \(0\)4.67.34.59.09](tel:+33(0)4.67.34.59.09)