

BIOCLIMATICS

Hospital Complex

MURCIA

Spain

As a method of construction, bioclimatics is the result of long experiment initially based on empiricism. Now with the latest technological developments and European Union backing, new constructions can apply these new, low-cost methods. The Spanish Ministry of Health, Insalud, has encouraged the construction of different health centres in different cities, all respecting bioclimatic rules, which save energy and promote the use of architecture which respects the environment.

THE CITY

As the previous capital of the Christian kingdom of Murcia (13th cent.), this Muslim foundation developed as an urban centre in one of Spain's great Mediterranean huertas, in the lower Segura valley. Capital of Murcia region, the town has a total of 318 800 inhabitants. A city of trade, administration and landowners, it has developed since the end of the 19th century, with the boom in fruit and vegetable exports. In the historical centre on the north bank of the river, over the bridge, a modern town has grown up, linked to the station and the agricultural industry. The silk industry, which dates from the time of the Moors, is still active. There is also a textile (wool, cotton, linen), leather and aluminium product industry.



CONTEXT

In the search for energy efficiency, bioclimatic architecture, on the sidelines for a long time, is back in force. Different studies have now proved that savings of up to 70% on energy can be obtained at an extra cost estimated at 15%.

Although only a small number of buildings are involved at the moment (mainly public), it is nevertheless headed for a rosy future. It essentially consists of constructions built to take into account the advantages to be obtained from the materials used, the climate and morphology of the site in question. This means having detailed knowledge of the climatic and geographical data of the construction area.

The Spanish Minister of Health, *Insalud*, decided during the 1990s to promote this method of construction and several hospital complexes have been built since then, applying its rules. These include health centres in Murcia, Jumilla, Alhama, Perales de Tajuña and Vielha hospital.

EXPERIENCE OF THE MURCIA HEALTH CENTRE



The Murcia *Infante D. Juan Manuel* health centre was built in 1991; it covers an area of 2.000 m² including 36 consultation rooms, an emergency room and personnel rooms (administration, restrooms, etc.). It can house about 300 people. Like any medical building, it must meet specific standards in terms of air-conditioning (5,600 m³ in volume), comfort and sanitation.

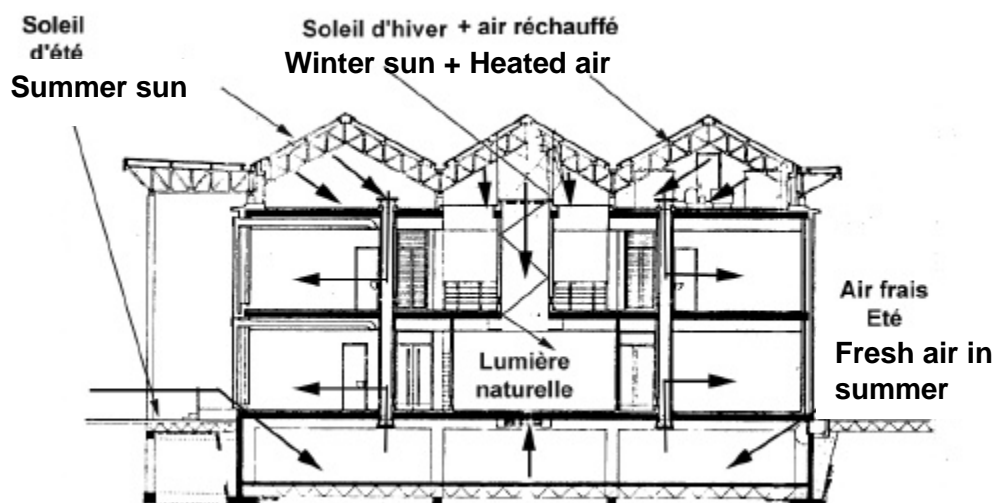
The architectural solution used is a two-story edifice with a basement and mainly southern

exposure, on an east-west axis. Both basement and roof have been designed as elements regulating the building's air-conditioning.

More simply, because of its position facing the sun, in winter the roof serves as a "hood", capturing and retaining heat, and in summer as a "straw hat", avoiding excessive exposure to the sun by providing shade on the façades and promoting ventilation. The basement allows continuous air circulation via a system of air vents positioned on the north and south faces of the building. Lighting is provided by a light well in the centre of the building; this well, with two smaller ones, also ventilates the different floors.

The southern face also has *Trombe* walls, named after the French scientist who designed them in the 1950s. These are walls covered with a dark surface which absorbs heat during the day and redistributes it at night. The walls of the central well have similar characteristics.

An automatic support system placed under the roof is used to control ideal air-conditioning by promoting fresh air ventilation from the basement in summer and warm air from the "attic" in winter. If the natural conditions are inadequate, a conventional air-conditioning system can be switched on.



The strategy differs according to the season:

- In winter, the building captures (*Trombe* walls, roof acting as a greenhouse and light well), accumulates (*Trombe* walls and central well walls) and distributes energy (natural or forced convection, wall radiation);
- In summer, the building reduces (reduced direct radiation by placing a porch on the south side, aeration via the roof) and disperses energy (natural or forced ventilation, nocturnal cooling via the basement).

EVALUATION AND OUTLOOK

The total cost of the Murcia health centre was 1.262 million euros which is 5% more than a traditional construction, but the energy saving has been evaluated at 70%. In eight years, this saving has covered the extra cost.

Because of this performance, this structure was included in the *Daylight in Buildings* manual produced by the General energy management in 1994 (EEC DG XVII) as part of its Thermie programme. It was also chosen to appear in the first catalogue of good practices, *Cities for a more durable future* produced in 1996 by the Spanish Ministry of public works.

Of course this experiment is not transposable in the same form to other places, because Murcia receives a high level of sunlight throughout the year and although its summers are particularly hot, its winters are also mild, which limits energy expense. Nevertheless, bioclimatic architecture is certainly an interesting method to be investigated in the search for efficient energy production and durable development.

FOR FURTHER INFORMATION

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