Passive Energy Conservation for Sustainable Buildings

El Hadi Bouguerra
LTSM, Mechanical Department, Blida I University
Route de Soumaa, Blida Algeria
EhBouguerra@yahoo.fr

The increasing demand for air conditioning especially in developing countries is a time bomb for the global climate warming. The supplementary electrical energy demand is on the way to be satisfied by means of CO_2 emissive energy sources mainly fossil.

The passive solutions must be used where it is possible; to decrease at least the energy load and it can be done for a low additional cost especially if it is implemented at the construction initial design stage. Some other promising passives means can be used for existing houses which are the weak point of all energy conservation policies.

A passive house uses mainly passive systems to provide the ambient atmosphere treatment (lighting, heating, refreshment, renewal of air) and the associated comfort. A passive system uses and controls the natural energy streams surround the building such as the solar radiation and the wind. The active components of low energy consumption (such as ventilators and pumps) can be associated there and can be powered by renewable energy sources such as photo-voltaic.

In fact, traditional architecture has always tried to adapt itself to the climate. The use of massive walls associated with white paint, small windows and narrow alleys in warm countries are a good example. Besides, architecture being a local feature, the original solutions of climate adaptation developed on a giving site on the earth can be unknown somewhere else. There is then the need for globalization to help us to benefit from others experience.

If some well known passive techniques have shown a real efficiency in the reduction of the energy needs of the new buildings where they were integrated with the design and the construction, It is not the same case for the existing housing where these passive practices are rarely applicable. An insulation to be really efficient must be made on the outside of the house envelope. This is impractical in buildings already integrated into the urban architecture. It's the same for the thermal mass, the permanent solar protections or the orientation of the housing that are generally an inheritance of several decades of urban development. But recent improvements on some techniques well known by the past but suffering from some inconveniences, make them very promising especially on the adaptation to the existing house. It is the case of using phase change materials, reflecting paints and adapted ventilation strategies.

In fact, the reduction of the energy consumption remains the best mean to limit the resort to fossil fuels and make economically viable the use of the renewable energies. It also gives time to the research in this field to succeed and to reach the phase of industrial maturation.