

## ENERGY AND BUILDING: COOPERATION 'VERSUS' SELF-SUFFICIENCY

JOAN SABATÉ

Improved efficiency in the building sector is essential to reduce energy consumption. In the EU, construction represents 40% of final energy consumption<sup>1</sup>. In Spain<sup>2</sup>, each household consumes an average of around 120 kWh per m<sup>2</sup> annually, and releases about 25 kg of equivalent CO<sub>2</sub> per m<sup>2</sup> for day to day activities, while to build a home represents the emission of 1,000 kg of additional CO<sub>2</sub>/m<sup>2</sup>.

This industry also has an extremely slow renewal time, which means it takes a long time for improvements in new buildings to become widespread throughout the building stock. The high initial investment, both economic and environmental, that a new building represents, makes it advisable to step up rehabilitation policies at the expense of new construction. Notwithstanding, rehabilitation rates remain slow. Pioneering countries, like Switzerland, reach ratios of 2.5% annually, while in Catalonia, to reduce 20% of CO<sub>2</sub> equivalent emissions in the sector would require 70,000 homes to be rehabilitated annually<sup>3</sup>.

Reducing energy consumption of buildings depends, first and foremost, on reducing the need for heating, cooling and hot water production. In the Mediterranean region, the goal would be to reduce heating demands to below 10 kWh per m<sup>2</sup> per year, which means reducing them to a fifth of current levels. This could be done by improving insulation, from the current average of 5 cm to 15-20 cm, breaking thermal bridges by intelligently using two heat-specific mechanisms, namely thermal inertia and ventilation. Above all, the contribution of the sun should be taken into account and used effectively, whereby urban planning should capture the sun in winter but protect us from it in summer.

Reducing energy requirements means less energy is needed to obtain the levels of comfort sought, and whatever the energy deficit, it should be produced using more efficient appliances. In

this respect, production system centralisation, with individual consumption meters, is often a good strategy. Additional reductions of 30% to 50% of final energy consumption can be achieved by changing from individual boiler systems to collective systems using geothermal heat pumps, cogeneration or biomass boilers, despite the need to overcome users' initial reluctance.

In this respect, we should think about buildings –and on a wider scale the city as a whole– as potential energy producers, not just as consumers, and do so with an integrated approach. It is no longer enough to envisage the self-sufficient house, as the environmentalists did in the seventies, but we should rather consider urban areas as a sum of interconnected energy-efficient buildings on different scales, working together to achieve maximum efficiency. A model of this type comes closer to the symbiosis advocated by contemporary biology than the competitive self sufficiency of a certain type of outdated Darwinism.

Thus energy production should be brought closer to consumption points and heat production centralised to match them (cogeneration and distributed generation, integrated and intelligent networks of heat and electricity). An adequate production scale (building, block, neighbourhood...) would also enable recovery of the synergies resulting from the complexity of uses, such as those produced by the simultaneous demand for cooling and electricity in offices and equipment, or for heat to produce hot water in houses.

Finally, it would be mistaken to argue that sustainability requires the eradication of cooling systems. In densely built-up urban environments with high levels of noise and air pollution, or in very warm areas, passive systems may not be sufficient and those living there are either subjected to prolonged discomfort or are forced to choose between ventilation and noise. Such a situation would worsen these people's quality of life, and they would resort to the outdated individual devices hanging from facades and balconies. ☺

<sup>1</sup> European Parliament Resolution of April 23, 2009, as reported in *Energy Performance of Buildings Directive* May 19, 2010.

<sup>2</sup> MAÑÀ, F. et al., 2003. *Paràmetres de sostenibilitat*. ITeC. Barcelona.

<sup>3</sup> SABATÉ, J., 2011. «Construcció i habitatge: objectius i accions». In GAUSA, M. (coord.). *Cap a un habitat(ge) sostenible*. CADS. Barcelona.

**Joan Sabaté Picasó**. Architect and Director of SaAS: Architecture and Sustainability (Barcelona, Spain).