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Energy saving and solar energy use in the University of Valencia (Spain)

J.L. Gómez-Amo, F. Tena *, J.A. Martínez-Lozano,
M.P. Utrillas

Grupo de Radiación Solar, Universitat de València, Dr Moliner 50, 46100 Burjassot, Valencia, Spain

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Abstract

Recent years have seen increasing public interest in issues related to energy saving and concern for the environment. It is important to highlight the work of public institutions in this respect. This was the motive that led the University of Valencia to finance a pilot project with the objective of studying useful initiatives for optimising energy consumption in accordance with the institution's needs as well as the incorporation of innovative and more efficient technologies. The approach was to consider various aspects ranging from the analysis of the current energy consumption and the state of the installations, through the substitution of some energy inefficient components, to the study of the possible installation of a photovoltaic solar powered electricity generation station connected to the network. Also purely technical questions on economic efficiency should not be forgotten as this could lead to a reduction in energy consumption and the optimisation of the current energy consuming equipment, since generally, it is this question that limits the possible energy saving actions.

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1. Introduction

Concern about the development of applications of, and the teaching about, renewable energies has increased markedly in recent years. Some university centres have established complete courses on renewable energies [1]. Other centres have opted to complement traditional courses, including in the curriculum a series of

* Corresponding author. Tel.: +34-6-398-3123; fax: +34-6-398-3385.

E-mail address: tenaf@uv.es (F. Tena).

subjects of existing degrees that allow the development of an optional complementary educational programme. This is the case of the courses that lead to the degree in physics in the University of Valencia, Spain. Within this degree, a semester course on renewable energies is given for students in the second phase of their degree studies, which has been very well received. The course forms part of the specialisation in environmental physics, the option chosen by the majority of students taking this degree [2].

The teaching on renewable energies is given within the context of a global analysis of energy consumption [3] and the promotion of energy saving, the result of an increasing concern that has been generated at international levels as a consequence of both the lack of conventional natural resources and the greater awareness of the need to conserve the natural environment [4]. This concern has led to a series of recommendations at national and international levels about energy saving and the development and promotion of renewable energies. In particular, the European Parliament recently unanimously approved the proposed directive on energy efficiency of public buildings, whose objective is the control and reduction of energy consumption by 22% by the year 2010 [5].

To achieve these objectives, two types of actions may be followed: (a) adapt existing buildings to modern energy saving strategies; (b) design new buildings so that, besides making use of these energy saving strategies, part of the energy that they consume is renewable, captured by systems integrated into the buildings themselves. This can be achieved in different, non-exclusive ways. For example, for a newly built building, bioclimatic architectural criteria may be applied, so that passive solar energy is used for heating, cooling or air conditioning [6], and cogeneration systems can be installed to minimise the energy brought from outside. On the other hand, in an already completed building, it is possible to consider using its surfaces (roofs and terraces) to install solar energy systems which may be either photothermal or photovoltaic [7].

These actions generally require a greater initial investment. For example, the use of a photovoltaic installation for providing hot water for washrooms has been estimated to increase the initial cost of a building by 5%. However, the energy savings that can be achieved have two advantages: (a) in the medium and long term, it compensates the original investment through reduced costs; (b) by saving on conventional energy, it implies in turn a reduction in atmospheric pollution.

In this context, it would be very interesting if public buildings, and particularly those managed by institutions like universities, became pioneers of these sorts of initiatives. This would lead to an additional benefit to those already mentioned, which would be difficult to quantify: they would act as a cue to the private sector to generalise the use of these sorts of systems.

Given these arguments, and based on the commitment to defend the natural environment expressed in its statutes, the University of Valencia has recently begun a pilot project under the title “Study of energy saving strategies and the feasibility of installing solar energy in the buildings of the University of Valencia” [8]. This study is being carried out by the Solar Radiation Group.

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