

Contribution of the solar energy in the sustainable tourism development of the Mediterranean islands

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ABSTRACT

The purpose of this work is to examine specific features of thermal and photovoltaic solar systems and their contribution to the sustainable tourism development of Mediterranean islands. In doing so, the best practices are studied and the factors which influence the transfer of these practices in other geographic regions are examined. We take under consideration the sensitiveness of many islander Mediterranean regions in relation to the climate changes and the perspective of their economic development through thematic tourism forms and differentiated tourism products and services. At a further step, we present currently developed innovative applications which are specially adapted to the needs identified within this research and we propose marketing strategies for their further expansion. The marketing approach followed is based on an innovative concept, which suggests that solar energy systems could constitute a driver for the development of specific forms of tourism. These systems are mainly the ICS solar water heaters, the coloured flat plate-collectors, the CPC collectors and the hybrid PV/T collectors. Apart from these, the use of booster reflectors that achieve a higher energy output in all cases of the above mentioned collectors is also suggested. We conclude that turning solar energy systems into a driver for specific types of tourism development and consequently of a local economic development is possible, if we take into consideration specific social needs and aspirations.

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1. Introduction

Globally, tourism activity increases at rates of 3% and 4.5% annually and it's expected that tourism's growth will raise revenues at about €1500 billions until 2010. Being the first industry at a global level (in terms of expenses and employees) [1,2] currently considered to be an integrated part of modern life, as well as an undeniable factor of economic development. These features find a particular application in the Mediterranean area, where there are thousands of small and big islands, both inhabited and uninhabited, and where important European initiatives have been recently developed.

The Mediterranean area is a very dynamic region. The economic growth has increased by 1–2% during 2000–2006, while the population increased from 132 to 145 million residents during the same period (increase of 9%) [3]. The region is of a strategic importance for Europe and thus the European Union is trying to

support Mediterranean countries, so as to be gradually transformed into a zone of stability and well being. To this purpose, Barcelona Declaration offers a base for the promotion of a sustainable and balanced economic and social growth in the Region.

In the European Union area, Mediterranean islands present 2.2% of the internal European product and they attract 30% of worldwide tourism. This represent 220 millions of tourists every year, a number which is expected to increase in the years to come [4]. This high percentage is due to existent tourism resources. Mediterranean islands are rich in natural resources, cultural heritage and political interest. Benefiting from these features they attract the interest of tourism activity and thematic forms of tourism. Hence, islands become destinations of “luxury holidays”, resort, cultural information, sport activities, etc. However, increasing tourist pressure and the overexploitation of the natural resources endangers the very existence of the tourist industry. Mass tourism, dominant in the majority of cases, often leads to severe degradation of natural landscapes, a lack of water provisions, pollution of coastal zones, and the construction of massive transport and building infrastructure.

The realisation of the degradatory effects of tourism led to the concept of sustainable tourism. For the majority of scientists [5,6]

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“sustainable tourism development” concerns an economic, social and environmental tourism development which aims at the continuous improvement of tourists’ experiences. Even if there are several definitions and interpretations of the concept of sustainable tourism development [7–9] several authors strongly believe that the sustainability of tourism’s development rely on the creation of particular characteristics of a tourism product in line with present and future tourists’ needs [10]. As such, this kind of development is an additional opportunity for the local communities to benefit from the products of their own local identity and local natural resources [11].

In this study, we focus on the exploitation of local natural energy resources abundant in the Mediterranean islands, especially of the solar energy and we link these resources to particular characteristics of a tourism product in line with present and future tourists’ needs. Aiming to a wider application of solar energy systems in Mediterranean islands, the main investigated systems at the University of Patras are presented, which adapt accepted performance, cost and aesthetic requirements. These systems are the Integrated Collector Storage (ICS) solar water heaters, the hybrid Photovoltaic/Thermal (PV/T) collectors (that convert simultaneously solar radiation into electricity and heat) and their effective combination with typical thermal collectors. In addition, what is suggested are the booster reflectors so as to increase the energy input to collectors and the blue coloured collectors and alternatively pc-Si PV or PV/T collectors that can be aesthetically integrated on Cycladic buildings. Figs. 1–6 give an idea on these solar systems.

2. Best practices in Mediterranean islands

Currently, the main concerns of the European Union seem to be the security of energy supply, the stabilisation of energy prices, a powerful competitiveness policy based on innovative technologies and the meeting of climate change obligations [12]. Within these concerns, promoting actions for renewable energy held a core-role at a European, national and local level. At a European level, the technologies of renewable energy sources (RES) are “imposed” through the European legislative and regulatory framework. At a national level, they become the subject of numerous laws and ministerial decisions. At a local level, the role of renewable energy sources have a more practical importance; this concerns mainly islands, which even if they don’t contribute to the CO₂ emissions, as much as the mainland regions, they are seriously affected by climate changes [13]. Moreover, the lack of electricity transport system (more than 50% of islands in Europe are not connected to the mainland), as well as the high cost of their energy demand are handicaps which should be met.

At the same time, islands have abundant natural energy sources and they constitute the ideal regions for the demonstration of innovative renewable energy projects and the development of thematic

forms of tourism. These forms constitute the current tendency of national and European tourism strategy. However, the above mentioned potential and benefits of renewable energy sources in the Mediterranean area, is blocked by difficulties linked to insufficient national regulatory regimes. In addition, the fictitious presentation of their cost is “high”, because of the non-internationalisation of the external cost in the use of solid fuels. The lack of information of end users with regard to these technologies is an additional problem [3]. Yet, in many islands, these barriers are overcome by specific strategies and practices which are based on specific motivations and several criteria.

The Italian island of *Sicily*, for example, is the biggest island of the Mediterranean area and its economy is mainly based on tourism. Since 1946, Sicily is an autonomous region of Italy (with a surface area of 25.799 km²) and is inhabited by 5,100,000 residents. Seventy percent of its electricity comes from oil, with a cost of produced electricity among the highest in Europe (77.91 €/MWh), while 25% of energy needs comes from renewable energy sources (hydroelectricity). The island is rich in regions of international protection, which is the main reason that national authorities intend to promote solar systems in the island. In the 70s, Sicily has suffered from a massive immigration of local people towards United States. This fact explains a high rate of unemployment (20%) among local population and a search for specialized engineers for the operation of innovative technologies. To meet these problems, authorities of the island have turned to research on site. A local research on storing of renewable energy produced [14], as well as the local development of an innovative system which produces electricity by waves, have been applied. This system is based on the concept that because of the difference between water and air density, the electricity feeding potential is 800 times higher than the electricity produced by wind. For the time being, the system shows that it can produce 22 MWh yearly. Still the overall potential of electricity produced by renewable energy in the whole region is 500 GWh each year [14].

The Hellenic island of *Gavdos* on the other hand, bases the promotion of solar energy on tourism needs which are mainly present in August, when young campers come to the island. The island is very small (27 km²) and for the time being there is only a photovoltaic unit of 20 kW that feeds the island with electricity, since 1987. Still, what was suggested is the use of new photovoltaic systems for the covering of electricity and desalination needs, especially at a time of a high cost of energy (2 €/kWh) and water feeding (7–10 €/m³) [15].

Regarding the barriers to be overcome, the combination of internal factors (such as local acceptance) and external factors could provide a consistent framework to understand how islands can reduce their economic and environmental vulnerability [16], the acceptance of the renewable energy technologies by the local societies, came as a priority for the Hellenic island of *Crete*. In this

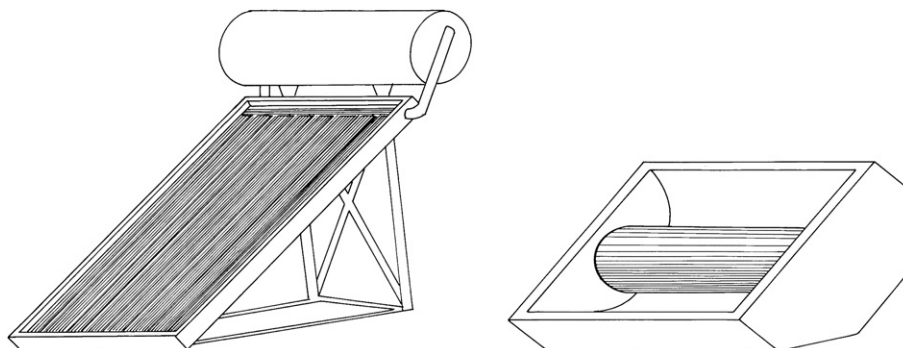


Fig. 1. Comparison of FPTU (left) and ICS (right) solar water heaters.

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