

Large - Scale Utilization of Solar Energy in Cyprus

Introduction

The island of Cyprus is situated in the eastern Mediterranean, at the geographical latitude of 35°N and has an area of 9,251 square Kilometers. The population in the government-controlled area, in 1998, was 663,300 inhabitants. The economy of Cyprus is prosperous, driven by tourist and services sectors. The final energy consumption per capita in 1998 was 1.56 millions of Tones Oil Equivalent (TOE). Cyprus does not have any indigenous fossil-fuel resources. It is almost totally dependent on imported energy products, mainly crude oil and refined products. Solar energy is the only indigenous source of energy in Cyprus. The contribution of solar energy to the energy balance of the country is about 4%.

Solar Energy

Solar energy is utilized extensively by households and hotels for the production of hot water. Indeed, Cyprus is a leading country in installed solar collectors per capita (0.86 m² of solar collector per capita, Sun in Action, Altener, February 1996).

Cyprus is one of the island States that most decidedly staked on a future based on Renewable Energy Sources. A clear indicator of this decision is that 92% of all island dwellings are fitted with solar water heating systems.

Solar energy is also used in non-thermal applications. Photovoltaic cells are in systematic use by the Cyprus Telecommunication Authority and the Cyprus Broadcasting Corporation to power telecommunication receivers and transmitters in remote areas. It is also important to note that the Electricity Authority of Cyprus is now committed to purchasing electricity produced from renewable energy sources at relatively high prices in order to boost the development of these sources.

Progress

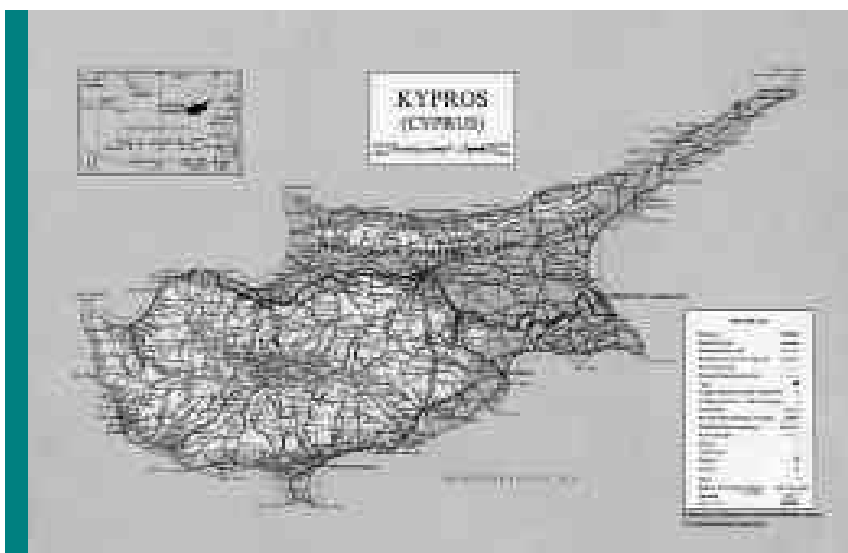
Solar water heaters were first fabricated and installed in 1960. Since then a remarkable expansion in the utilization of solar water heaters has taken place rendering the country among the leaders on the basis of total number of solar water heaters in use per person.

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Progress was slow, during the first years, on account of the defects in design, which led to low efficiency, high cost and operational difficulties (e.g. leakage). With engineering developments and rationalization of production, the defects were eliminated to a large extent and the cost kept at constant level, witnessing an impressive increase in production. Today, there are about ten major and twenty manufacturers of solar water heaters in Cyprus, employing about 300 people and producing about 35.000 m² of solar collectors annually. The estimated penetration of solar water heating systems in the different categories of buildings as on 1.1.1999 was for houses 92% and for hotels 50%. The estimated current area of solar collector in working order in Cyprus is 600.000 square meters, and the annual solar thermal energy production is 336,000 MWh/year. As a reusable of the extensive use of solar heaters 10% of total CO₂ emissions are avoided (285.600 tones CO₂/year).

Technology

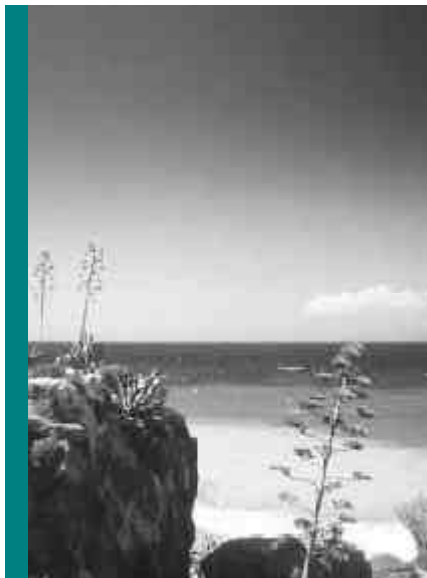
The majority of solar domestic hot water heaters, put up on individual houses are of thermosyphon type. Two solar collectors,



with a total glazed area of 3 square meters, are connected in series to a hot water tank, placed at a height, just above the top of collectors. Since the city water supply is not continuous, a cold-water storage tank is located above the hot water storage tank. The hot water tank is also fitted with an auxiliary electric 3 kW heater, which can be operated manually or automatically. The solar collectors are invariably of the flat plate type glazing.

Economics of solar heating in Cyprus

The average daily solar radiation falling on a collector installed at an angle of 35° to the horizontal in Cyprus is 5.4 kWh per square meter. From test carried out at the Applied Energy Center of Cyprus the annual savings per square meter of installed collector area in Cyprus are 550 kWh. The extra total cost required to install a solar water heating system on a house is around



Euro 700. The payback period depends on the price fuel displaced; in the domestic sector it is electricity where as in the other sectors it is fuel oil. In accordance with 1998 prices the payback period of a typical solar system, displacing electricity is estimated to be about four years.

Reasons for widespread use of solar energy in Cyprus

A number of factors have contributed to the wide scale use of solar energy in Cyprus. The most important factor, contributing to this phenomenon is the enterprising industry. The industry identified correctly the prime application of solar water heaters and boosted the improvement of technology and promotion of product with vigor. Hot water is a primary need and solar water heaters can meet the need economically with an investment, which most Cypriot house owners can make, with out any significant inconvenience.

The sunny climate has tended to make solar heating more competitive. In hotels the maximum demand in summer matches very well with the flux of solar radiation, which makes water-heating systems more efficient and economic.

The government through the Applied Energy Center of the Ministry of Commerce, Industry and Tourism has helped the promotion of solar energy by:

- Providing technical support, consisting of testing of collectors, advice to industry for improvement of products and to consumers for efficient utilization. The provision of technical support to industry proved to be very critical at the initial stages, but even now, the provision of



technical support is necessary because most local solar water heater firms on account of their size cannot support research activities.

- Making the material used for fabrication of solar water heaters duty free.
- Providing technical support for the preparation of relevant standards.
- Making the installation of solar water heaters compulsory on state-built Housing.

The government has given no subsidies and the growth of solar energy industry is in conformity with natural laws of economics and, hence, reasonably stable.

The main lesson to be learnt from Cyprus is that nothing succeeds like the exploitation of a properly identified application of solar energy, in this case solar water heating, by an enterprising industry, backed up a co-operating government.

