

Real Energy Performance Study of Large-Scale Solar Water Heater by Using Remote Monitoring

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Abstract : Solar thermal systems available today provide reliability, efficiency and significant environmental benefits. In housing, they can satisfy the hot water demand and reduce energy bills by 60 % or more. Additionally, collective systems or large scale solar thermal systems are increasingly used in different conditions for hot water applications and space heating in hotels and multi-family homes, hospitals, nursing homes and sport halls as well as in commercial and industrial building. However, in situ real performance data for collective solar water heating systems has not been extensively outlined. This paper focuses on the study of real energy performances of a collective solar water heating system using the remote monitoring technique in Algerian climatic conditions. This is to ensure proper operation of the system at any time, determine the system performance and to check to what extent solar performance guarantee can be achieved. The measurements are performed on an active indirect heating system of 12 m² flat plate collector's surface installed in Algiers and equipped with a various sensors. The sensors transmit measurements to a local station which controls the pumps, valves, electrical auxiliaries, etc. The simulation of the installation was developed using the software SOLO 2000. The system provides a yearly solar yield of 6277.5 KWh for an estimated annual need of 7896 kWh; the yearly average solar cover rate amounted to 79.5%. The productivity is in the order of 523.13 kWh / m²/year. Simulation results are compared to measured results and to guaranteed solar performances. The remote monitoring shows that 90% of the expected solar results can be easy guaranteed on a long period. Furthermore, the installed remote monitoring unit was able to detect some dysfunctions. It follows that remote monitoring is an important tool in energy management of some building equipment.

Keywords : large-scale solar water heater, real energy performance, remote monitoring, solar performance guarantee, tool to promote solar water heater

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