Solar Thermal Hybrid Heating System

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ABSTRACT

In this work a solar hybrid system is used to heat up a swimming pool to maintain it at around 30 ^{0}C around the year. The solar energy is collected using evacuated tubes collectors, within whichwater is heated up as it flows inside the tubes, before it is introduced into a heat exchanger located inside a large well insulated storage tank, where it cools down as it looses heat to water in the tank. In winter, during cloudy days, an auxiliary system (in addition to the solar thermal system) was used to provide the required heating load. Three types of auxiliary systems were used namely; natural gas, electrical power and diesel powered boiler. In addition an energy management system is used to optimize the percentage of the heating load to be supplied by eachauxiliary heating system

It was found that during summer season, the heating load may be completely provided by the solar system, while during the rest of the year an auxiliary system is required to maintain the pool temperature at the desired value. Furthermore, it was found and based on current costs of electrical power, diesel fuel and natural gas in Jordan, that natural gas is most economic source of energy to be used as an auxiliary system

Keywords: Hybrid solar thermal system, evacuated solar collectors, thermal solar fraction, auxiliary system