

Topic: A Comparative Study of Small Solar Absorption and PV-Driven Chiller

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ABSTRACT

IEA reports that 75% out of total energy consumption in buildings is from the residential subsector, and some studies done in Thailand show that air-conditioning contributes to more than 70% of total electric load from a small house hold. Reducing energy demand is a well researched area due to its impact on environment, to tackle the global issue of scarcity of energy resources, and some countries local issues to reduce energy dependency on other countries. Due to decreasing costs of solar cooling systems, it's believed that they could be used in households and small buildings. This is a comparative study of a solar absorption chiller system and PV-driven chiller system based on the climatic condition of Thailand. This study was done fully by computer simulation using MATLAB with the meteorological data of year 2000. Absorption system was modeled based on the performance curves of a 4.7kW_{th} absorption chiller, while electrical chiller was modeled under the assumption that it operates at constant COP. Life cycle costing for the solar powered absorption chiller, PV-driven electric chiller and a grid operated electric chiller was also done. The results show that, for small capacity systems, grid powered cooling is economically more feasible while for large capacity systems, solar powered absorption chiller is economically more feasible.

Keywords: Simulation, Solar water collector, Absorption chiller, Photovoltaic panel, Sky model, Life cycle cost.