DEVELOPMENT OF COMBINATION COOLING METHOD FOR SOLAR-POWERED DEVICE

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ABSTRACT

Globally, demand for cooling had been increased in the 50 most populous metropolitan areas. Most of them are in warm and humid climates. Conventional air conditioning system has high energy consumption, incur high cost and give bad impact to the environment. A Direct and Indirect Evaporative Cooler (DIEC) is a suitable technology to replace air conditioning as a cooling system. Main purpose of this research is to study the effect of the indirect and direct evaporative cooler to the human comfort level at indoor. The reason behind combination two type of evaporative cooler is able to reduce outlet air temperature lower compare to the individual using. In addition, direct evaporative cooler produce high humidity. By applying the concept of heat and mass transfer, heat exchanger used to reduce the temperature of inlet air. Water evaporation process applied to cool the surface of the heat exchanger. Warm external air flow, treats by the evaporative cooler cools the ventilation air flow through heat exchanger. Solar energy is a source of power used to charge 12V rechargeable battery. Water circulated through the system by applying the water pump. The rechargeable battery provided electrical energy to operate the water pump. Natural desiccant from coco peat combined with DIEC to reduce humidity of inlet air for high cooling efficiency. It acts as a dehumidifier to reduce the content of moisture in the air and reduce heat load. In conclusion, DIEC was able to drop the ambient temperature about 2-5 ℃. Range of product temperature is about 27-31 ℃. This technology is promising to develop in the future because of very low energy consumption and high efficiency in its range of applications.