

Performance Analysis of Solar Assisted Air Condition Using Carbon Dioxide as Refrigerant

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Abstract : The aim of this study was to model an air conditioning system that brings about effective cooling and reduce fossil fuel consumption with solar energy as an alternative source of energy. The objective of the study is to design a system with high COP, low usage of electricity and to integrate solar energy into AC systems. A hybrid solar assisted air conditioning system is designed to produce 30kW cooling capacity and R744 (CO₂) is used as a refrigerant. The effect of discharge pressure on the performance of the system is studied. The subcool temperature, evaporating temperature (5°C) and suction gas return temperature (12°C) are kept constant for the four different discharge pressures considered. The cooling gas temperature is set at 25°C, and the discharge pressure includes 80, 85, 90 and 95 bars. Copeland Scroll software is used for the simulation. A pressure-enthalpy graph is also used to deduce each enthalpy point while numerical methods were used in making other calculations. From the result of the study, it is observed that a higher COP is achieved with the use of solar assisted systems. As much as 46% of electricity requirements will be save using solar input at compressor stage.

Keywords : air conditioning, solar energy, performance, energy saving

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