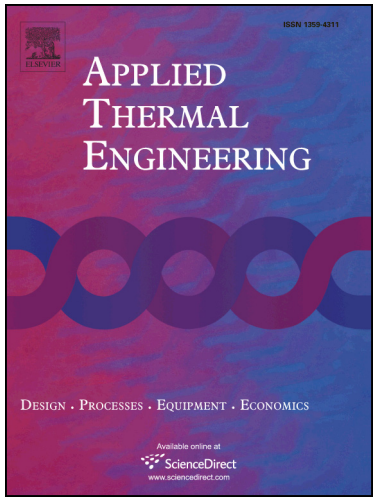

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Carbon Dioxide based Power Generation in Renewable Energy Systems

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ABSTRACT

After a substantial impact on refrigeration, carbon dioxide (CO_2) is gaining considerable attention as a working fluid for thermal power generation. This can be attributed mainly to its excellent heat transfer properties and compactness of components arising from its high density. It has the merit of being amenable to operation in sub-, trans- or super-critical Brayton cycle modes. However, inhibiting factors are high pressures needed when operated in trans- or supercritical cycles and the work of compression eroding most of the work of expansion in sub-critical cycle operation. Some of the lacunae of CO_2 such as high work of compression can be alleviated by using non-mechanical means such as thermal compression using the adsorption technique either for partial compression in high pressure Brayton cycles or for total compression in low pressure cycles. CO_2 has also been proposed as an additive to flammable hydrocarbons such that their flammability can be suppressed and yet retaining their other desirable thermodynamic qualities. This review explores the potential and limitations of thermodynamic